



WARREN REGION REGIONAL CONSERVATION PLAN



Department of **Biodiversity,
Conservation and Attractions**



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Christine's Spider Orchid (*Caladenia christineae*). Photo – DBCA

Karri forest (*Eucalyptus diversicolor*) Shannon River, Shannon National Park. Photo – Bron Anderson, 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 Warren Region is located on the western south coast of Western Australia, extending 240km from the Wilson Inlet (Denmark) west to Black Point (45km west of Pemberton), inland to just south of Nannup, to Bridgetown, Frankland, Rocky Gully, Cranbrook, Mount Barker, and south to Denmark along the Hay River. It covers a major proportion of the Warren and southern Jarrah forest Biogeographic Regions. The higher rainfall 'karri belt' to the south, bounded by jarrah forest to the north and areas of wandoo transitioning into the agricultural zone. The region is floristically diverse containing a relatively high proportion of the State's relic and Gondwanan flora. It contains a network of regionally, nationally and internationally significant wetlands, including a Ramsar wetland, as well as offshore islands. There is also a high incidence of narrow endemism associated with wetlands and with granitic and gneissic outcrops and peaks. Rich assemblages of aquatic and terrestrial fauna occur across the region, including several species of freshwater fish, endemic and relictual amphibians and short range endemic invertebrates. The Warren Region forms part of an area that is internationally recognised as a biodiversity hotspot.

The region contains extensive areas of relatively undisturbed habitat for flora, fauna and ecological communities where biological, ecological and evolutionary process can occur without interference from humans. These areas include the reservation of almost entire river systems in a relatively natural condition.

The department manages approximately 60 per cent of the land within this region. The majority of this is made up of national park (60 per cent), State forest (29 per cent) and nature reserve (9 per cent).

The region faces several challenges that affect biodiversity that result in habitat loss and impact species and ecosystem persistence. This plan identifies threats and priorities for mitigation of known threats including pest animals, environmental weeds, spread and impact of Phytophthora dieback (and other plant disease), altered hydrology, human activities, drying climate and inappropriate fire regimes.

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 Warren Region, CMAs are in place between the department and Karri Karrak and Wagyl Kaip Southern Noongar Aboriginal Corporations. As of 1 December 2025, the Warren 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 Warren Region is provided in [Table 1](#) and [Figure 1](#).

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

Region	Warren																																																																			
Interim Biogeographic Regionalisation of Australia (IBRA) regions	Jarrah Forest sub-region (JAF02), Warren sub-region (WAR01)																																																																			
Integrated Marine and Coastal Regionalisation of Australia (IMCRA) regions	Leeuwin-Naturaliste, WA South Coast																																																																			
Landscape description	The region contains a relatively intact, varied and rich complex mosaic of natural landscapes and vegetation such as wetlands, heaths, woodlands, forests (including old-growth forests and tingle forests) riparian ecosystems, rivers, rock outcrops, inlets, estuaries, beaches, coastal plain and cliffs, and islands.																																																																			
Department-managed land	<table border="1"> <thead> <tr> <th>Tenure classification</th> <th>No.</th> <th>Area (ha)</th> </tr> </thead> <tbody> <tr> <td>Legislated lands and waters</td><td></td><td></td></tr> <tr> <td>National park</td><td>27</td><td>562,027</td></tr> <tr> <td>Conservation park</td><td>3</td><td>667</td></tr> <tr> <td>Nature reserve</td><td>53</td><td>90,934</td></tr> <tr> <td>Section 5(1)(g) reserve</td><td>13</td><td>240</td></tr> <tr> <td>Section 5(1)(h) reserve</td><td>15</td><td>1224</td></tr> <tr> <td>State forest</td><td>26</td><td>265,302</td></tr> <tr> <td>Timber reserve</td><td>26</td><td>8313</td></tr> <tr> <td>Marine park</td><td>1</td><td>1440</td></tr> <tr> <td>Section 34A freehold</td><td>18</td><td>1551</td></tr> <tr> <td>Section 131 freehold</td><td>37</td><td>3106</td></tr> <tr> <td>Total</td><td>219</td><td>934,805</td></tr> <tr> <td>Department interest in lands and waters</td><td></td><td></td></tr> <tr> <td>Crown freehold – department interest</td><td>6</td><td>654</td></tr> <tr> <td>Crown reserve – department interest</td><td>1</td><td>141</td></tr> <tr> <td>Unallocated Crown land – department interest</td><td>5</td><td>134</td></tr> <tr> <td>Total</td><td>12</td><td>929</td></tr> <tr> <td>Total area of all lands and waters encompassed by the region (and portion managed by the department)</td><td></td><td>1,597,426 (59%)</td></tr> <tr> <td>Remnant vegetation</td><td>Approximately 73.0% of the total area of land encompassed by the region includes remnant vegetation, with approximately 86.0% of this remnant vegetation occurring on department-managed land.</td></tr> <tr> <td>Threatened¹ and Priority² fauna species</td><td>Extinct (0), critically endangered (9), endangered (26), vulnerable (27), conservation dependent (3), migratory (44), other specially protected (2), Priority 1 (0), Priority 2 (7), Priority 3 (6), Priority 4 (13)</td></tr> <tr> <td>Threatened and Priority flora species</td><td>Extinct (0), critically endangered (6), endangered (13), vulnerable (6), Priority 1 (13), Priority 2 (66), Priority 3 (69), Priority 4 (49)</td></tr> <tr> <td>Threatened and Priority ecological communities</td><td>Collapsed (0), critically endangered (2), endangered (0), vulnerable (0), Priority 1 (6), Priority 2 (5), Priority 3 (3), Priority 4 (0)</td></tr> <tr> <td>Wetlands</td><td>Wetlands of International Importance under the Ramsar Convention (1), Wetlands of National Importance (7)</td></tr> </tbody></table>	Tenure classification	No.	Area (ha)	Legislated lands and waters			National park	27	562,027	Conservation park	3	667	Nature reserve	53	90,934	Section 5(1)(g) reserve	13	240	Section 5(1)(h) reserve	15	1224	State forest	26	265,302	Timber reserve	26	8313	Marine park	1	1440	Section 34A freehold	18	1551	Section 131 freehold	37	3106	Total	219	934,805	Department interest in lands and waters			Crown freehold – department interest	6	654	Crown reserve – department interest	1	141	Unallocated Crown land – department interest	5	134	Total	12	929	Total area of all lands and waters encompassed by the region (and portion managed by the department)		1,597,426 (59%)	Remnant vegetation	Approximately 73.0% of the total area of land encompassed by the region includes remnant vegetation, with approximately 86.0% of this remnant vegetation occurring on department-managed land.	Threatened¹ and Priority² fauna species	Extinct (0), critically endangered (9), endangered (26), vulnerable (27), conservation dependent (3), migratory (44), other specially protected (2), Priority 1 (0), Priority 2 (7), Priority 3 (6), Priority 4 (13)	Threatened and Priority flora species	Extinct (0), critically endangered (6), endangered (13), vulnerable (6), Priority 1 (13), Priority 2 (66), Priority 3 (69), Priority 4 (49)	Threatened and Priority ecological communities	Collapsed (0), critically endangered (2), endangered (0), vulnerable (0), Priority 1 (6), Priority 2 (5), Priority 3 (3), Priority 4 (0)	Wetlands	Wetlands of International Importance under the Ramsar Convention (1), Wetlands of National Importance (7)
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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.

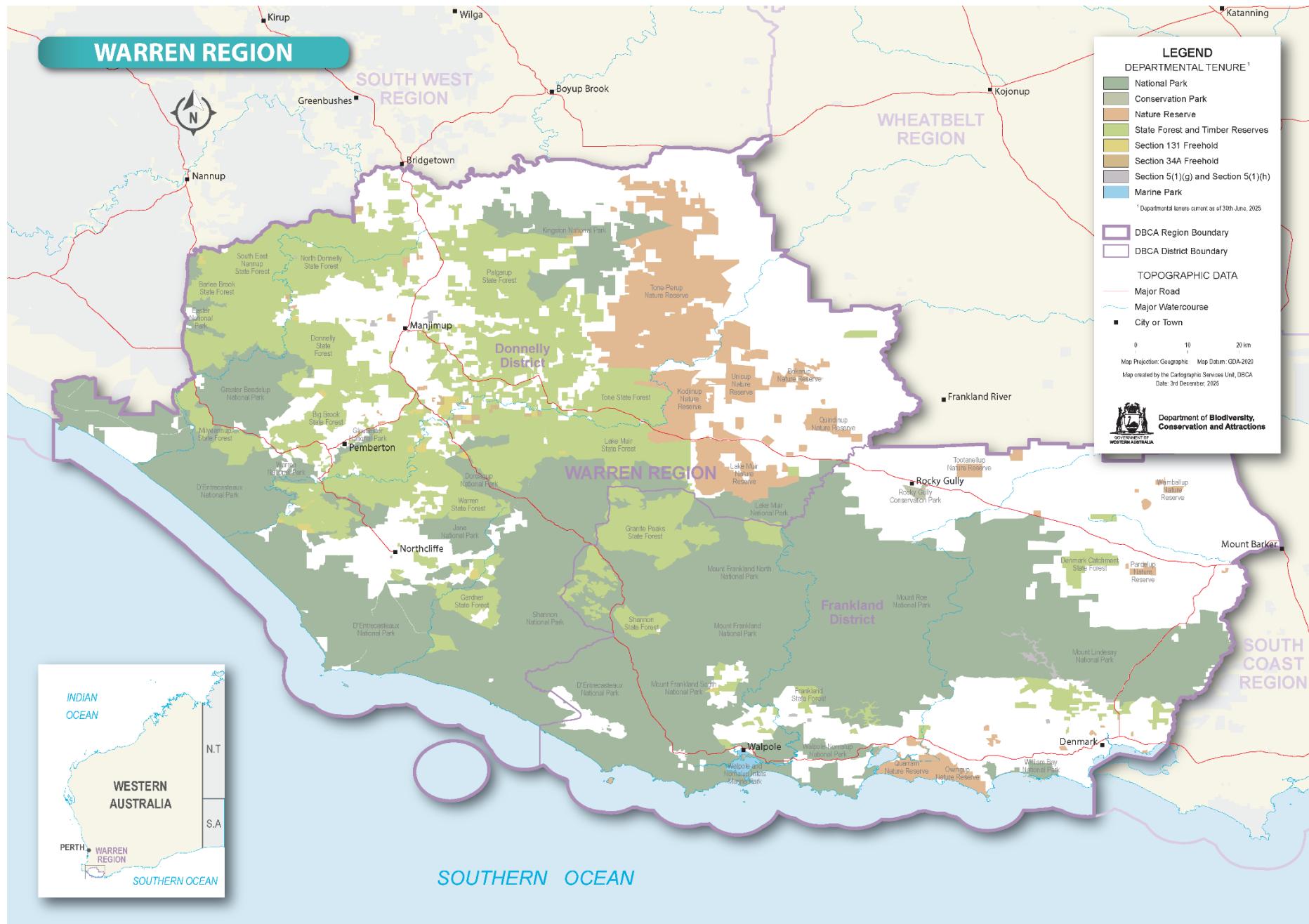


Figure 1 Warren Region department-managed land and waters (December 2025).

3 Identification of priority reserves and landscapes

To determine priorities for landscape-scale threat mitigation, the Warren 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 regional landscapes*

Two IBRA regions occur within Warren Region (Jarrah Forest 2 and Warren) with Jarrah 2 having a greater range of ecological values.

3.1.2 *Categorisation of land into management units*

The regional and district conservation leaders assisted in the development of the *Warren Regional Fire Management Plan* in 2016 by identifying vegetation and environmental values. The plan developed Fire Management Areas (FMA). These FMAs represented landscape level areas which had relative uniformity in environmental values, land use and cultural conditions, allowing consistent approach with fire management.

The FMAs were reviewed as part of the regional conservation planning process and were found to be largely consistent with the conservation leaders' concepts. Some minor changes, based on vegetation type/extent occurred prior to the development of this plan.

3.1.3 *Identification of priority management units*

Priority units were identified and split into Unicup Plains (Tootanellup, Lake Muir and a range of isolated nature reserves) and Upper Warren (Tone-Perup Nature Reserve).

The Warren Region's priority management units are outlined 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

- Install environmentally sensitive area markers for the unassigned *Commersonia apella* populations on the Bibbulmun Track in Maringup block ensure those populations and population 1 are avoided during road and trail maintenance [TA-FL-176].

ECOLOGICAL COMMUNITIES

- Manage recreational access to occurrences ML207 and ML208-1 of the Mount Lindesay - Little Lindesay Vegetation Complex by managing access, utilising surveillance equipment and implementing an education campaign targeting the local community to reduce threatening processes such as firewood removal, trampling and Phytophthora dieback spread through motorbike use [TA-EC-002].

LANDSCAPES

- Maintain appropriate management access around each conditional burn area (CBA) location for monitoring and effective fire suppression [LA-006].
- Manage the following reserves to prevent unauthorised activities by clearly demarcating the boundaries and installing signage, implementing enforcement and compliance activities targeting unauthorised access, publicising enforcement outcomes to enhance public education and increase the presence of conservation management activities, including weed control, feral animal management and signage inspection:
 - Faunadale Nature Reserve [LA-021]
 - Mount Lindesay National Park [LA-050].

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

- Protect resting Australian sea lion (*Neophoca cinerea*) from interaction with the public through barriers and signage [TA-FA-168].

FLORA

- Maintain irrigation, fencing and fire access at Kingston National Park in the Winnejup Forest block to support the translocated population 6 of *Andersonia annelsii*. Supplement translocation with approximately 17 five-year-old plants [TA-FL-373b].
- Continue to monitor translocated population 6 of *Andersonia annelsii* in Kingston National Park in the Winnejup Forest Block [LE-FL-006].
- Survey for new populations of *Andersonia annelsii* across suitable habitat in the Tone-Perup Nature Reserve [LE-FL-007].
- Monitor decreasing mature plant numbers in *Caladenia dorrienii* populations 6, 7A, 7B, 7C, 7D, 7, 8, 9, 10, 11 and 12 and determine appropriate threat mitigation response [LE-FL-011].
- Implement targeted surveys for new populations of *Caladenia perangusta* across suitable habitat types (Newgalup Habitat Complex) and monitor known populations of *Caladenia perangusta* to determine threatening processes, inform listing status and need for translocations [LE-FL-016].
- Implement an adaptive management program targeting population 1A of *Caladenia winfieldii* inclusive of removing hakeas and other woody shrubs, to create more suitable habitat and implement a prescribed burn to regenerate the population. Continue to exclude fire from population 1B of *Caladenia winfieldii* until learnings from fire implementation at population 1A can be applied [TA-FL-377].
- Monitor all existing populations of *Caladenia winfieldii* to determine status [LE-FL-019].
- Monitor population 4 of *Diuris micrantha* [LE-FL-028].
- Confirm record of *Gastrolobium ovalifolium* and survey suitable habitat for additional populations [LE-FL-033].
- Monitor existing populations of *Lomandra ordii* to determine status and review listing [LE-FL-037].
- Survey for new populations of *Rhacocarpus rehmannianus* var. *webbianus* in the vicinity of Mount Lindesay and Mount Chudalup and continue to monitor all existing populations [LE-FL-042].
- 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.

LANDSCAPES

- Implement enforcement, compliance and pest animal management actions in Tone-Perup Nature Reserve, to maintain and enhance vegetation communities including areas of rehabilitation. Publicise outcomes to enhance public education campaigns. Increase the presence of conservation management activities [LA-091].

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

- Reactivate a Technical Advisory Group to assist in the management of water levels at Lake Muir Nature Reserve to provide appropriate waterbird habitat [LA-038].
- Maintain stream connectivity by maintaining culverts on tracks that cross tributaries or creeks within spotted galaxias (*Galaxias truttaceus*) [TA-FA-363] and little pygmy perch (*Nannoperca pygmaea*) [TA-FA-379] distribution.
- During operational use of fire water points and when expanding or maintaining water points, reduce the amount of water extracted and/or remove little pygmy perch (*Nannoperca pygmaea*) and return after disruption, where possible [TA-FA-096].
- Install signage at fire water points across the little pygmy perch (*Nannoperca pygmaea*) distribution to provide advice to users on how to minimise potential impacts to the species [TA-FA-192].

DISEASE

- Develop and implement a Phytophthora dieback management plan for Mount Lindesay that includes addressing interactions between Phytophthora dieback and fire, and the impact of drying out, through research [LE-EC-001].

FIRE REGIMES

- For all Warren Region landscape units, undertake targeted and ongoing liaison and input into Burn Options Program and prescribed fire planning processes to achieve and maintain a fine scale mosaic of vegetation floristic and structural states across all vegetation, considering current fuel age and severity mapping [LA-005].
- Undertake targeted and ongoing liaison and input into the Burn Options Program and prescribed fire planning process to maintain an appropriate mosaic of fuel ages for coastal vegetation within the D'Entrecasteaux National Park [LA-014].
- Undertake targeted and ongoing liaison and input into the Burn Options Program and prescribed fire planning process to achieve the implementation of prescribed burning within Lake Muir Nature Reserve, based on moisture levels obtained from monitoring the peat substrate [LA-037].
- Implement strategies that seek to minimise impacts from fire within prescribed burns where critical populations of western ringtail possum (*Pseudochirus occidentalis*) exist in Corbal and Dwalgan forest blocks and Hay River [TA-FA-114].
- Undertake pre- and post-prescribed burn and post-bushfire monitoring of western ringtail possum (*Pseudochirus occidentalis*) to inform fire management strategies [LE-FA-001].

- Implement strategies that seek to minimise impacts from fire across Mount Chudalup to protect *Rhacocarpus rehmannianus* var. *webbianus* (populations 1A and 1B) [TA-FL-375].

PEST ANIMALS

- Implement introduced predator control in D'Entrecasteaux National Park at an adequate rate to protect native fauna populations [LA-013].
- Implement a control program for feral cats [LA-039] and foxes [LA-040] in key areas of the Lake Muir Nature Reserve, identified through monitoring.
- Implement a feral cat control program in key areas of the Tone-Perup Nature Reserve identified through monitoring [LA-089].
- Implement a feral pig control program in collaboration with the Donnelly Pest Management Group and the Lake Muir Denbarker Community Feral Pig Eradication Group. Support groups to expand field operations in undertaking feral pig control within the D'Entrecasteaux National Park [LA-012] and Lake Muir Nature Reserve [LA-041] to complement departmental operations.
- Undertake supplementary introduced predator control at key populations of western ringtail possum (*Pseudochirus occidentalis*) after prescribed burn and bushfire events to manage predation pressures. Subject to risk assessment approval, undertake supplementary introduced predator control at the key populations within Dwalgan and Corbal forest blocks, Hay River and Denmark River to manage predation pressures [TA-FA-112].

WEEDS

- Implement targeted weed control within Faunadale Nature Reserve, focusing on woody weeds, in conjunction with community programs. [LA-022].

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.

FLORA

- Revegetate approximately 33 hectares of Lake Muir Nature Reserve (R3180) containing all populations of *Euphrasia scabra* [TA-FL-374] and *Caladenia startiorum* populations 4 and 5 [TA-FL-195].

- Liaise with contractors to ensure no herbicide is used in track and trail maintenance in the vicinity of populations 1, 2, 3, 5, 6-19 of *Hemianдра* sp. Windy Harbour in D'Entrecasteaux National Park [TA-FL-209].
- Liaise with private property owners and contractors in Coonan forest block to minimise disturbance to *Ornduffia submersa* when undertaking maintenance works (for example grading and weed spraying) [TA-FL-157].
- Limit access to wetlands using barriers to protect *Schoenus benthamii* population 7 near Kodjinup [TA-FL-490].

LANDSCAPES

- Across all Warren Region landscape units, maintain appropriate management access throughout conservation areas to assist biodiversity monitoring and effective fire suppression [LA-004].
- Control or prevent unauthorised activities including in the following reserves:
 - Gill Nature Reserve [LA-025]
 - Martagallup Nature Reserve [LA-048]
 - O 215 25 [LA-060]
 - Ongerup Lagoon Nature Reserve [LA-061]
 - R113443 [LA-068]
 - Randell Road Nature Reserve [LA-072]
 - Tootanellup Nature Reserve [LA-093]
 - W_CBA_Fire Exclusion Habitat 17 [LA-101]
 - Wambellup Nature Reserve [LA-104].
- Manage the following reserves to prevent unauthorised activities by clearly demarcating the boundaries and installing signage, implementing enforcement and compliance activities targeting unauthorised access, publicising enforcement outcomes to enhance public education and increase activities that enhance conservation outcomes:
 - Donnelly River Nature Reserve [LA-015]
 - Greater Kingston National Park [LA-027]
 - Karri forest management unit nature reserves [LA-077]
 - Lake Muir Nature Reserve [LA-036]
 - New [LA-051] and other [LA-062] nature reserves within Unicup Plains
 - Tone-Perup Nature Reserve [LA-087]
 - Upper Warren MU nature reserves [LA-063].
- Rehabilitate fringe of riparian zone of W_CBA Fire Exclusion Habitat 17 with overstorey species and restock riparian zone with scrub species [LA-100].

****Land acquisition and transfer actions***

- Investigate the potential acquisition, incorporation into the Tone Perup Nature Reserve and rehabilitation of properties assessed as having significant conservation value and that will reduce fragmentation of the reserve [LA-080].

- Investigate the potential acquisition of Crown Reserve 1811, Lot 13728 containing outlier *Acacia oncinophylla* subsp. *patulifolia* population 10 and implement a weed control program in liaison with South West NRM [TA-FL-267].

****Liaison actions***

- Provide advice to relevant stakeholders in relation to disturbance activities that impact on acid sulfate soils within the D'Entrecasteaux National Park [LA-011].

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

- Protect resting subantarctic fur seal (*Arctocephalus tropicalis*) from interaction with the public through barriers and signage [TA-FA-167].
- Establish a monitoring program with an effective methodology to survey for western ringtail possum (*Pseudochirus occidentalis*) across its range to determine the trajectory of the species and the extent of its habitat to inform management [LE-FA-003].
- Implement a cross regional monitoring plan to assess quokka (*Setonix brachyurus*) populations post fire to advise fire exclusion areas and to understand interactions with invasive species post-burn and inform introduced predator baiting options [LE-FA-002].
- 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*) in their breeding season across the Midwest, Pilbara, South West, Swan and Warren regions [TA-FA-223].
- Implement timely nest protection and site management actions in response to reports of hooded plover (*Thinornis cucullatus*) nesting, such as fencing, signage and introduced predator monitoring where required, to maximise breeding success at key nesting sites with high visitation along the South West and Warren coast [TA-FA-064].
- Implement enforcement programs to ensure dogs are kept away from hooded plover (*Thinornis cucullatus*) on conservation estate at Broke Inlet, Conspicuous Cliffs, Coodamurrup Beach, Eagles Nest, Fish Creek, Gardner Beach, Jasper Beach, Lake Jasper, Little Quarram, Mandalay Beach, Mazzoletti's, Nornalup Mouth, Salmon Beach, Sharps Rocks, Warren Beach and Yeagarup Beach [TA-FA-062].
- 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].

*Liaison actions

- Work with wildlife rehabilitators to educate the community to discourage unnecessary transfer of juvenile or presumed abandoned or orphaned western ringtail possum (*Pseudocheirus occidentalis*) to wildlife rehabilitators. Work with wildlife rehabilitators to manage the treatment of injured and sick western ringtail possum (*Pseudocheirus occidentalis*), including protocols and kits provided for emergency response for injured wildlife at bushfires. Ensure wildlife rehabilitators understand the need to keep updated records of sightings and captured animals to feed back into the region's monitoring program for this species [TA-FA-145].
- 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].
- 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 (South Coast, South West, Swan, Warren and Wheatbelt).

FLORA

- Monitor for the following threatened and Priority flora populations:
 - *Acacia oncinophylla* subsp. *patulifolia* population 10 [LE-FL-001]
 - *Caladenia appanata* subsp. *erubsecens* population 1 [LE-FL-010]
 - *Caladenia integra* population 27 [LE-FL-014]
 - *Cardamine paucijuga* population 4 [LE-FL-021]
 - *Chordifex gracilior* populations 14 and 15 [LE-FL-023]
 - *Cyathochaeta teretifolia* populations 9 and 18 [LE-FL-025]
 - *Drosera occidentalis* population 24 [LE-FL-030]
 - *Juncus meianthus* populations 12, 13A and 13B [LE-FL-036]
 - *Microtis quadrata* populations post-fire. [LE-FL-038]
 - *Placynthium nigrum* populations post-fire. [LE-FL-040]
 - *Schoenus benthamii* population 7 [LE-FL-043]
 - *Trithuria australis* populations 6, 7A, 7B, 8, 9, 10, 11, 12 [LE-FL-047].
- Confirm records of below taxa and survey suitable habitat for additional populations:
 - *Acacia semitrullata* [LE-FL-002]
 - *Amanita drummondii* in Surprise Forest Block [LE-FL-003]
 - *Amanita fibrilloses* in D'Entracasteaux National Park [LE-FL-004]
 - *Amanita kalamundae* in Perup [LE-FL-005]
 - *Boronia juncea* subsp. *juncea* on Biro Road [LE-FL-009]
 - *Caladenia uliginosa* subsp. *patulens* at Unicup Nature Reserve. [LE-FL-017]
 - new populations of *Cryptandra arbutiflora* var. *pygmaea*. [LE-FL-024]
 - *Dampiera tribola* [LE-FL-026]
 - *Drepanocladus aduncus* to determine status [LE-FL-029]

- *Thysanotus formosus* [LE-FL-045]
 - *Thysanotus* sp. Badgingarra [LE-FL-046]
 - *Xanthoparmelia darlingensis* [LE-FL-048].
- Undertake surveys for:
 - population 7 of *Carex tereticaulis* [LE-FL-022]
 - additional populations of *Euphrasia scabra*, and monitor all existing populations to determine status [LE-FL-032]
 - additional populations of *Hemigenia microphylla* [LE-FL-034]
 - population 4 of *Hibbertia helianthemoides* [LE-FL-035]
 - additional populations of *Placynthium nigrum* [LE-FL-041].
- Apply an adaptive management program trialling a prescribed burn to regenerate *Melaleuca viminea* and reintroduce a mid-storey to the habitat of *Caladenia christineae* at population 17 [TA-FL-186].
- Investigate *Caladenia erythrochila* populations 1A, 1B and 2 at Southfield Road to determine the location of plants. Monitor the population again after planned burn to assess regeneration [LE-FL-012].
- Locate population 6 of *Caladenia interjacens* on the Meerup Dune System and Blackwater plains (southern plains system) in the D'Entrecasteaux National Park and monitor to assess status [LE-FL-015].
- Survey to relocate the unverified population of *Caladenia x triangularis* in the Keminup 4 block [LE-FL-020].
- Monitor *Diuris drummondii* populations 5, 10B, 11, 12A, 14, 15, 26, 31B, 31C, 31D, 31E, 31F, 36A, 37, 38A [LE-FL-027].
- Investigate the single *Senecio leucoglossus* record in the Warren Region [LE-FL-044].

***Liaison actions**

- Monitor *Ornduffia submersa* population on Cowarup peat mine to determine current level of threat posed by mining [LE-FL-039].

ECOLOGICAL COMMUNITIES

- Investigate potential new occurrences of Scott River ironstone in Lake Jasper area and surrounds. Undertake further survey and analysis to determine if the new occurrences are a subset of the Threatened Ecological Community [LE-EC-002].

LANDSCAPES

- Implement enforcement, compliance and animal welfare actions in managing problematic native fauna, including black cockatoos, chuditch (*Dasyurus geoffroii*) and western ringtail possum (*Pseudochirus occidentalis*), within and adjoining settlements within karri forest [LA-073], Southern Coastal Plain [LA-074], Upper Warren settlements [LA-075], and Upper Warren State forests [LA-078]. Publicise outcomes to enhance public education and increase conservation management activities.

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

- Maintain an array of groundwater monitoring stations in Unicup Plains nature reserves to inform management of potential impacts of altered hydrology on flora/habitats within reserves [LA-019].
- During operational use of fire water points or ephemeral pools and when expanding or maintaining water points, reduce the amount of water extracted and/or remove Balston's pygmy perch (*Nannatherina balstoni*) [TA-FA-095], salamanderfish *Lepidogalaxias salamandroides* [TA-FA-098], black-stripe minnow (*Galaxiella nigrostriata*) [TA-FA-093], and return after disruption, where possible.
- Install signage at fire water points and ephemeral pools containing *Galaxias truttaceus* [TA-FA-097], Balston's pygmy perch (*Nannatherina balstoni*) [TA-FA-187], western mud minnow (*Galaxiella munda*) [TA-FA-110], black-stripe minnow (*Galaxiella nigrostriata*) [TA-FA-154] and salamanderfish *Lepidogalaxias salamandroides* [TA-FA-170] to provide advice to users on how to minimise potential impacts on these species.
- Maintain stream connectivity by maintaining culverts on tracks that cross tributaries or creeks within Balston's pygmy perch (*Nannatherina balstoni*) distribution in South West and Warren regions [TA-FA-242].

***Liaison actions**

- Minimise increased sediment input into catchments that control western mud minnow (*Galaxiella munda*) spawning habitat between August and September through liaison with the key stakeholders undertaking disturbance activities (South West and Warren) [TA-FA-094].

DISEASE

- Identify, evaluate and where practical, implement effective measures for the maintenance and/or restoration of significant Phytophthora dieback infested areas in:
 - Mount Lindesay National Park [LA-049]
 - Tone-Perup Nature Reserve [LA-082]
 - nature reserves of the Unicup Plains [LA-018].
- Limit access to Fordson Road except for fire management activities to maintain hygiene in the area and protect *Andersonia annelsii* (populations 1, 2A, 2B, 3A and 3B) from potential Phytophthora dieback infestation [TA-FL-382].
- Implement a phosphite ground/aerial spraying program targeting *Astartea granitica* for all extant populations where Phytophthora dieback has been detected in the vicinity [TA-FL-459].

- Implement a phosphite spraying program targeting *Daviesia mesophylla* population 1 across 3000 sqm in the Mount Roe National Park [TA-FL-222].

FIRE REGIMES

- Develop and implement prescribed burn plans in accordance with the Bushfire Risk Management Framework to protect threatened species occurring in the Faunadale Nature Reserve [LA-020].
- Establish firebreaks to protect melaleuca thickets against potential unplanned fire to allow appropriate period of senescence, where appropriate, within Greater Kingston National Park [LA-026] and Tone-Perup Nature Reserve [LA-083]. Include a fox control program to help protect species utilising this habitat.
- Develop and implement guidelines to protect melaleuca thickets to support threatened fauna within Perup Sanctuary [LA-066] and Tone-Perup Nature Reserve [LA-084].
- Review and update fire response plan for Tootanelup Nature Reserve to ensure a rapid and appropriate response to bushfire suppression within the reserve and for bushfires threatening the reserve from private property [LA-097].
- Implement managed prescribed fire into the O'Sullivan fire scar based on the development of a geographic information system product, to inform burn targets that minimise impact on the recovery of quokka (*Setonix brachyurus*) within the fire scar and surrounding areas (at a landscape scale). Update to inform prescribed burn and conservation planning [TA-FA-384].
- 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 moderate intensity prescribed burn for *Caladenia harringtoniae* along Vasse Highway and Carey Brook to open the understorey and remove competition from native overstorey vegetation [TA-FL-193].
- Implement a suitable fire regime for all *Gastrolobium formosum* populations in the South West and Warren regions [TA-FL-223].
- Implement strategies that seek to minimise impacts from fire to populations 1 and 3 of *Grevillea acropogon*, including using existing fire management tracks [TA-FL-238].
- Implement fire management strategies that seek to minimise fire impacts to peat swamps encompassing all *Reedia spathacea* populations on department-managed land including populations in the South West and Warren regions [TA-FL-255].

PEST ANIMALS

- Implement feral cat management along selected alignments within and adjacent to completed prescribed burns and high conservation value areas across the Warren Region [LA-106].

- Implement a fox control program:
 - along selected alignments within and adjacent to completed prescribed burns across the Warren Region [LA-003]
 - along selected alignments within and adjacent to Forest Enhancement Areas within the Karri forest [LA-008] and Upper Warren [LA-010] management units along selected alignments within and adjacent to Perup Sanctuary [LA-067]
 - within Randell Road Nature Reserve [LA-071] and Tootanellup Nature Reserve [LA-094]
 - in key areas of the Tone-Perup Nature Reserve identified through monitoring [LA-086]
 - in areas pre- and post-disturbance where assessments indicate western ringtail possum (*Pseudocheirus occidentalis*) may be present [TA-FA-237].
- Implement a feral pig control program in collaboration with pest management groups. Support groups to expand field operations in undertaking pig control within targeted areas to complement departmental operations within the following management units:
 - Karri forest [LA-028]
 - Upper Warren [LA-099]
 - Southern Hilly Terrain [LA-076]
 - Unicup Plains [LA-098]
 - Walpole tingle [LA-102].
- Implement feral pig control in peat swamp habitat of sunset frog (*Spicospina flammocaerulea*) across 11 forest blocks [TA-FA-011].
- Implement management options to locate feral herbivore herds (feral pigs and goats) and use of contractors to undertake control measures [LA-079].
- Construct and maintain a fence (approximately 9.4 hectares) around *Reedia spathacea* population 35 [TA-FL-256] and *Drosera binata* District population B (unassigned TPFL population number) [TA-FL-216] to exclude feral pigs and undertake pig control.
- Implement pig control at occurrence Walpole airstrip/W2 of the *Reedia spathacea* - *Empodium gracillimum* - *Schoenus multiglumis* dominated peat paluslopes and sandy mud floodplains of the Warren Biogeographical Region and assess its effectiveness and selectivity to inform ongoing use. In addition, fence the occurrence to exclude feral pigs but to allow native herbivores in [TA-EC-004].
- Upgrade existing fencing at occurrences W19, PR and GP/W10 of the *Reedia spathacea* - *Empodium gracillimum* - *Schoenus multiglumis* dominated peat paluslopes and sandy mud floodplains of the Warren Biogeographical Region to exclude feral pigs but allow access for native grazers [TA-EC-005].
- Apply mulch, with local community support, to sites that have been damaged by feral pigs including occurrence GP/W10 of the *Reedia spathacea* - *Empodium gracillimum* - *Schoenus multiglumis* dominated peat paluslopes and sandy mud floodplains of the Warren Biogeographical Region [TA-EC-007].
- Continue providing support for and engagement with the Australian Deer Association to undertake monitoring and control of feral deer populations within the Lake Muir Nature Reserve [LA-030].

- Protect important breeding areas for forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) [TA-FA-033], Baudin's black cockatoo (*Zanda baudinii*) [TA-FA-034] and Carnaby's black cockatoo (*Zanda latirostris*) [TA-FA-090] by undertaking feral bee hive 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.
- Remove nest competition by feral bees by managing apiarist license conditions and using contractors to undertake bee control 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.

WEEDS

- Undertake targeted weed control, with priority for high and medium rated environmental weeds within fringes of wetlands, and adjoining areas within the following management units:
 - Karri forest [LA-042]
 - Owingup Nature Reserve [LA-064]
 - Southern Coastal Plain [LA-043]
 - Upper Warren national parks and nature reserves [LA-058].
- Implement targeted weed control focusing on Cape tulip in Lake Muir Nature Reserve in collaboration with Southern Forests Community Landcare [LA-031].
- Implement targeted weed control to reduce the impact of typha across wetlands in Lake Muir Nature Reserve [LA-033] and Unicup Plains nature reserves [LA-016].
- Implement targeted weed control, with priority for high and medium rated environmental weeds, within the Unicup Plains nature reserves [LA-017].
- Employ a contractor to conduct weed control within Galamup [LA-023] and Tone-Perup nature reserves [LA-081].
- Remove research plots of introduced tree species (for example *Pinus* spp., non-native *Eucalypt* spp.) and rehabilitate areas back to natural vegetation where appropriate and adjacent to areas of high conservation value [LA-059].
- Implement a weed control program targeting grassy pasture weeds adjacent and within *Caladenia christineae* populations in Yeticup Swamp water point, District population F Donnelly Mill Road Mersea and Old Glentulloch Road. Follow up with control of other weed species such as capeweed, *Vulpia* sp. and lotus [TA-FL-185].
- Implement a weed control program targeting pasture grasses at unassigned *Caladenia longicauda* subsp. *extrema* populations at Aerial Road (District population E), Conto Road (District populations A, B and C) and adjacent areas [TA-FL-372].
- Implement a weed control program for *Solanum nigrum* and Indian weed to protect *Rhacocarpus rehmannianus* var. *webbianus* (population 1A) [TA-FL-376].

Scientific research



Undertake scientific investigations that are effectively targeted to improve knowledge and integrate science knowledge into biodiversity conservation and management.

FLORA

*Proposed germplasm collection and storage priorities

- Consider seed collection and storage priorities for *Acacia oncinophylla* subsp. *patulifolia*.

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

- 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].

*Liaison actions

- Develop and implement strategies to reduce the incidence of motor vehicle collisions with Baudin's black cockatoo (*Zanda baudinii*) across its range (South Coast, South West, Swan, Warren and Wheatbelt) including the identification of hotspots, signage, road and drainage design, and planting of food resources [TA-FA-331].
- Install fencing on private properties through natural resource management networks around the catchment areas of the Goodga River and Kent River (South Coast and Warren regions) to mitigate the impacts of water degradation by riparian livestock on spotted galaxias (*Galaxias truttaceus*) [TA-FA-091].

FLORA

- Communicate with private property owners adjacent to populations 6, 11, 7D, 10 and district population H of *Caladenia dorrienii* to improve understanding about the need for the continued implementation of longer prescribed burn rotations [TA-FL-187].

*Liaison actions

- Work with the LGA and private property owners to revegetate five hectares of *Acacia oncinophylla* subsp. *oncinophylla* (District population A) on other lands including proposed roadside revegetation projects. This will include collecting representative local provenance seed collections [TA-FL-266].
- Liaise with the Adopt an Orchid Program to survey for additional populations of *Caladenia erythrocilia* [LE-FL-013] and *Caladenia validinervia* [LE-FL-018] in adjoining woodland types.
- Liaise with Main Roads and LGAs to maintain access tracks and minimise clearing and disturbance to *Caladenia validinervia* populations along road verges (populations 1B, 1C and Donnelly District population C) when implementing maintenance activities [TA-FL-379].
- Liaise with the LGA to manage burning and post-burn weed control of grassy weeds of riparian vegetation at Winneup Reserve encompassing *Carex tereticaulis* population 3 [TA-FL-249].
- Liaise with South West NRM to restore riparian habitat along the Warren River post-blackberry collapse in *Carex tereticaulis* habitat containing an unassigned population next to Calcup Ford [TA-FL-251].
- Liaise with the LGA to prevent disturbance to population 5 of *Corysanthes limpida* during any road and track maintenance [TA-FL-197].
- Liaise with Main Roads to minimise clearing and disturbance when implementing maintenance activities that will impact on *Cryptandra arbutiflora* var. *pygmaea* (populations 1A and 1B) [TA-FL-378].
- Liaise with the LGA, the Department of Planning Lands and Heritage and railway tourist operator to minimise clearing and disturbance when implementing maintenance activities (for example grading), other operations (for example weed control), and road and track maintenance to protect *Lomandra ordii* (populations 1C, 2C, 12, 19, 20B, 21B and 22B) [TA-FL-380].

LANDSCAPES

*Liaison actions

- Seek to exclude feral horses from occurrences of threatened and Priority flora populations and wetlands within the management units listed below. Engage with the local community and relevant stakeholders to determine appropriate management measures.
 - Lake Muir Nature Reserve [LA-034]
 - Upper Warren [LA-045]
 - Southern Hilly Terrain [LA-046]
 - Unicup Plains [LA-047].

- Monitor the condition of surface and groundwater regime changes over time to inform management actions and assess any activities in the catchment area for impact at the following reserves:
 - Gill Nature Reserve [LA-024]
 - Lake Kurnicup Nature Reserve [LA-029]
 - Owingup Nature Reserve [LA-065]
 - Randell Road Nature Reserve [LA-069]
 - Tootanellup Nature Reserve [LA-095]
 - Wambellup Nature Reserve [LA-103]
 - Yarnup Nature Reserve [LA-105].
- Investigate and implement solutions to potentially reverse impacts of acidification at Lake Muir Nature Reserve [LA-035].
- Negotiate with adjacent landholders in relation to reinstatement of boundary fences, alteration of drainage alignments and other works to rectify impacts of adjacent land use practices on the Lake Muir Nature Reserve [LA-032].
- Map the current extent of salinity at Tootanellup Nature Reserve and potential for spread and implement salinity mitigation measures including diversions drain in the reserve [LA-092].

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.

Birds

- Train local staff and ranger groups in shorebird identification to improve survey and monitoring outcomes, including:
 - red knot (*Calidris canutus*)
 - curlew sandpiper (*Calidris ferruginea*)
 - great knot (*Calidris tenuirostris*)
 - greater sand plover (*Charadrius leschenaultia*)
 - lesser sand plover (*Charadrius mongolus*)
 - bar-tailed godwit (*Limosa lapponica baueri* and *Limosa lapponica menzbieri*)
 - far eastern curlew (*Numenius madagascariensis*).
- Collaborate with BirdLife Australia to improve data flow regarding surveying and monitoring work on red knot (*Calidris canutus*) and hooded plover (*Thinornis cucullatus*).
- Map forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) water sources across the landscape and liaise with the Department of Water and Environmental Regulation to support maintaining water resources/stream flows.

- Investigate the effectiveness of different feral predator control regimes on the persistence and recovery of malleefowl (*Leipoa ocellata*) populations.
- Engage with the BirdLife Australia to identify nesting sites of southern giant petrel (*Macronectes giganteus*) and the associated threats in these locations to advise management.
- Map current 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.
- 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.
- Establish efficient and effective information sharing pathways across the regions for fairy tern (*Sternula nereis nereis*).
- 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.
- Consolidate information available on feeding, roosting and nesting habitat of forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*), Baudin's black cockatoo (*Zanda baudinii*) and Carnaby's black cockatoo (*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 and roosting habitats to understand where conservation effort should be focused.
- 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.
- Survey potential forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*), Baudin's black cockatoo (*Zanda baudinii*) and Carnaby's black cockatoo (*Zanda latirostris*) habitat occupied by feral bees and determine, through liaison with the apiculture industry, where the use of fipronil to control feral bees is appropriate. Liaise with Biodiversity and Conservation Science and Australian Pesticides and Veterinary Medicines Authority to implement a fipronil trial with the view to adopting as an effective control method for feral bees using black cockatoo nest hollows.
- 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.

Fish

- Undertake studies to determine current threatening processes to black-stripe minnow (*Galaxiella nigrostriata*).
- 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*) and black-stripe minnow (*Galaxiella nigrostriata*).
- Undertake modelling of available black-stripe minnow (*Galaxiella nigrostriata*) habitat in response to climate change.
- Investigate the impact of Gambusia species on salamanderfish *Lepidogalaxias salamandroides*, Balston's pygmy perch (*Nannatherina balstoni*) and black-stripe minnow (*Galaxiella nigrostriata*) and implement feral fish control if native species are adversely affected.
- 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-stripe minnow (*Galaxiella nigrostriata*), salamanderfish (*Lepidogalaxias salamandroides*) and Balston's pygmy perch (*Nannatherina balstoni*).

Invertebrates

- Develop a routine monitoring program for Carter's freshwater mussel (*Westralunio carteri*) 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, phylogeographic and interactions with other species to inform management actions.

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 strikes, seismic activity and marine debris on blue whale (*Balaenoptera musculus*).

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

- 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.
- Develop a standardised monitoring program to identify breeding habitat and range extensions of southern right whale (*Eubalaena australis*).
- Liaise with the Department of Primary Industries and Regional Development to address knowledge gaps within departmental databases and to be involved in the management of great white shark (*Carcharodon carcharias*).

FLORA

- Continue the comparison for fire ecology tests between spring, winter and long unburnt areas to assess regeneration and biology of *Andersonia annelsii* and inform burn management.
- Monitor populations 1A, 5, 7, 9 and 12 of *Astartea granitica* and review listing.
- Monitor populations of *Caladenia erythrochila* after fire events particularly population 2 at Wingebelup Road.
- Undertake conservation status review of *Caladenia harringtoniae*.
- Investigate the taxonomy of *Caladenia longicauda* subsp. *extrema* to determine if it is a subspecies of *Caladenia christineae*.
- Investigate the weed impacts on *Caladenia longicauda* subsp. *extrema* populations to determine control for non-pastoral weeds at Tonebridge and Kingston Forest Block.
- Liaise with the Adopt an Orchid Project to relocate, verify coordinates and monitor *Caladenia ultima* populations 1A and 1B in the Meribup State Forest.
- Survey seasonally after fire events for additional populations of *Caladenia validinervia* in suitable habitat between the main populations in Donnelly District and the population in Perup Nature Reserve.
- Monitor all populations of *Caladenia validinervia* after fire events to assess regeneration.
- Investigate natural pollination of *Caladenia winfieldii* within subpopulations using cameras to screen for pollinators in addition to trialling hand pollination of plants. Utilise findings to inform future natural or manual pollination requirements.
- Review management activities surrounding population 1A of *Caladenia winfieldii* to inform the introduction of prescribed fire.
- Confirm record of *Chamaescilla gibsonii* and survey suitable habitat for additional populations.
- Research fire response of *Commersonia apella*.
- Determine pollinator species for *Drakaea micrantha*.
- Investigate response of *Drepanocladus aduncus* to fire.
- Investigate fire response of *Eryngium* sp. Ferox (G.J. Keighery 16034).

- Instigate a taxonomic review to inform mapping of critical habitat and survey requirements for the *Senecio gilbertii*.
- Survey unverified population of *Thelymitra jacksonii* in Dixie 6 block in Shannon National Park.

ECOLOGICAL COMMUNITIES

- Distinguish between discrete community types of Aquatic invertebrate assemblages of granite outcrops associated with Burnside Batholith (Warren Region occurrence is a subset of Wheatbelt granites).
- Undertake a full biological survey to understand the composition and potential for amalgamation of the Busselton and Black Point microbial tufa communities / assemblages.
- Determine the most appropriate monitoring methodology for the tufa microbial community (such as utilising photo points with occasional in person visitation).
- Improve mapping to establish a baseline for the Black Point tufa microbial community with a drone survey across its extent recording latitude/longitude for some areas. Undertake further surveys to discover if new occurrences exist outside the current known geographical extent.
- Monitor the *Reedia spathacea* - *Empodiuma gracillimum* - *Schoenus multiglumis* dominated peat paluslopes and sandy mud floodplains of the Warren Biogeographical Region community for other species that can help inform fire management/impacts on the whole community.
- Liaise with universities regarding the specific pathogen causing plant disease found at Chesapeake and develop a research plan that involves monitoring the site and developing methods to reduce impact to occurrence CBW20 of *Reedia spathacea* - *Empodiuma gracillimum* - *Schoenus multiglumis* dominated peat paluslopes and sandy mud floodplains of the Warren Biogeographical Region.
- Determine a suitable fire management plan for burning near the Chudalup site of *Reedia spathacea* - *Empodiuma gracillimum* - *Schoenus multiglumis* dominated peat paluslopes and sandy mud floodplains of the Warren Biogeographical Region (occurrences CDS/W22 and CDN/W23) and liaise with fire management services to ensure this informs burning practices. Include monitoring of saturation levels prior to burning using peisometers in the plan.
- Develop a remote sensing plan to map the boundaries and to document the decline of *Reedia spathacea* - *Empodiuma gracillimum* - *Schoenus multiglumis* dominated peat paluslopes and sandy mud floodplains of the Warren Biogeographical Region.
- Develop a research plan to study the impacts feral pigs have on *Reedia* communities and how they influence the resilience of peat and silicone-based sites. Apply learnings to identify where feral pig control is a priority.
- Monitor floristics in detail of the Mount Lindesay - Little Lindesay Vegetation Complex (as per Clarke 2009 monitoring protocol). Utilise line intercept transects to quantify compositional changes to determine fire response of all flora and entire ecological

community to frequent burn regime, in combination with Phytophthora dieback impacts. Consider the addition of remote sensing techniques to supplement previous monitoring actions.

- Seek evidence to support removal of Sphagnum communities of the tingle forest community from current priority list.

8 References

Clarke V 2009. *Monitoring the impacts of fire and Phytophthora within the shallow soil plant communities of the Mt Lindesay Threatened Ecological Community, Denmark WA*. Version 1.0. (June 2009). Prepared for Significant Native Species and Ecological Communities – Resource Condition Monitoring Project. Department of Environment and Conservation.

Department of Parks and Wildlife, 2016. *Regional Fire Management Plan, Warren Region 2015-2019*. Unpublished report. Department of Parks and Wildlife.

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

Table 2 Warren Region priority management units.

Priority management unit	Tenure type	Component reserves	Responsibility	Area (ha)
Upper Warren	Conservation park	R 1333	Donnelly District	39
	National park	Kingston National Park (R 47662)		21,219
	Nature reserve	Wilgarrup Nature Reserve (R 12381), Tone-Perup Nature Reserve (R 47879), Alco Nature Reserve (R 32142)		3,627
	Section 34A freehold	1182/361, 1039/178, 1266/716, 1368/794, 24/300A, 1878/741		550
	Section 5(1)(h) reserve	R 39199, R 51982		207
	State forest	Palgarup State Forest (F 37), North Donnelly State Forest (F 34), Yornup State Forest (F 9), Tone State Forest (F 38), Lake Muir State Forest (F 55)		54,287
	Timber reserve	O 162 25, O 184 25, O 167 25, O 166 25, O 168 25, O 156 25, O 116 25		3,791

Priority management unit	Tenure type	Component reserves	Responsibility	Area (ha)
Unicup Plains	Conservation park	Rocky Gully Conservation Park (R 52970)	Frankland District	633
	Nature reserve	Kulunilup Nature Reserve (R 26677), Unicup Nature Reserve (R 25798), Kodjinup Nature Reserve (R 26678), Cowerup Nature Reserve (R 33455), Quindinup Nature Reserve (R 25506), Pindicup Nature Reserve (R 26679), Galamup Nature Reserve (R 6549), Noobijup Nature Reserve (R 26680), Pinticup Nature Reserve (R 26682), Cobertup Nature Reserve (R 26681), Lake Muir Nature Reserve (R 31880), Bokarup Nature Reserve (R 14739), Lake Muir Nature Reserve (R 46478), R 40910, Yarnup Nature Reserve (R 29601), Gill Nature Reserve (R 44543), Ongerup Lagoon Nature Reserve (R 798), Wamballup Nature Reserve (R 11760, R 6716), Tootanellup Nature Reserve (R 22442), Randell Road Nature Reserve (R 26586), Pardelup Road Nature Reserve (R 22841), Pardelup Nature Reserve (R 23171), R 11343, Kwoinicup Lake Nature Reserve (R 32284), R 16262, Tone-Perup Nature Reserve (R 47879)	Donnelly / Frankland District	69,334
	State forest	Tone State Forest (F 38), Lake Muir State Forest (F 55), Denmark Catchment State Forest (F 64), Palgarup State Forest (F 37)		12,068
	Timber reserve	O 203 25, O 216 25, O 215 25, O 130 25		2,459

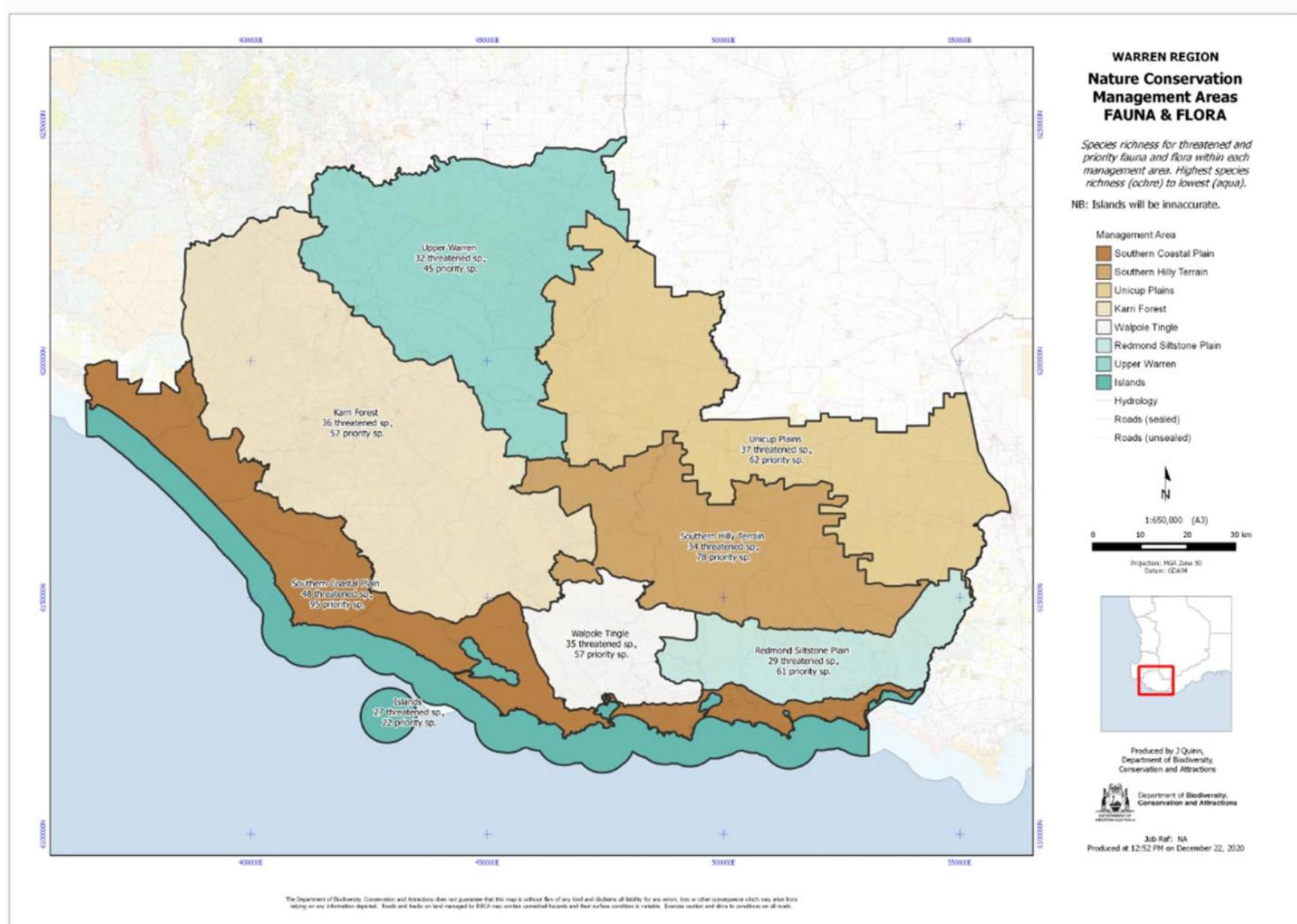


Figure 2 Warren Region conservation management areas (2023).



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