MIDCOAST
council

MIDCOAST KOALA CONSERVATION STRATEGY

Acknowledgement of Country

We acknowledge the traditional custodians of the land on which we work and live, the Gathang-speaking people and pay our respects to all Aboriginal and Torres Strait Islander people who now reside in the MidCoast Council area. We extend our respect to Elders past and present, and to all future cultural-knowledge holders.

Cover photo: Peter Goonan

Koalas carry deep cultural significance for Traditional Owners. Traditional Owners hold profound knowledge of koalas, their habits, and their biology. Traditional Owners lived alongside koalas for tens of thousands of years. Totems, dreaming stories and song lines feature the koala. Traditional Owner views and knowledge is important to the recovery and conservation of koalas in NSW and on the MidCoast.

Decline or extinction of local koala populations directly impacts Traditional Owners and their culture (NSW DPE, 2022). The National Recovery Plan (DAWE, 2022) for the koala recognises the experience and wisdom of Traditional Owners in koala conservation and recovery.

Acronyms and Abbreviations

ARKS	Areas of Regional Koala Significance
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BCT	Biodiversity Conservation Trust
CIFOA	Coastal Integrated Forestry Operations Approval
Council	MidCoast Council
Cwth	Commonwealth
DCCEEW	Department of Climate Change, Energy, the Environment and Water (formerly the Department of Planning and Environment (NSW))
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
FCNSW	Forestry Corporation of NSW
ha	Hectares
IBRA	Interim Biogeographic Regionalisation for Australia
IKPOM	Individual Koala Plan of Management
KVS	Koala Vehicle Strike
LEP	Local Environment Plan
LGA	Local Government Area
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NPWS	National Parks and Wildlife Service
NSW	New South Wales
LLS Act	*Local Land Services Act 2013* (NSW)
PCT	Plant Community Type
PNF	Private Native Forestry
the Strategy	Koala Conservation Strategy
SAT	Spot Assessment Technique
SEPP 2021	State Environmental Planning Policy (Biodiversity and Conservation) 2021 (NSW)
SF	State Forests

Vision

The MidCoast contains enough safe spaces and safe connections for koalas. Our koala populations and habitat are secure, healthy, and safe in the long-term.

Executive summary

MidCoast Council has developed this Koala Conservation Strategy to guide the conservation and management of koalas and their habitat across the region for the next five years.

The preparation of this Koala Conservation Strategy has been partly funded by the New South Wales Government Regional Koala Conservation Partnership, with in-kind and financial contributions from MidCoast Council. It aligns with actions, pillars, and targets in the State Government's 2022 Koala Strategy.

The region contains some of the highest recorded densities of koalas in New South Wales.

Koala habitat mapping developed to support this Koala Conservation Strategy represents the most up to date and accurate spatial analysis for the MidCoast and is intended to be dynamic, so that it can be updated as new survey data becomes available.

Management actions within this Strategy have been developed with consideration of previous and ongoing plans and actions, as well as through consultation with key stakeholders and the local community. Council's partners, through the Koala Reference Group, were central to the development of this Koala Conservation Strategy and their ongoing collaboration is fundamental to its realisation.

Council recognises the crucial role private landholders play in providing valuable koala habitat and movement corridors and Council endeavours to undertake projects that produce benefits for both koalas and landholders.

Council also recognises that the New South Wales and Commonwealth agencies have key roles and responsibilities for koala recovery and conservation. This Strategy is essentially a Council plan that reflects the values our community places on maintaining the local koala population and, that high quality and connected habitat is essential for koala survival. It sets out the roadmap for Council's contribution to koala conservation in the MidCoast, but it also seeks to align these Council efforts with those of other agencies, organisations, and the community.

The actions outlined in this Strategy have been classified under five categories:

1. Habitat protection, restoration and connectivity
2. Threat mitigation (vehicle strike, wild and domestic dogs, livestock trampling, bushfire management)
3. Education, engagement and the integration of Traditional Owner knowledge
4. Research, monitoring, health and welfare
5. Advocacy, funding and partnering.

The successful delivery of this Koala Conservation Strategy requires that management actions are pragmatic and prioritised according to resource availability.

Progress reporting against the Strategy's targets and actions will be presented annually.

Table of Contents

Figures

Table

INTRODUCTION

1 Introduction

Koalas in New South Wales (NSW) are facing an uncertain future. This is one of the key messages in the NSW Koala Strategy, which reported that, without action, koalas in NSW could be extinct by 2050 (DPE, 2022).

The MidCoast region is recognised for its biodiversity (MidCoast Council, 2020) and still contains substantial populations of koalas in areas of the coast, near-coastal ranges, river valleys and slopes of the eastern Great Dividing Range. The MidCoast region can play a valuable role in the recovery and conservation of koalas in a statewide context. For this reason, the MidCoast Council (Council) is a regional partner to the NSW Koala Strategy.

The MidCoast local government area (LGA) is in the NSW North Coast Koala Management Area. This Area extends from Tweed Heads to Newcastle and west to the Great Dividing Range. The Area contains some of the highest recorded densities and the largest population of koalas remaining in NSW.

Across NSW, threatening factors, including climate change, land clearing, vehicle strike, and disease, has resulted in the koala's distribution contracting by at least 30% over the last two decades. Declines have been documented from all regions (Predavec *et al.*, 2017) (Phillips in Legislative Council Portfolio Committee No. 7 - Planning and Environment, 2020). The 2019 / 2020 bushfires resulted in additional, sudden, and significant loss of koala populations, and short to medium-term impacts on habitat. Consistent with these trends, there is evidence of decline in koala populations across parts of the MidCoast, and the "Black Summer" bushfires had substantial local negative impacts.

On 20 May 2022, the conservation status of the koala was uplisted to Endangered under the NSW *Biodiversity Conservation Act 2016* (BC Act). The koala was also listed as Endangered on 12 February 2022 under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The koala is listed as one of the priority threatened species in Council's Biodiversity Framework 2020-2030. Populations in the Kiwarrak, Hawks Nest, Crowdy Bay, Hallidays Point and The Bucketts (Gloucester) localities were highlighted for focussed attention (MidCoast Council, 2020). There is also an Asset of Intergenerational Significance (AIS) for the koala in the MidCoast region, in Crowdy Bay National Park (AIS_E0_182).

Successful conservation of the koala and its habitat in the MidCoast relies on a collaborative approach across all levels of government, partnering organisations and the community. This Koala Conservation Strategy (the Strategy) reflects the aims of Chapter 3 Koala habitat protection 2020 and Chapter 4 Koala habitat protection 2021 of the *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (SEPP 2021). It *encourages the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the trend of koala population decline* in the MidCoast LGA.

Council has developed this Strategy to guide the conservation and management of koalas and their habitat across the MidCoast LGA for the next five years. The Strategy is a roadmap for Council's contribution to koala conservation in the MidCoast. It also seeks to coordinate and position the Council action within a wider framework of effort by other agencies, organisations, and the community.

Importantly, the koala is an umbrella species. The conservation of koalas in the landscape has cascading effects for the protection of other species and biodiversity generally, the condition of the natural environment, the liveability of local communities, and the function of natural processes.

1.1 Koala recovery and conservation in this Strategy

The elements that underpin a species recovery and conservation effort generally comprise:

- Enhancing and conserving existing habitat, including occupied habitat, unoccupied but otherwise suitable habitat, connecting habitat (corridors) and buffering habitat, and
- Creating new habitat and new corridors in areas that aid the expansion / recovery of populations, and
- Avoiding, minimising, or mitigating the factors that are threatening adult survival and / or juvenile recruitment, and
- Compiling strategic knowledge and adaptively applying that knowledge via enhanced management systems.

These elements are recognised by the NSW Koala Strategy (DPE, 2022).

The koala is a landscape species. The management of threats and the conservation of the species requires that actions and management are applied in a strategic, coordinated way at landscape-wide scales.

This is a Strategy for Council that aligns and integrates the Council actions with the efforts of other stakeholders, including government agencies, organisations, and the broader community. Council, as the closest tier of government to the community, is well placed to lead the delivery of some koala recovery and conservation actions, and to support others. Council can also lead, advocate, research and play a coordinating, collaborating, or informing, role.

Effective koala conservation will not be delivered by continuing the approaches of the past. Business as usual / the *status quo* is not going to achieve the outcomes that are needed. Generally, conserving and recovering the koala on the MidCoast will require five (5) informed action platforms to be delivered in a system with adequate resources, delivery frameworks and processes. These action platforms are:

1. Safeguarding koala habitat (whether occupied or unoccupied) through tools and mechanisms that avoid the progressive loss and decline of important habitat ("*avoiding loss*"), and

2. Strategically delivering effective conservation action, habitat restoration, new habitat creation and increased reservation of important habitat, and

3. Systematically controlling the threats affecting koala survival and successful reproduction, as well as securing the dispersal / movement needed to support the resilience and integrity of long-term populations,

4. Effective, efficient, and targeted auditing, performance monitoring and feedback loops, and

5. Community education, communication, and engagement.

There are elements that can be described as "*in scope*" and as "*out of scope*" for this Strategy. Whether an element is in or out of scope depends on factors such as whether it is within the control of Council, or whether the element can be feasibly resourced. Examples are provided in Table 1-1.

Table 1-1 Examples of the ‘in scope’ and ‘out of scope’ elements within this Strategy

In Scope (examples)	Out of Scope (examples)
Council actions and activities Council advocacy and partnerships Council targets and priorities Actions agreed by external project partners	A Comprehensive Koala Plan of Management (CKPOM) as defined in the SEPP^ Activities of Government agencies that are not regulated by Council (eg public forestry) and not agreed to by that agency Existing State and Commonwealth legislation, such as land management and development assessment processes

^ The Koala Reference Group of MidCoast Council considers that a CKPOM is not appropriate until the NSW Government review of the SEPP has been completed.

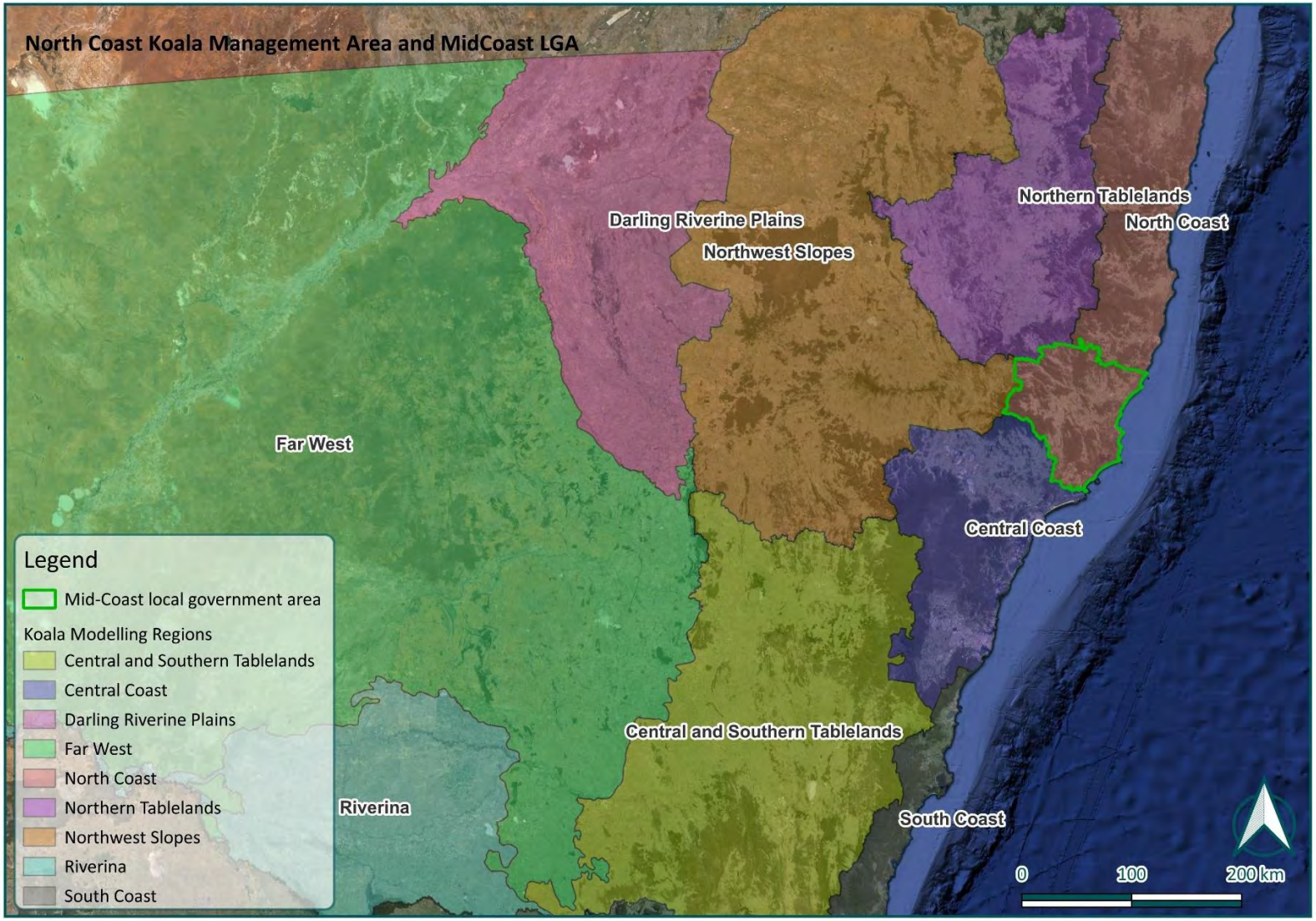


Figure 1-1 The NSW North Coast Koala Management Area and the MidCoast LGA

1.2 Background

The NSW Government funds a Regional Koala Conservation Partnership with MidCoast Council as part of the NSW Koala Strategy (DPE, 2022). The NSW Koala Strategy identifies 24 actions to protect koala populations. These actions are listed under four pillars:

- koala habitat conservation
- conservation through community action
- safety and health of koala populations
- building our knowledge.

This MidCoast Koala Conservation Strategy also recognises and reflects the NSW Strategies' four pillars.

The NSW Koala Strategy recognises 50 different koala populations. The populations are based on the mapping of "*Areas of Regional Koala Significance*" (ARKS) (Rennison and Fisher, 2018). These ARKS were devised to guide regional scale planning in NSW. ARKS boundaries were based on a density analysis of koala records between 1990 and 2016 and reflected areas of koala occupancy at moderate to high densities. They are regarded as "*regional koala populations*" (DPIE, 2020). The 50 mapped ARKS were prioritised in the NSW Koala Strategy, with the highest two intervention categories being: "*populations for immediate investment*" and "*populations to fill key knowledge gaps and deliver local actions*".

Nineteen populations have been identified as priorities for immediate investment under the NSW Koala Strategy (DPE, 2022). Three (3) are wholly or partly located in the MidCoast Council area (Crowdy Bay, Comboyne and Forster). There are thirty-one populations identified to fill key knowledge gaps and deliver local actions, with seven (7) being wholly or partly contained in the MidCoast.

1.3 Studies and surveys

Management actions within this Strategy have been informed by the work of agencies and organisation that have undertaken or are undertaking conservation plans or work (i.e. research on disease, threat mitigation, habitat modelling and surveys) on the MidCoast. These plans include, but are not limited to:

- The *Strategic Threatened Species Action Plan for koalas in the MidCoast LGA* (TierraMar, 2021). This was developed as a multi-agency plan to provide local decision makers with knowledge to inform landscape-scale conservation actions to achieve maximised outcomes.
- A 2019 study of the Kiwarrak ARKS, which was commissioned by the Saving our Species Iconic Koala initiative of the NSW Office of Environment and Heritage (Biolink, 2022).
- The *Good Koala Country Plan* (NSW Government, 2023). This was created by Gumbaynggirr people for Gumbaynggirr people to assist uphold cultural law and responsibilities to care for Country and the koala.
- The *Cool Country Koala Project (South)* (Stringybark Ecological, 2017). This was prepared for the Northern Tablelands Local Land Services and investigated koalas and their management within the Nowendoc area.
- In 2002, the former Greater Taree City Council prepared a *Draft Comprehensive Koala Plan of Management* in accordance with SEPP 44. In 2016, Gloucester Shire, Greater Taree City and Great Lakes Councils became MidCoast Council.

During the development of this Strategy, MidCoast Council coordinated investigations that improved knowledge of the distribution, population, and trends of koalas across the LGA. This involved the collation of koala sightings reports and data, as well as the deployment of additional targeted koala surveys. Public, care group, consultant and agency koala sightings are critical sources of information. When incorporated into the Council and State databases, they help drive prioritisation, actions, funding, and resource allocations for koala conservation programs.

The Koala Safe Spaces Program is a partnership program between Council and the NSW Government. It aims to provide more habitat for koalas and supports local community action. A koala safe space is a feature of habitat or land that contributes positively to the health, wellbeing, and long-term conservation of koalas across the MidCoast. Safe spaces can be in rural and urban areas and can span from a single paddock or yard tree to a large bush block. Safe spaces include corridors for the safe movement of koalas (MidCoast Council, 2023a).

1.4 Legislative and planning context

A range of legislation, policies and plans apply to koalas and their habitat on the MidCoast (Table 1-2). **Appendix A** also provides further information.

Table 1-2 Applicable legislation and policy guidelines for koalas on the MidCoast

Level	Legislation	Policy	Plan
National	*Environment Protection and Biodiversity Conservation Act 1999*	Significant Impact Guidelines (for the koala)	National Recovery Plan for the Koala (DAWE, 2022)
State	*Biodiversity Conservation Act 2015* *Environmental Planning and Assessment Act 1979* *Local Land Services Act 2013*	SEPP (Biodiversity and Conservation) 2021	Koala Strategy (DPE, 2022)
Local	Greater Taree Local Environment Plan (LEP) Great Lakes LEP Gloucester LEP Development Control Plans (DCP) – for Greater Taree, Great Lakes, and Gloucester	MidCoast Vegetation Management Policy 2021	Greening Strategy Biodiversity Framework

Considerations and assessment processes for koalas in development applications and planning proposals are established by the NSW *Biodiversity Conservation Act 2015* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. In December 2022, the Commonwealth Government announced that it was reforming Australia's environmental laws.

State koala habitat protection planning frameworks are currently presented in two separate chapters within the *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (SEPP 2021):

- Chapter 3 State Environmental Planning Policy (Koala Habitat Protection) 2020, and
- Chapter 4 State Environmental Planning Policy (Koala Habitat Protection) 2021

This is an interim measure pending a legislative review.

Further, it has been reported that new codes are being developed that are purported to include protections for high value koala habitat under the *Local Land Services Act 2013*.

Individual Koala Plans of Management (IKPOM) are legally enforceable action plans prepared under the former SEPP44 – Koala Habitat Protection. They apply to certain, specified lands. They are actioned as part of consent conditions for developments. Failure to comply with the requirements of an IKPOM can be regulated. Across the MidCoast region, there are approximately twenty (20) IKPOMs in the former Greater Taree area, and one (1) IKPOM in the former Great Lakes area.

1.5 Strategy development consultation

The MidCoast community and key stakeholders have played an important role in the development of this Strategy. Many individuals, community groups, Traditional Owners, koala care providers and research institutions, along with NSW Government agencies, have taken the opportunity to contribute. Stakeholders provided input and feedback during the development of the Strategy, and via the exhibition and finalisation of the Strategy.

The consultation process for the development of this Strategy included:

- Establishment and administration of a specially-convened Koala Reference Group,
- Online survey (December 2023 – February 2024),
- Koala Reference Group workshop (4 December 2023), and
- Community engagement drop-in sessions (5 - 7 December 2023) at Tinonee, Bulahdelah, and Gloucester.

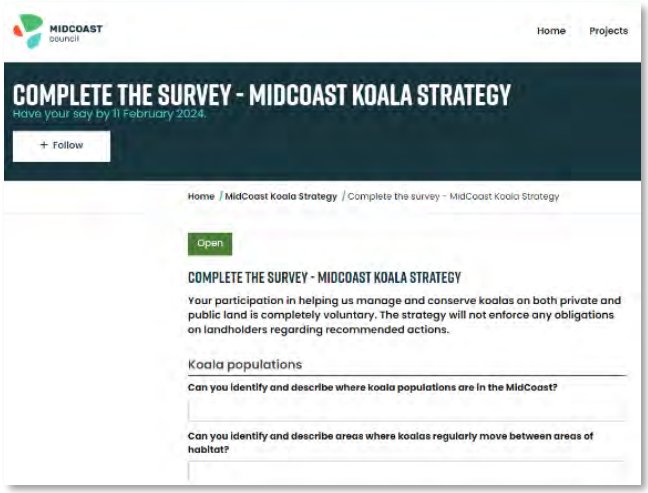
The Koala Reference Group (KRG) consisted of members from:

- NSW Department of Climate Change, Energy, the Environment and Water
- NSW National Parks and Wildlife Service
- Hunter Local Land Services
- Crown Lands
- Taree Indigenous Development & Enterprise (TIDE)
- MidCoast 2 Tops Landcare
- NSW Farmers
- Koalas in Care (Taree) Inc
- Port Macquarie Koala Hospital

- Community and industry groups
- MidCoast Council representatives (Mayor and Councillors).

Figure 1-2 Meeting of the Koala Reference Group

An online survey containing 18 questions regarding koala threats and potential management actions was posted on Council's website between December 2023 and February 2024.



Forty-nine survey (49) responses were received.

Community members were invited to participate in several drop-in sessions carried out at Tinonee, Bulahdelah, and Gloucester (**Figure 1-3**). Approximately fifty (50) people attended a drop-in session.

Figure 1-3 Community engagement during the development of the Strategy (at Tinonee)

During the Strategy development consultation process, community and stakeholders' indicated:

- They held concerns about private native forestry (PNF) practices and logging in State Forests and the implications on koala habitat and populations already under threat.
- Council advocacy to the NSW and Australian Governments should be centred on actions related to habitat and corridor expansion and protection, including from the impacts of residential developments, forestry, and tree clearing.

- There should be greater focus on protecting existing high-quality habitat from clearing, degradation and development.
- Private landholders should be engaged and educated on their obligations and restrictions concerning koala habitats.
- Council should help facilitate planting projects that have co-benefits for private landholders.
- Habitat conservation and restoration were desired and should be delivered through effective partnerships.
- Responsible dog ownership behaviours should be better promoted and enforced.
- More or better signage (including speed reduction) could help reduce koala-vehicle strikes when koalas are moving through the landscape. The Bucketts Way was one of several roads and locations highlighted.
- There should be more education on koalas. It should be delivered in a variety of formats (wild koala day, workshops, schools programs, letterbox drops, information packs, radio, social media) and at various locations. The results of local koala surveys should be published.
- There should be more information for private landowners regarding bushfire management, ecological and hazard reduction burning, and traditional ways for low and slow burns.
- Council should develop partnerships with the local Aboriginal people, schools, clubs, nurseries, Rural Fire Service, environmental groups, and residents, to delvier koala projects.
- The NSW Forestry Corporation submission *applauded Council for developing a local koala strategy* and expressed an interest to partner with and share koala survey, monitoring, and research data.

A Draft MidCoast Koala Conservation Strategy was exhibited from the 25 March to the 6 May 2024, being a period of twenty-eight (28) business days. The Draft Strategy was hosted on Council's website via a Have Your Say page. The exhibition of the Draft Strategy was advertised in print, radio, and on-line media. Council staff attended one (1) public drop-in session, held at Mondrook (which was associated with a tree giveaway on 3 May 2024). Interested people and organisations were encouraged to lodge a submission.

During the public exhibition period, Council received thirty-eight (38) submissions comprising:

- Thirty-six (36) submissions from the community, and
- Two (2) submissions from government agencies.

One hundred and sixty-nine (169) separate comments were received across ten (10) key themes. Almost half of the submission comments related to actions within the Draft Strategy, and over 20% of the comments received were positive / supportive of the Strategy.

The Strategy was amended based on feedback received during the public exhibition process.

1.6 Habitat mapping

Habitat mapping developed for this Strategy represents the most up to date and accurate spatial analysis of koalas on the MidCoast. The habitat mapping is intended to be dynamic. It is to be regularly updated as new survey data becomes available. As part of the Strategy's actions, Council

will be responsible for updating koala mapping on a regular basis, as new information is acquired or becomes available.

Habitat mapping for this Strategy was undertaken as a two-stage process:

1. Development of a habitat model in Case Study areas (**Figure 1-4**)
2. Application of a general habitat mapping model across the whole LGA.

The habitat model was based on a range of datasets (i.e. BioNet koala sighting records), spatial layers (i.e. plant community types) and a list of regional koala food trees. A report describing the mapping methods is provided in **Appendix B**.

Mapped koala habitat was classified into two categories:

- Occupied – habitat derived from plant community types containing 15% koala food trees AND known to contain koala records from the last 3 koala generations (18 years i.e. generational persistence).
- Likely – habitat derived from plant community types containing 15% koala food trees. (N.B. some of this mapping category contains recent survey records, however 'occupancy over time or generational persistence' was yet to be established).

As part of the mapping process for the Case Study areas, Council organised targeted ground-truthing surveys with botanists and koala detection dogs. This data helped populate the 'Occupied' and 'Likely' koala habitat mapping.

Land managed by the NSW Forestry Corporation (State Forests) was not mapped within this Strategy.

Land without classification contains unknown koala habitat value. Such areas may comprise highly developed / urban areas, or they may be areas with insufficient data available to inform the classification process. Land that is not mapped as occupied habitat or likely habitat may contain koalas and koala habitat. The mapping is constrained by the availability of quality data.

Stage 1: Case Studies

Within the MidCoast LGA, three (3) Case Study areas were selected, comprising Khappinghat (**Figure 1-5**), Kundle Kundle (**Figure 1-6**) and Tea Gardens (**Figure 1-7**). These were chosen because they are representative, they contain recorded koala populations and they are subject to moderate to high levels of development pressure.

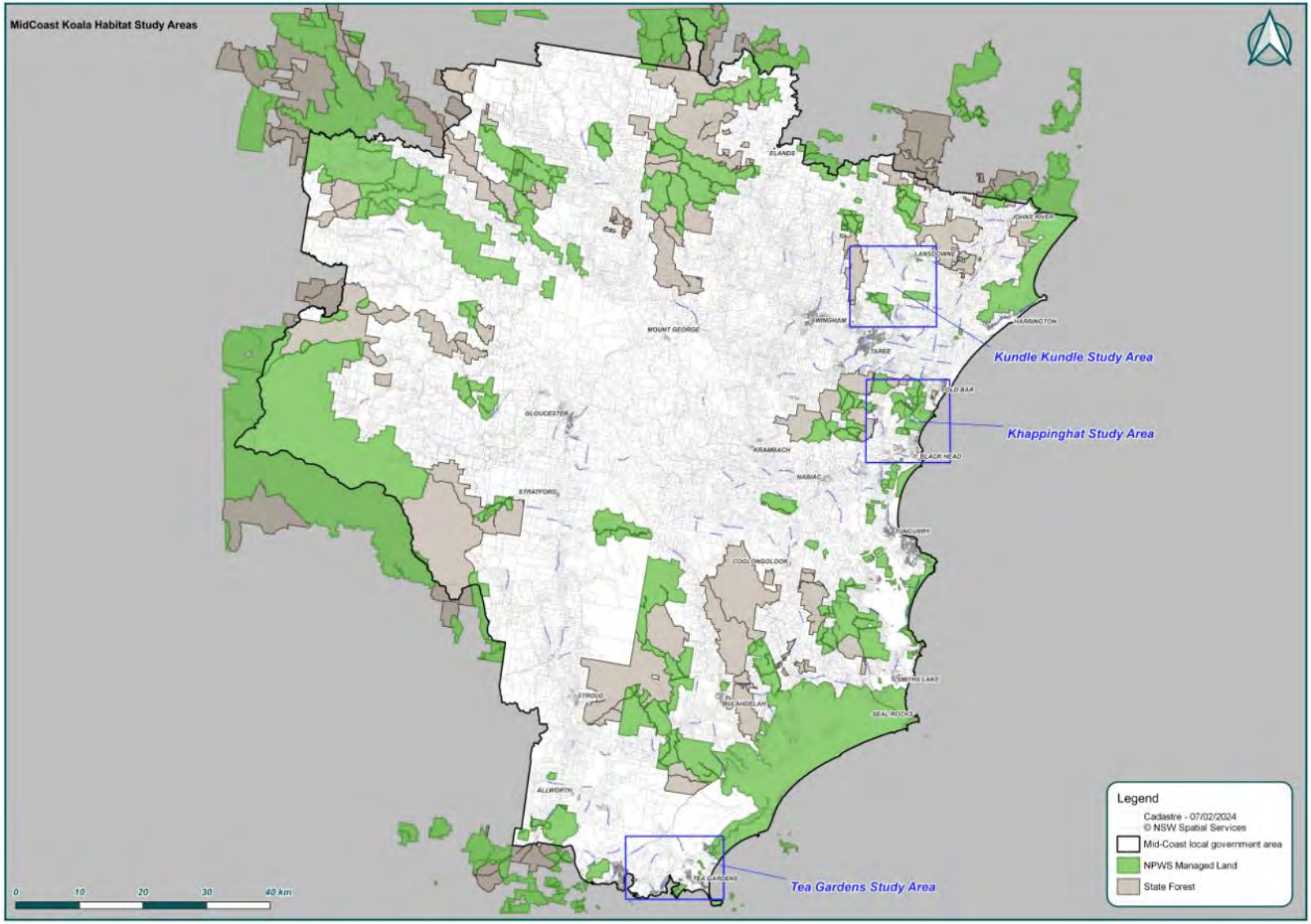


Figure 1-4 Case Study areas (Khappinghat, Kundle Kundle and Tea Gardens)

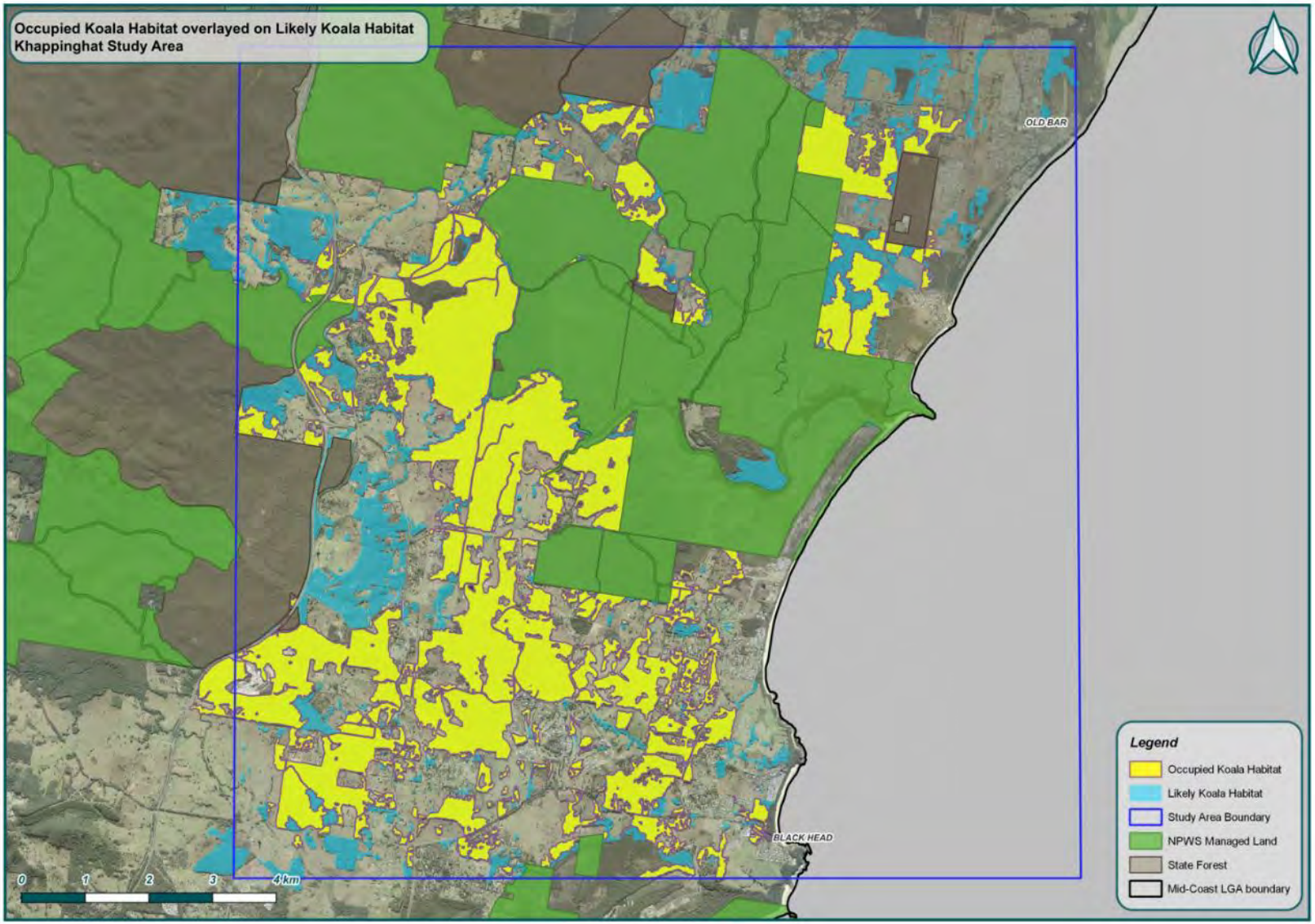


Figure 1-5 Khappinghat Case Study Area

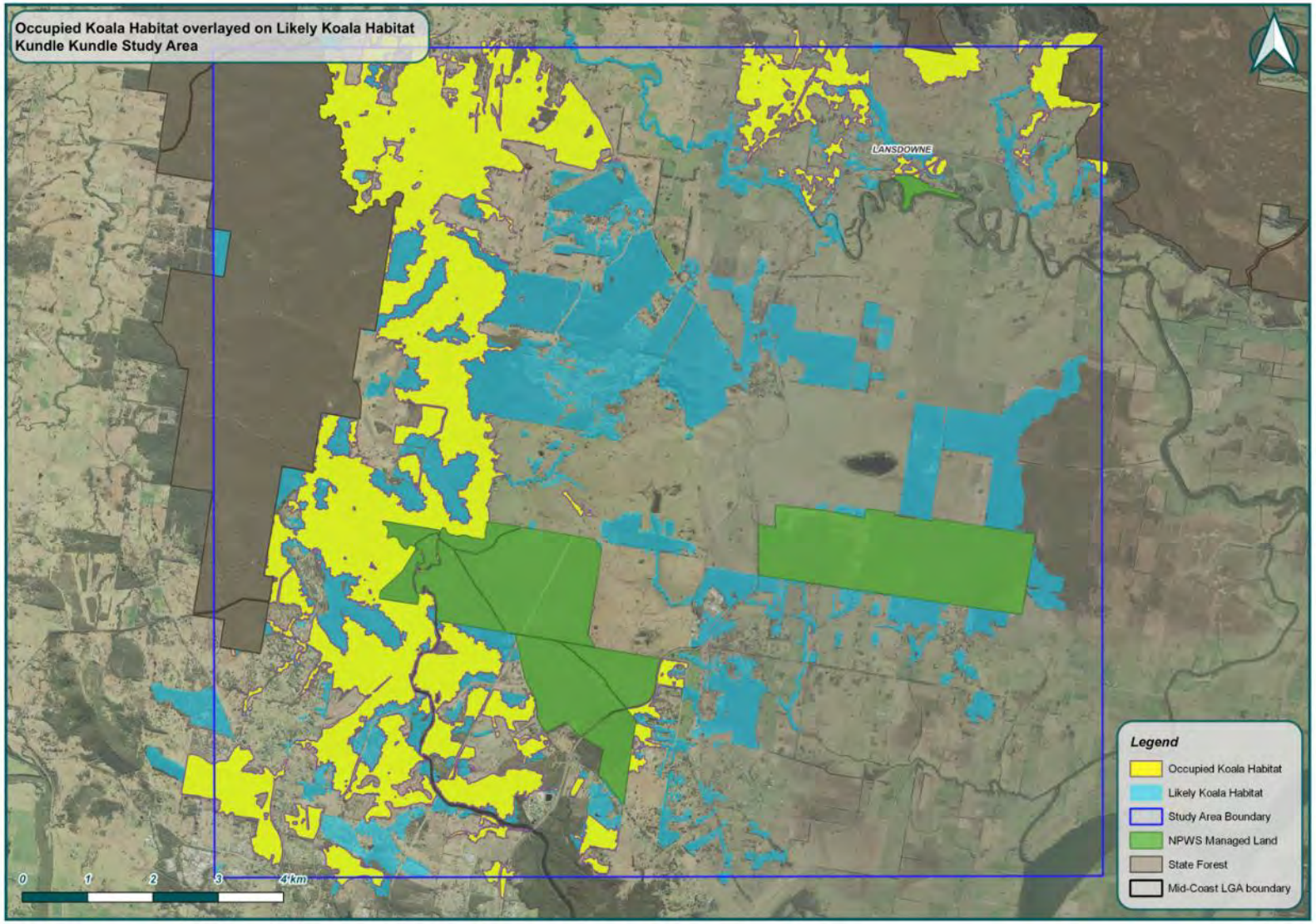


Figure 1-6 Kundle Kundle Case Study Area

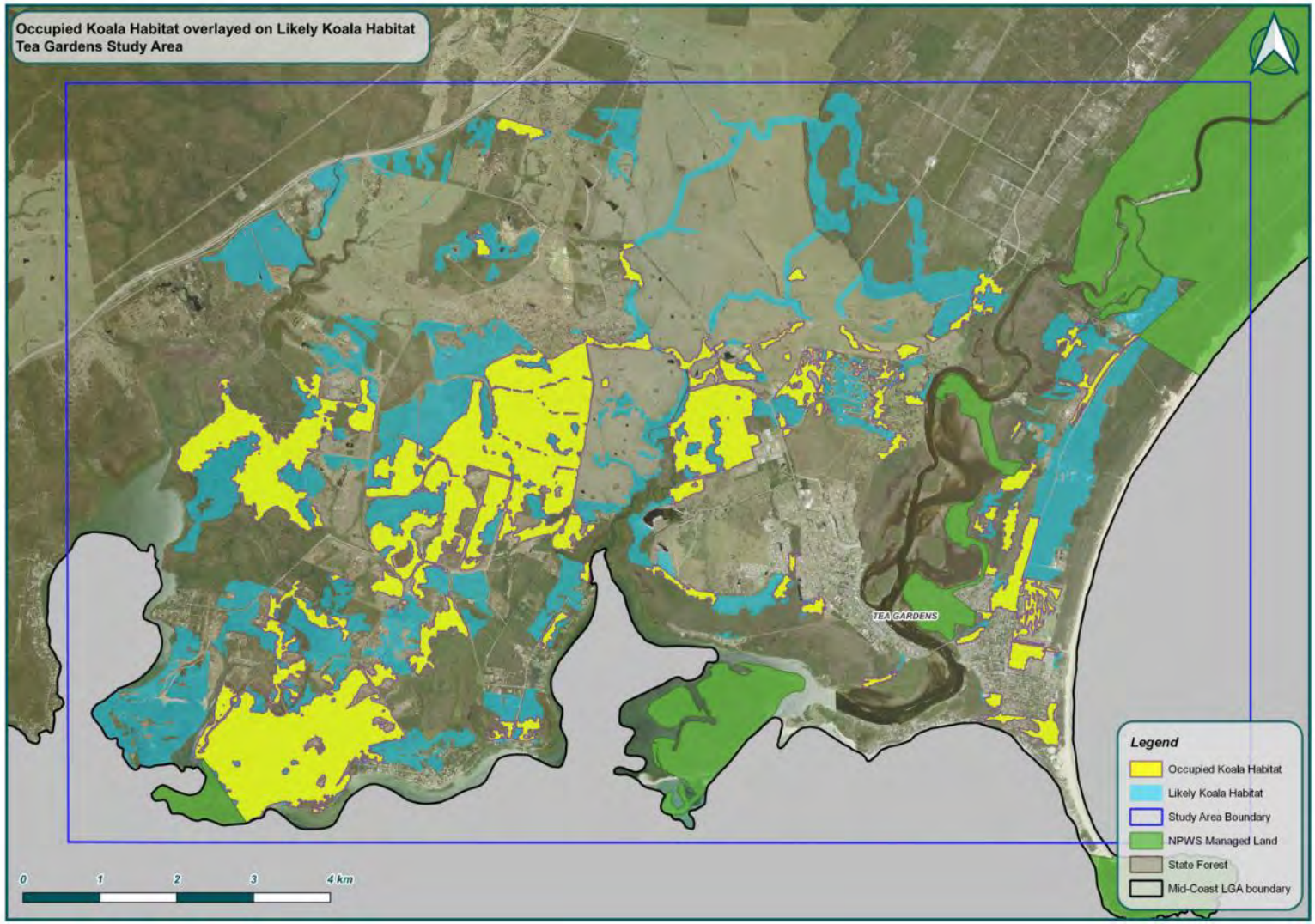


Figure 1-7 Tea Gardens Case Study Area

Stage 2: LGA-wide habitat mapping

After the mapping of the three Case Study areas was completed, the koala habitat model for 'Occupied' (**Figure 1-8**) and 'Likely' (**Figure 1-9**) was applied across the whole MidCoast region.

At the LGA-wide scale, 'Occupied' koala habitat is displayed at the modelled 2.5km grid cells (refer methods in Appendix B).

A range of datasets containing koala records (i.e. BioNet koala sighting records and wildlife carer records) along with Council's most recent survey data is shown within both 'Occupied' and 'Likely' koala habitat mapping.

Available koala sightings records are displayed for between the years:

- 2005-2010
- 2011-2016
- 2017-2022
- 2023 onwards.

Appendix C provides further detailed mapping; separating the MidCoast into four quadrants.

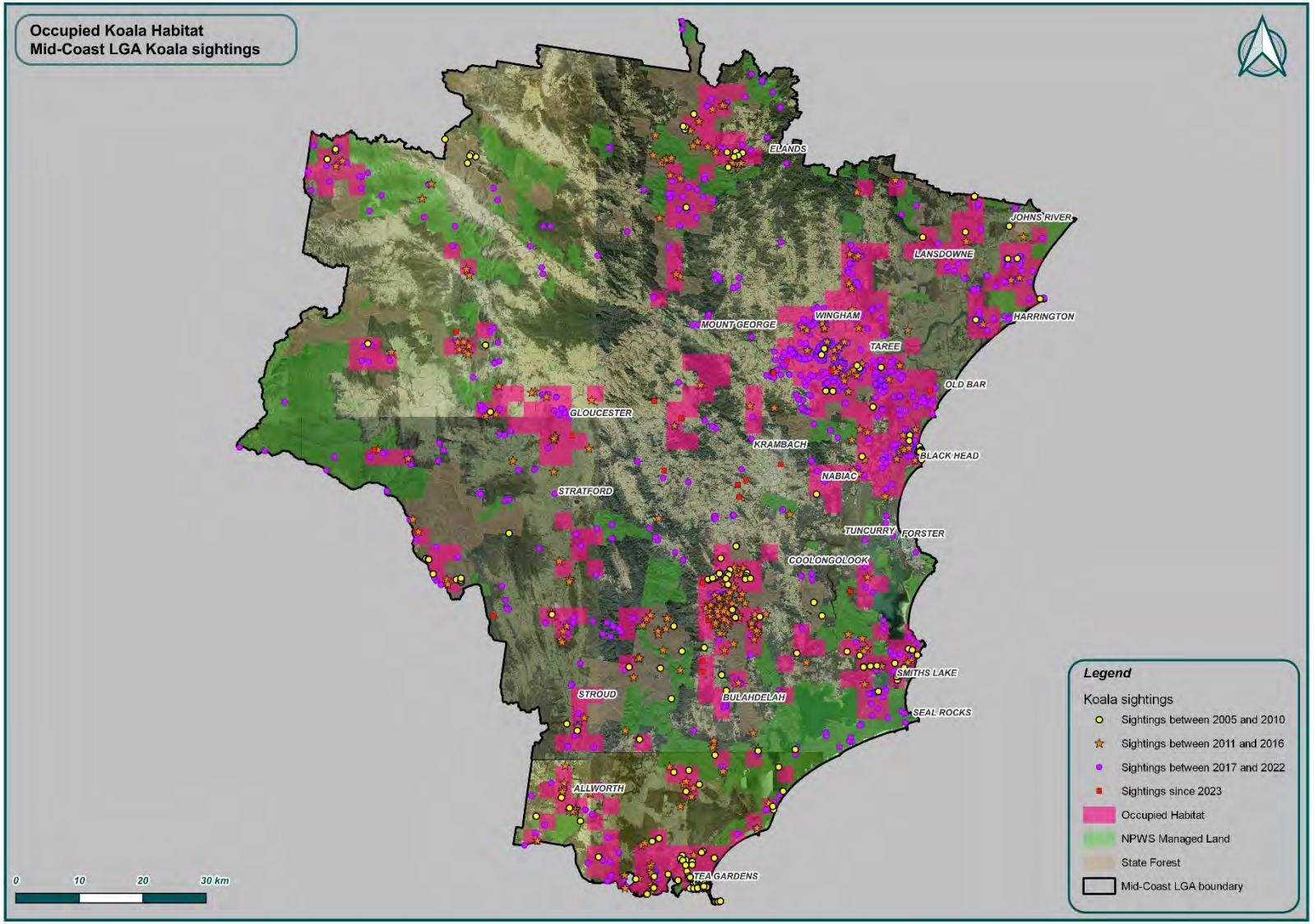


Figure 1-8 Occupied koala habitat grids with koala sightings in MidCoast LGA

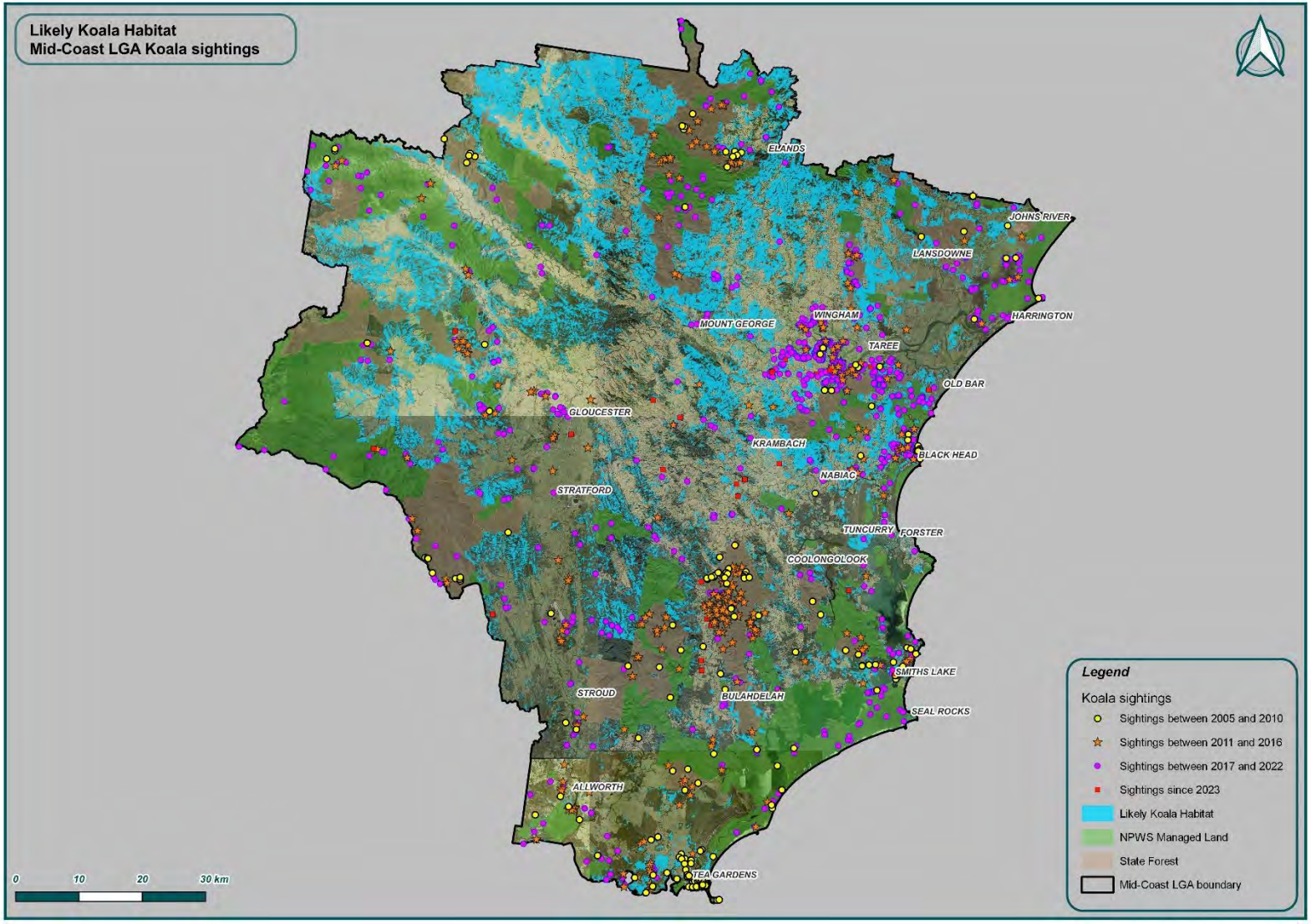


Figure 1-9 Likely koala habitat across the MidCoast LGA

KOALA ECOLOGY ON THE MIDCOAST

2 Koala ecology on the MidCoast

2.1 Distribution and important populations

Koalas are distributed along the east coast of Australia, in Queensland, NSW, Victoria, and eastern South Australia. Most koalas in NSW are now found in the forests and sub-humid woodlands on the central and north coasts. MidCoast Council lies within the NSW North Coast Bioregion where significant populations are still found. Koalas occur across all parts of the LGA, but population densities vary (TierraMar, 2021).

Of the fifty (50) ARKS in NSW, there are ten (10) within the MidCoast LGA (

Figure 2-1). All the ARKS / populations of the MidCoast are either populations for immediate investment or populations prioritised for filling key knowledge gaps and delivering local actions in the NSW Koala Strategy. These are listed in Table 2-1.

Table 2-1 ARKS of the MidCoast Council Area

ARK Name	Reference in NSW Koala Strategy	Total Size (ha)	Area in MidCoast LGA (ha)
Barrington	Barrington[2]	94,827	76,048
Comboyne	Comboyne[1]	168,506	142,511
Crowdy Bay	Crowdy Bay[1]	16,664	15,117
Hawks Nest	Hawks Nest[2]	2,568	2,568
Karuah – Myall Lakes	Myall Lakes[2]	18,850	18,850
Khappinghat	East Taree[2]	18,807	18,807
Kiwarrak	South Taree[2]	34,947	34,947
Nowendoc	Nowendoc[2]	11,979	2,366
Wallingat NP	Forster[1]	37,852	37,852
Wang Wauk SF	Bulahdelah[2]	162,554	153,165

[1] – Population for immediate investment
[2] – Population prioritised for filling key knowledge gaps and delivering local actions

While the NSW Koala Strategy (DPE, 2022) lists these as the second tier priority, MidCoast Council considers that the Kiwarrak and Khappinghat ARKS are two areas likely to contain important remnant koala populations within the LGA (Biolink, 2019) and they are a focal point for Council's koala recovery and conservation efforts (MidCoast Council, 2020). Previous studies have suggested that the Kiwarrak and Khappinghat ARKS function as a single unit, because they share a boundary and are most likely operating as a single, interconnected koala metapopulation (Biolink, 2022).

Over the past 18-months, Council, with financial support from the NSW Koala Strategy, and assistance from partnering agencies, has undertaken numerous surveys, gathering the latest local data for koala and habitat presence. Enhanced data now exists for parts of Kiwarrak, Khappinghat, Wang Wauk SF, Karuah - Myall Lakes, Wallingat NP, Hawks Nest and Barrington ARKS.

Based on the best available knowledge, and acknowledging substantial limitations in some data, an evaluation of each of the ARKS of the MidCoast LGA is provided in Table 2-2.

Table 2-2 ARKS profile

ARK name	Estimated population density	Estimated trend over last 3 koala generations	Population estimate
Barrington	Low - Moderate	Stable	Not available
Comboyne	Low	Large decline in some areas	Not available
Crowdy Bay	Moderate - High	Stable but substantially impacted by 2019 bushfires	Not available
Hawks Nest	Low	Large decline across all areas	Not available
Karuah – Myall Lakes	Low - Moderate	Stable	Not available
Khappinghat	Low - Moderate	Stable but substantially impacted by 2019 bushfires and high incidence of disease	Not available
Kiwarrak	High – Very High	Stable but substantially impacted by 2019 bushfires	1,358[1]
Nowendoc	Low - Moderate	Stable	Not available
Wallingat NP	Low	Stable	Not available
Wang Wauk SF	Moderate – High	Stable	Not available

[1] – Gonsalves & Law, 2023

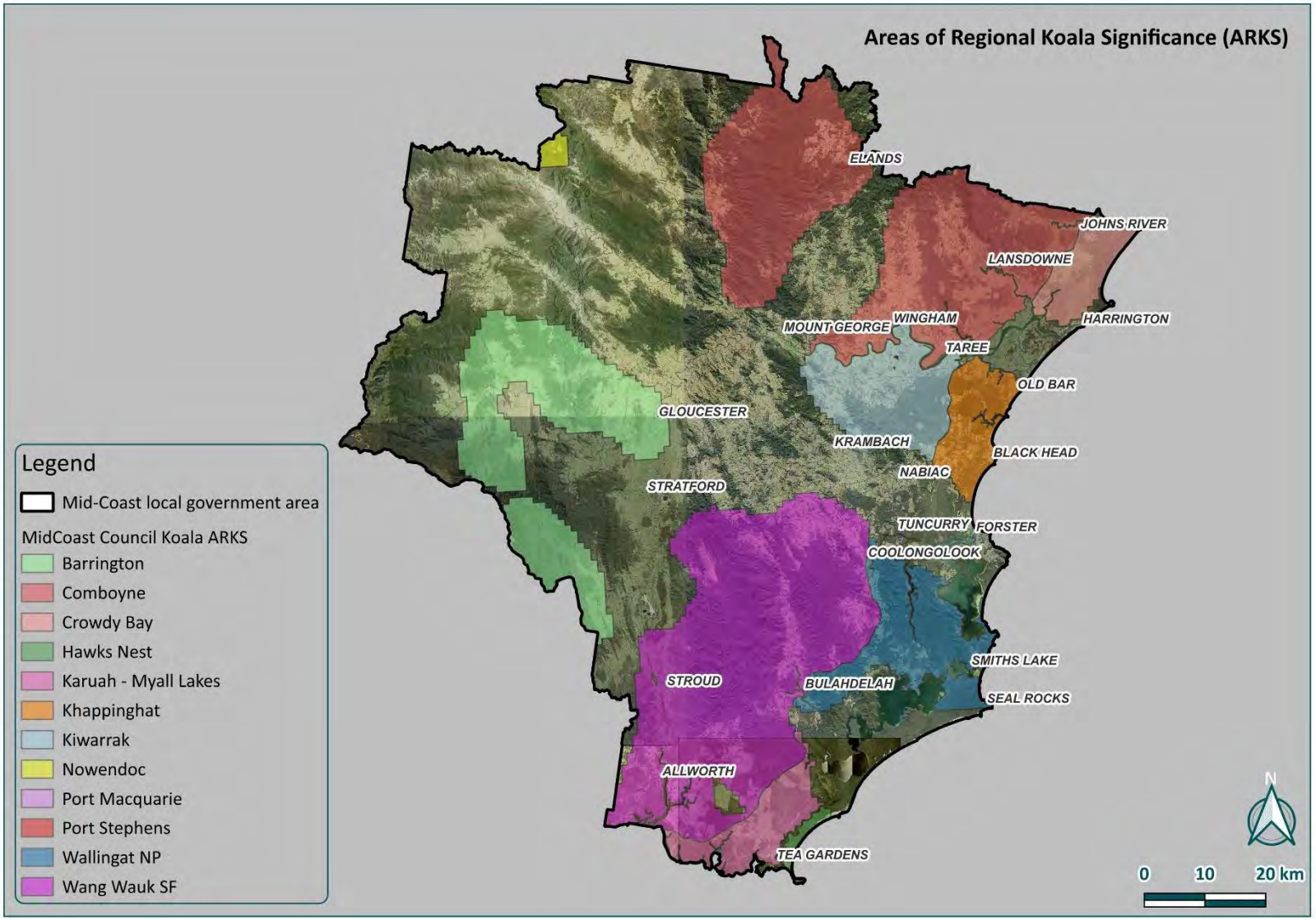


Figure 2-1: ARKs within the MidCoast LGA

2.2 Habitat and home range

Koala habitat includes a wide range of forest and woodland types, from dry, semi-arid woodlands to tall, wet coastal forests. Koalas also occur in riverine woodlands, forested wetlands and sometimes rainforest, if there are emergent koala food tree species present (refer Section 2.3 Diet). Koala habitat appears to be influenced by land elevation, annual temperature and rainfall patterns, soil types, soil moisture, and soil fertility. For a viable population, comprising numbers of breeding females, dominant males, and juvenile animals, large contiguous or well-connected areas of suitable habitat are required.

In certain circumstances, koalas can inhabit residential areas (such as at Port Macquarie, Taree, Tinonee, and Wingham), but urban environments have a high incidence of stressors and threats, which can supress and even extirpate the population. Koalas can occur in fragmented, mostly agricultural landscapes, provided there are sufficient trees along riparian zones, bushland remnants, shelterbelts, and other sites. Again, these populations are at substantial risk as they lack the security of contiguous, intact, or well-connected habitat patches.

Koala occurrence is largely driven by food tree preferences which is determined by the nutritional quality of the leaves on the trees. Water and the availability of thermal refuges (cooler areas for sheltering during hot weather) appear to be important components of preferred habitat. Koalas do spend time in trees that they do not eat including non-eucalypts, for the shade or thermal properties determined by the type of bark, tree size and/or density of canopy foliage, offering cooler or warmer surface temperatures to help the koala thermoregulate (Ellis *et al.*, 2010) (Youngentob, Marsh and Skewes, 2021). Where food tree availability is scarce or absent, the carrying capacity of the habitat is reduced or eliminated. Proximity to water or cooler areas with higher moisture content will become more important as the climate warms and may influence the persistence of populations. Heat stress and disease appear to have been synergistically involved in serious declines in koala populations in parts of western NSW.

Koalas have highly variable home ranges. A typical home range of a koala in northern coastal NSW is about 20-hectares (DPIE, 2020). For the MidCoast area, home ranges can vary significantly depending on the quality of habitat, ranging from a few hectares (high density) to over 30 to 40-hectares or larger (low density and widespread) (J Turbill, pers. comm. 27 November 2023).

Some examples of high koala densities in surveys on the MidCoast are provided:

- In the Bootawa Dam perimeter lands (Kiwarrak ARKS), in a 90-hectare thermal drone search area in 2024, forty (40) individual koalas were detected; representing *one koala per 2.5-hectares*. This density calculation was equivalent to a calculation of density based on a song-meter array for the wider area (Gonsalves & Law, 2023).

- In the Kiwarrak State Forest (Kiwarrak ARKS), prior to the 2019 bushfires, male koalas were detected at a density of 1 per 0.07 ha, which equates to a density of about one male koala per 14-hectares. Assuming a 50:50 male to female ratio; koala average density in that forest may have been *one koala per 7-hectares* (Law., et al 2022).

- At Bunyah (Wang Wauk SF ARKS), analysis of a song-meter array identified koalas at a density of about *one koala per 5-hectares* (Gonsalves & Law, 2024).

The size of a koala home range is influenced by the nutritional quality and availability of preferred food trees and the quality of the habitat. Different parts of a home range can be used in different seasons, with wetter and cooler positions often preferred during warmer months. Dominant male koalas will occupy the best quality habitat; aggressively defending this area from rivals and overlapping his range with several breeding females. Lower ranking males live on the periphery of

the range of the dominant male koala. Animals tend to stay in their home range and have preferred trees for feeding and sheltering.

Depending on the subdivision / land use pattern of an area, an individual koala's home range can occur across one or many private properties. The actual presence of a koala on an individual property may not be a daily occurrence but linked to seasonal dispersal and usage within an individual koala's larger home range (J Turbill, pers. comm. 27 November 2023).

2.3 Diet

Koalas are folivores preferentially browsing mostly but not entirely on leaves of *Eucalyptus, Corymbia* and *Angophora* species (Youngentob, Marsh & Skewes, 2021).

Koalas consume around 500 – 800 grams of leaves each day, obtaining most of their water requirements from the leaves they consume. Koalas seek out trees with higher leaf water during drought. It is a very low energy diet comprising only 5% sugars and starches (DES, 2022). Koalas cope with this low nutrient, low energy and high toxicity diet because of their specialised digestive systems and their low metabolic rates. In dry periods, koalas need to access surface water and do drink. They lick the trunks of trees of dew and rain, and drink from water-filled cavities in trees or other standing water in creeks or dams. Koalas readily drink from artificial water sources, such as dishes and buckets. Koalas live in a fine nutritional balance; they have no fat reserves. In heatwaves, hot animals eat less.

Browsing preferences show regional differences which are influenced by the chemical profiles and water content of different target food leaves (Stalenberg *et al.*, 2014). Foliar chemistry varies both within and between eucalypt species and between different leaf phases or age (Marsh *et al.*, 2018). Eucalypt leaves contain a variety of chemical constituents, including nitrogen (a proxy for protein) and plant secondary metabolites (PSMs) such as tannins, formylated phloroglucinol compounds (FPCs), and unsubstituted B-ring flavanones (UBFs). Koalas can break down the toxic oils using a specialised digestive system, comprising an elongated caecum and specialised bacteria. Koalas are not born with this bacteria in their system and need to acquire it from their mother (DES, 2022). By providing this "pap", the mother koala provides her joey with gut bacteria that is highly specialised to the feed tree species of the joey's birth-range.

Locally important koala habitat trees present within the LGA are listed in Appendix D. In any area, the bulk of a koala's diet is sourced from a small number of preferred food tree species, with supplementary browsing adding to nutritional needs. Very minor quantities of other plant material may be consumed, such as buds, flowers, or bark.

In a care facility being treated by licensed rehabilitators, only 6 – 7 different types of tree species' leaves are regularly consumed by an individual koala. Other species that are offered are not consumed (Koalas in Care Taree, pers. comm.).

There are nearly 50 different primary and secondary koala habitat tree species in the MidCoast. Due to the variety of environments, from coastlines to the mountains, these species are often only found within specific areas, limiting the number of food tree species present in each locality. Some important food tree species are limited or missing in some landscapes due to patterns of clearing or the landscapes' agricultural and / or logging history.

2.4 Lifecycle

Koalas are relatively long-lived with maximum reported ages of 15 years and 12 years for females and males, respectively, in the wild (Martin and Handasyde, 1999). Average natural lifespans in the wild can be substantially reduced in stressful or high-risk environments. Female koalas reach reproductive maturity between two and three years of age. Females have a reproductive potential

to produce one offspring per year (McLean and Handasyde, 2007), but actual reproduction rates per female is often much lower (one offspring per 2 to 3-years). As marsupials, they give birth after 34 - 36 days gestation. The young joey grows in the pouch for the first six months. At this age, juvenile koalas begin transitioning from their exclusive milk diet by ingesting a special maternal faeces known as pap (Blyton *et al.*, 2022) that contains the bacteria it needs to eat the leaves in adult life. After a 12-month lactation period, young koalas are weaned during periods of high food availability and favourable climatic conditions to maximise survivorship when approaching independence (Ballantyne *et al.*, 2015).

Local factors, including population density, food quality and availability, soil type and climate, influence the timing of breeding but on the MidCoast this generally occurs between October and March (McLean and Handasyde, 2007; Ballantyne *et al.*, 2015). Koalas may not breed every year if conditions are unfavourable, and breeding can be unsuccessful due to poor body condition or disease (e.g. *Chlamydia*) (McLean and Handasyde, 2007). Seasonality is a major factor in koala reproduction, and the breeding season differs between northern and southern populations. The highest percentage of births occur in Summer and early Autumn (December to March) (Ellis *et al.*, 2010).

Koalas have slow reproductive rates, which limits the capacity of populations to recover from disturbance events and declines, including moderate to high severity fires.

Breeding female koalas exhibit high levels of maternal care to their dependent young. While young can become independent from about 12 months of age, particularly young females may remain in their birth range for up to 3-years. Juvenile dispersal can be from 0.3 to more than 20-kilometres from their birth range.

2.5 Behaviour

Koalas are mostly nocturnal, sleeping or resting up to 20 hours a day. They are typically solitary, but live in a network of overlapping home ranges, allowing contact between individuals for mating. Territorial behaviour is shown in both males and females who use urine and faeces to scent mark objects in their environment. Male koalas also use the sternal gland on their chest to leave chemical signals, mostly at the base of trees. Koalas also use a range of vocalisations to communicate with one another over large distances. Males use a deep grunting bellow to signify their social and physical position. Bellowing is used to attract females and conserve fighting energy by bellowing their dominance. Females tend to make squeaks, screams, or yaps. Mostly arboreal, koalas can move over large distances on the ground, but they are then vulnerable to vehicle strike and attack from predators.

It was previously believed koalas rarely drank water and observations of drinking in captivity were considered ‘unusual’. Koalas seen drinking from pools or water bottles were attributed to heat stress. However, a recent study revealed koalas were observed to drink by licking the wet surface of branches and tree trunks during or immediately after rain, even when free standing water was available. It is likely this behaviour has gone unnoticed because observations are rarely undertaken during heavy rainfall (Mella *et al.*, 2020).

During hot days, koalas seek cool microclimates and take up heat-dispersing postures, such as hugging the cooler trunks of large trees, splaying limbs (Briscoe *et al.*, 2014) or even climbing into large tree cavities, to reduce or eliminate their need for respiratory evaporative cooling. During heat events or fire, koalas seek refuge in riparian areas, gorges and rock outcrops (Collins *et al.*, 2019). Koalas cannot move rapidly out of the way of fast-moving fire and tend to climb as high up a tree as possible, in a bushfire situation.

2.6 Threats

The status of koalas has been influenced by legacy impacts associated with two significant drivers in this region, namely broadscale clearing of fertile habitats during the period from European settlement through to the mid-20th century, as well as the hunting of koalas for their pelts up until about 1930. Clearing for European settlement would have irreparably transformed some of the highest and best quality habitats of the koala in the region – the alluvial forests along the floodplains of the major rivers and creeks. The continuous use of these landscapes for crops and stock, and the suppression of natural regeneration, would have meant that areas likely to have naturally supported the highest density koala populations would have been heavily altered. Further, koalas in the region were killed in their thousands for their pelts for the export fur trade market. There are references in local newspapers from the period of around the late 1800's and early 1900's, such as:

- *"Messrs Hayward and Cowan shot 62 bears at Marlee on Friday evening last,*
- *A dray loaded with bear skins arrived from Marlee containing many thousands of skins,*
- *A large bale of bear skins, … was shipped to Sydney aboard the steamer Coraki,*
- *A great many persons are shooting native bears on the Upper Manning for the sake of obtaining their skins which bring about 10/- or 12/- per dozen. Some say they make fair wages at it, bears being very abundant in these parts".*

In 1897, it was reported that "*a trio of sportsmen from Taree*" journeyed to Gangat, where they shot five (5) koalas amongst a total bag of 311 animals from ten (10) different species (https://trove.nla.gov.au/newspaper/article/122735288).

The enduring influence of these drivers is not known. The clearing of the highest quality habitats and the killing of many thousands of koalas in the region for "*sport*" or their pelts would have significantly reduced the population of koalas by the mid-20th century and reduced the diversity of the koala genetic pool. Diverse genetics is advantageous for wildlife populations. With their slow reproductive rate, plus the effect of persistent, ongoing threats, these legacy impacts would be influencing the current state of koalas in the MidCoast; but the scale of this influence is not known.

There are many threats to koalas across the MidCoast region, including:

- Habitat destruction, fragmentation, and degradation,
- Urbanisation, resource development, infrastructure and agriculture,
- Disease,
- Vehicle strike,
- High intensity bushfire and altered fire regimes,
- Climate change including heatwaves, droughts and intensified flooding
- Domestic dog attack (residential and rural locations),
- Cattle and horse attack, and
- Stress.

Many of these threats operate synergistically; working together to exert compounding negative effects on local koalas.

Previous experience has shown that the extinction of local populations (e.g. Barrenjoey Peninsula) can be the result of a tyranny of small factors, such as habitat loss, urban development, koala vehicle strike and domestic dog attack (S. Phillips, pers. comm. 29 October 2023). These factors can initiate a decline, which once commenced, can be protracted and difficult to reverse. Typically, habitat loss is a key factor in declining populations.

2.6.1 Habitat destruction, fragmentation, and degradation

The clearing, fragmentation and degradation of koala habitat is considered the primary threatening process affecting the koala. Protecting koala habitat from loss and degradation is the most important recovery and conservation action for koalas across the MidCoast. The loss of habitat leads to many other stressors on koalas (eg. high rates of disease).

Koalas are often found in areas where soil fertility is high, and hence are subject to conflicts associated with intensive land-uses, such as agriculture, urban development, and some resource development.

Most clearing events affecting koala habitat occurs on freehold or leasehold land (Ward *et al.*, 2019). The remaining fragmented koala habitat is reduced in its availability and accessibility and can be subject to degradation from urbanisation. Loss of connectivity in habitat reduces movement and the ability of individuals to disperse safely, therefore reducing breeding and gene flow. Ongoing habitat loss and degradation intensifies climate change impacts on koala populations by reducing the availability of climate-suitable habitat or refuges.

The prevention of the regeneration of important koala food trees in the environment through the deliberate suppression of native regrowth is a threat in some areas and land use contexts.

Koalas are territorial and show substantial fidelity to their established home ranges. As such, clearing and modification of habitat reduces the space available for a viable, stable population. Koala populations, confined by territoriality and by limited preferred habitat, cannot simply adjust to most patterns of clearing and modification of their habitat.

Modification of habitat can result from activities such as under-scrubbing, selective thinning, weed invasion or altered fire and hydrological regimes. These changes disadvantage koala populations and expose them to increased stress or threats (such as from predation).

Most clearing of habitat results from approved developments / activities (including State significant development / major projects), clearing conducted in agricultural lands purportedly under NSW land management codes and exemptions, for infrastructure, or as unexplained or unauthorised clearing. Using biomass for energy production may represent a threat to the habitat of koalas across some parts of the MidCoast region.

The issue of public and private native forestry is contentious. Industry, logging interests and some government agencies cite published research and monitoring that logging and koala populations are not incompatible and that koala populations pre- and post-harvesting can be demonstrated to be equivalent. Public forestry in the region has a requirement to comply with the Coastal Integrated Forestry Operations Approval (CIFOA), which has koala specific prescriptions. Private Native Forestry requires compliance with the PNF Code, which also has koala prescriptions. PNF is administered by Hunter Local Land Services and regulated by the Environment Protection Authority.

However, other researchers, governmental reports and some community members believe that private and public native forestry is a significant threat to NSW koala populations. This view is that private native forestry (PNF) and logging in public native forests in NSW has had cumulative impacts on koalas over many years because it has reduced the maturity, size and availability of preferred feed and shelter trees and it fragments and degrades koala habitat (DPIE, 2020). Mature

or older forests have cooler microclimates than younger / regenerating forests and the logging can open the forest canopy promoting weed invasion and changed mid and lower storey vegetation. Logging is cited as an activity with a risk of injury or death to individual koalas and may increase the stresses affecting koalas. It may transform the habitat of forests and increase risks from more frequent and / or higher-intensity bushfire. Logging in the near-aftermath of moderately and severely impacted forests after the 2019 bushfires is particularly contentious, as koala and other wildlife populations are depleted, susceptible to further impacts and stresses, and are in mid-recovery.

Between 2007 and 2015, there were 3,052 PNF approvals ranging in size from less than one hectare to over 24,000 hectares across NSW. In the MidCoast, there are presently 327 PNF Agreements in the LGA covering properties totalling 110,394-hectares in size. This equates to approximately 11% of the LGA. If PNF is a threat to koalas, then the scale of PNF approvals across the MidCoast would mean that it would be having substantial negative impacts. A recent Senate Estimates Inquiry heard that there is a very low rate of governmental auditing of compliance with the PNF Code at present in NSW.

MidCoast Council routinely reports observations of potentially unlawful clearing to the NSW Government agency responsible for regulation and compliance action. Over the past six years, there has been several instances where potentially unauthorised clearing of native vegetation has impacted properties on which there are known koala sightings or where koalas have been recorded on adjoining or proximal lands.

It has been argued in the inquiry into Koala populations and habitat in NSW (Legislative Council Portfolio Committee No. 7 - Planning and Environment, 2020) that the *Biodiversity Conservation Act 2016* and Local Land Services Act 2015 are weaker, in the protection of koalas, than the former *Threatened Species Conservation Act 1995* and *Native Vegetation Conservation Act 2003*. They allow for greater land clearance through landowner self-assessment and greater difficulty in detecting and regulating illegal clearing of koala habitat. NSW Government's Woody Vegetation Change 2017-18 report, *found a substantial increase in the rate of deforestation following repeal of the Native Vegetation Act and its replacement with the Local Land Services Act and Biodiversity Conservation Act under the 2016 land management reforms*.

Land use threats impacting koalas and their habitat include urbanisation, grazing and agriculture, mining and resource extraction, roads, and other linear infrastructure. Ever-increasing human populations drive the need for more housing and infrastructure. The continual change of natural and rural landscapes to build urban, commercial and industrial estates is a significant threatening process for koala populations, particularly along the coast where human populations are high and demand is increasing (DPIE, 2020). It can significantly impact and interrupt wildlife corridors. Coal mines, hard rock quarries and coal seam gas extraction over the past two decades and more recently the clearing of habitat for renewable energy projects has additional impacts on koalas (McAlpine *et al.*, 2015) (DAWE, 2022).

Council has substantial land use planning roles and regulates some development but has limited to no formal responsibility for State-significant development and major projects (such as large gravel quarries and coal mines, very large developments, and biomass for energy proposals), public native forestry, biodiversity matters within PNF, infrastructure projects, or rural land clearing.

Addressing the threat associated with the clearing and modification of koala habitat requires effective development assessment, regulatory and land management frameworks, and an enhanced reserve system. It also relies on adequate contemporary knowledge of the presence of important koala habitat (occupied and unoccupied), corridors and priority habitat re-creation areas.

2.6.2 Vehicle strike

The NSW government reported that 3,500 koalas were killed by vehicles between 1980 and 2018. (OEH, 2019). Vehicle strike is more likely to occur on roads that dissect or are in close proximity to occupied koala habitat (Gonzalez-Astudillo, 2018). This likelihood is exacerbated where habitat and roads correspond with large coastal cities and towns.

A large proportion of individuals killed by vehicles are otherwise healthy. This mortality removes otherwise healthy individuals from the population (Gonzalez-Astudillo, 2018). Mortality poses a significant threat during the breeding season, when males move around searching for mates or territories and during post-weaning dispersal, which occurs at a young age in both male and female koalas, potentially disrupting gene flow. Young males typically disperse more frequently and over larger distances than their female counterparts. Mature males are at a higher risk as they have larger home ranges and increased movements during the breeding season (October to March).

MidCoast Council is being supported by the NSW Government to develop a koala vehicle strike (KVS) mitigation strategies and install mitigation measures such as fencing, signage and retrofitting road underpasses across the LGA. A KVS audit report has been prepared to guide management actions.

By analysing available data sources and interpreting patterns in koala vehicle strike observations, five (5) priority road sections have been identified in the MidCoast:

- Pacific Highway – north (from Nabiac to the south arm of the Manning River),
- The Bucketts Way – north (from Taree South to Krambach),
- Tinonee – Wingham Road,
- The Bucketts Way – south (from Stroud to the intersection with the Pacific Highway), and
- Pacific Highway – south (from Nerong to the Karuah River).

Other notable roads where there have been recent koala vehicle strike deaths, injuries and / or near-misses include:

- Old Bar Road,
- Failford Road,
- Bootawa Road / Bootawa Dam Road,
- Belbora Creek Road,
- The Bucketts Way near Belbora,
- the Pacific Highway at Wang Wauk Gap,
- Thunderbolts Way, and
- Harrington Road.

2.6.3 Disease

Disease is a significant driver of decline for koalas in some areas and there are correlations between disease and stress, and disease and heatwaves / droughts.

Of all potential pathogens and parasites, infections by the bacterium *Chlamydia pecorum* that lead to chlamydial disease and the koala retrovirus are of most concern (Bachmann *et al.*, 2014; Fabijan *et al.*, 2017; Grogan *et al.*, 2017; McCallum *et al.*, 2018; Quigley and Timms, 2020) (Wildlife Health Australia, 2023).

The most prevalent symptoms of chlamydia are conjunctivitis which leads to blindness, urinary tract disorders (wet bottom / dirty tail), pneumonia, and infertility in females (Polkinghorne, Hanger and Timms, 2013; Fabijan *et al.*, 2017). Chlamydial infection is ubiquitous across the Australian koala population. Given the fertility implications of resultant infections, chlamydia remains one of the major causes of decline in most contemporary populations (Rhodes *et al.*, 2011). Various studies have targeted temporal and regional comparisons of chlamydia infection rates in an attempt to understand how the severity of the disease varies with time and population (Quigley and Timms, 2020), and the influences of different environmental stressors (Narayan and Williams, 2016; Narayan, 2019). The symptoms of chlamydial infection are known to be exacerbated by factors that increase chronic stress to individual koalas such as poor nutrition, reduced habitat quality (habitat loss, fragmentation, degradation, and drought), exposure to unnatural situations (predation, dogs, and traffic), heat-stress, or bushfires. These factors lead to the production of glucocorticoids (stress hormones), which can inhibit reproductive hormones and immune responses, reducing individual health (McAlpine *et al.*, 2015; Narayan and Williams, 2016).

The NSW Koala Strategy includes actions associated with disease monitoring and facilitating chlamydia vaccine trials.

Koalas are also susceptible to a range of medical issues, such as cancerous growths, organ failures, and respiratory diseases. Respiratory diseases can increase in populations affected by large bushfire events, which suggests a link between smoke inhalation and respiratory disease.

2.6.4 High intensity bushfire and altered fire regimes

Fire can be a substantial threat to koalas. Depending on frequency and intensity, fire can affect habitat use, koala feeding behaviour, growth rates, reproductive capacity, and risk of predation. In moderate to high intensity fire, where the tree canopy is scorched, bushfires can cause direct koala mortality.

Although ecologically-appropriate fire is essential for the maintenance of koala habitat, altered fire regimes that exclude fire increase fuel loads, potentially causing high intensity canopy fires resulting in habitat decline and displacement, at least in the immediate and short term. Studies have shown koalas can recolonise burnt habitat, even after severe fire (Law *et al.*, 2022) and that burnt habitat can support breeding (Beale, Marsh and Youngentob, 2022). However, the 2019 bushfires had severe negative impacts. 21% of all mapped Areas of Regional Koala Significance (ARKS) across the MidCoast were burnt; many at moderate or high fire severities. The Crowdy Bay, Comboyne, Khappinghat and Kiwarrak ARKS were all severely impacted. Fortunately, the southern half of the MidCoast LGA was spared from significant bushfire and, in the aftermath of 2019, acted as regionally important unburnt refugia.

At least 5,000 koalas (about 17% of the population) died during the 2019–20 bushfires (NSW Parliament 2020). More than 1.9 million hectares, or 22% of the modelled high or very high suitability koala habitat in eastern New South Wales was impacted. 20.5% of the MidCoast LGA was burnt (**Figure 2-2**). 49% and 63% of the Kiwarrak and Khappinghat ARKS respectively were subjected to canopy scorch (Biolink, 2022).

Law, et al. (2022b) evaluated the impact of the 2019 bushfires on koala populations. They estimated male koala density before and after fires using large acoustic arrays and spatial count models. Acoustic arrays sampled three timber production forests with a gradient in fire severity and three unburnt controls in national parks. They found that koalas were temporarily extirpated where high fire severity dominated the landscape, but some localized recovery was evident after 1 year. Where moderate severity fire dominated, density was reduced by about 50% within 1 year, but koalas were widespread throughout the burnt area. In the third area dominated by low severity fire, no impact was detected as pre- and post-fire uncertainty intervals overlapped. Control sites surveyed at similar times showed little change in density between years. Law et al. (2022b) confirmed the substantial impact of the 2019 bushfires and identified that more frequent fires in a changing climate in the future will compound koala losses. In a fire-impacted forest of the Kiwarrak ARKS, Gonsalves & Law (2023) reported a change of male koala density from 0.07 males per hectare prior to 2019 to 0.025 males per hectare after the bushfires in the Kiwarrak State Forest. Full population recovery from moderate to high intensity fires will take many years.

Prescribed burns can deliver the cool, slow fires that are ecologically appropriate for koalas. However, this requires significant planning and execution to keep fire intensities low, protect koala use trees through trittering or fuel reduction, and prevent breakouts. Those undertaking prescribed burns benefit from up-to-date information on the relationship between fire extent, frequency, and severity as well as impacts on koala habitat (Beale, Marsh and Youngentob, 2022). Taree Indigenous Development and Enterprise (TIDE) has funding from the NSW Koala Strategy to employ a Koala Officer. The purpose of this position is to conduct cultural burning, raise awareness of Traditional Ecological knowledge and Traditional caring for Country practices through working with the local Traditional Owner community, and the broader community.

Most eucalyptus recover from fire via epicormic regrowth (regeneration above ground on branches and stems). How quickly this recovery occurs is dependent upon forest composition, seasonal conditions before and after the fire, and the patchiness and intensity of the fire (Martin and Handasyde, 1999). This can have implications for the timing of release of rehabilitated koalas back into fire-affected areas (Beale, Marsh and Youngentob, 2022).

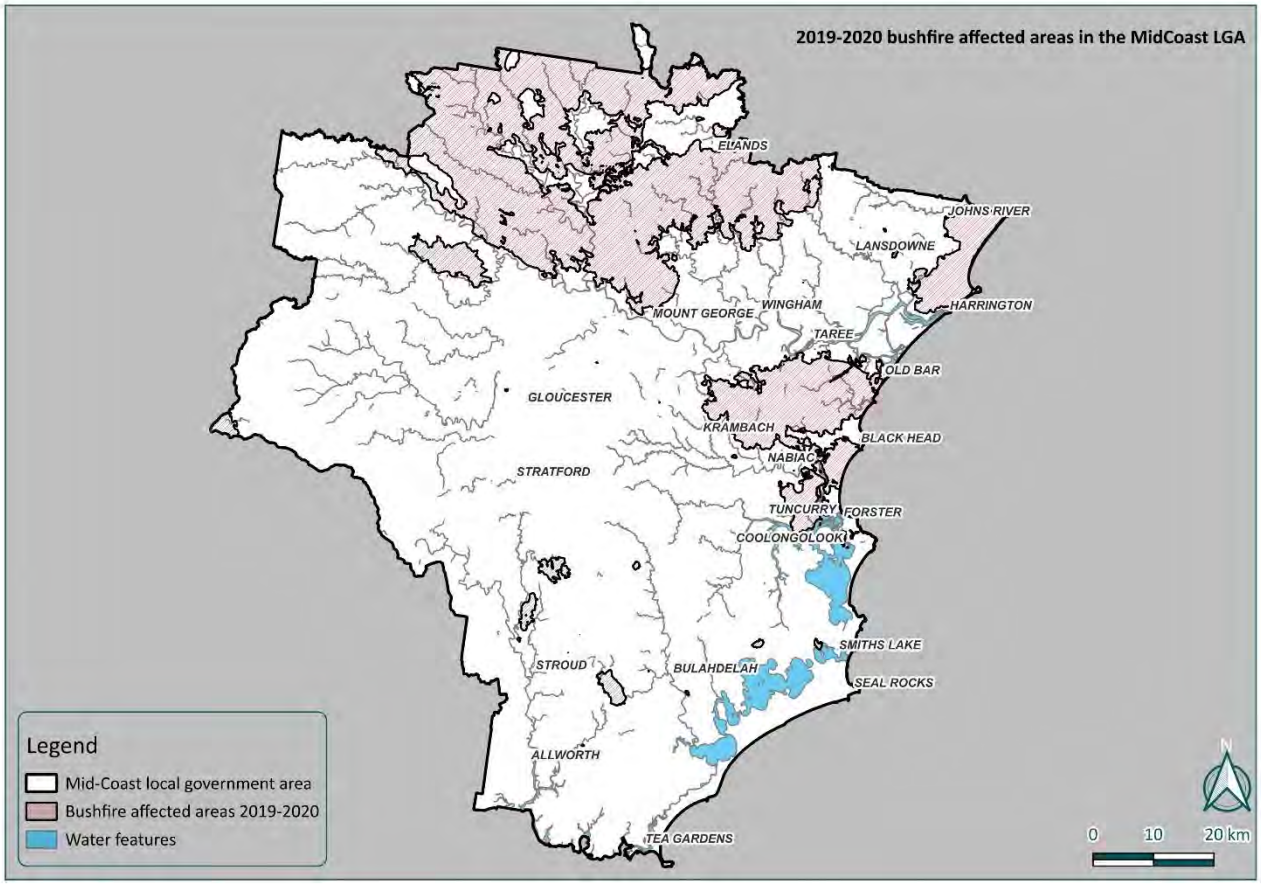


Figure 2-2: 2019-2020 bushfire affected areas in the MidCoast LGA

2.6.5 Climate change including heatwave and drought

Increased drought and heatwaves are the predominant means by which climate change is likely to impact koalas. Climate change is having a severe impact on koala populations by affecting the quality of their food and habitat and causing stress and health impacts. Koalas have limited capacities to cope with very hot days.

Climate change is expected to increase the frequency of high temperatures, change rainfall patterns and increase the frequency and intensity of droughts, potentially causing the koala's range to contract eastward (Adams-Hosking *et al.*, 2011) (Steffen *et al.*, 2009). Up to 20 additional days per year above 35°C have been predicted for north-west NSW. Koalas can be killed directly by heat stress as high temperatures impact kidney function and reduce the ability of koalas to digest the toxins found in eucalypt leaves. High temperatures force koalas out of trees to search for refuge and water, putting them at risk of predators and vehicles. (Legislative Council Portfolio Committee No. 7 - Planning and Environment, 2020).

Extensive tracts of eucalypt forest and woodlands along the eastern seaboard of NSW, including preferred koala food trees such as grey gums and box gums, have experienced browning off and associated dieback, presumably due to lack of water in heatwave / drought events. In the future, preferred koala food trees may become unpalatable or lost from where they currently occur as conditions become climatically unsuitable for these trees.

Access to water in times of drought and heat stress is considered an important landscape feature for koala populations during these high stress events (DPIE, 2020). Ensuring the protection of sheltered, cool refuges and intact riparian zones, and retaining or enhancing the presence of tree species of value for koala thermoregulation, will be important measures for the future.

2.6.6 Domestic dog attack

Domestic dogs attack, injure and kill koalas. 75% of all domestic dog attack koala victims that are brought into care at the Port Macquarie Koala Hospital die because of their injuries or because of resultant infection. Koalas are most often attacked in the residential or rural-residential yards where domestic dogs are present, although sometimes uncontrolled domestic dogs do attack koalas in public or rural spaces.

Domestic dog attacks are a considerable cause of death and injury especially in areas within and adjacent to peri-urban, rural-residential and residential areas (DPIE, 2020) and domestic dog attack is one of the leading causes of recorded koala death and injury within the MidCoast LGA (MidCoast Council, 2023b). In a study from south-east Queensland, domestic dog attack (14% of wild koala deaths) was the third ranked cause of wild koala deaths behind vehicle strike (52% of deaths) and chlamydia-related disease (34%) (https://www.uq.edu.au/news/article/2023/09/cars-chlamydia-and-canines-are-biggest-koala-killers).

Dog attack was considered a high likelihood in all of the MidCoast ARKS (DPIE, 2020), although further analysis in this Strategy has refined this assessment (see Section 2.7).

Across NSW, there are laws to protect koalas from domestic dog attacks on both public and private land. The owner or person in charge of a dog that rushes at, attacks, bites, harasses, or chases a koala (whether any injury is caused) is guilty of an offence under the *Companion Animals Act 1998* for which the maximum penalty is $11,000 (or $44,000 for a dangerous, menacing or restricted dog) and the dog can be seized. However, there has been no action against an owner of a dog killing a koala on the MidCoast, even where the same dog / owner has been involved in more than one known incident. A dog killing, injuring or harming a koala may also be an offence under the *Biodiversity Conservation Act 2016* (MidCoast Council, 2023b). It would not be the intent to prosecute people should an unfortunate, unforeseen, one-off event occurs. It is important to not stigmatise dog attacks on koalas, rather it is critical that koalas involved in dog attacks are urgently admitted to care and that measures are taken to prevent any risk of re-occurrence of the incident. This might be via fencing rectifications, climbing poles to allow koalas to escape from yards, effective dog containment, etc. Exclusion of dogs from new developments in sensitive areas and responsible dog ownership are valuable prevention measure to assist mitigate this threat.

2.6.6 Dingo / wild dog attack

Dingoes as well as free-ranging wild dogs (feral-living stray domestic dogs or their offspring, or dingo-hybrids) have been recording killing and predating koalas (Gentle et al., 2019).

In one Queensland study by Hawthorne L. Beyer and others in the eastern Moreton Bay Council in 2013–2017, 503 koalas were captured and fitted with telemetry devices for monitoring in the wild. Of the 144 koala deaths confirmed as predation in that study, wild dogs accounted for 81.3% and domestic dogs 4.2%. One single male dog that eluded capture until the end of the study was thought to be responsible for 75 koala deaths (https://invasives.com.au/news-events/koala-conservation-efforts-may-be-undermined-by-wild-dog-predation/).

Fragmented landscapes require koalas to move large distances along the ground, making them vulnerable to predation. In a Port Stephens study, predation by wild dogs was the most common reason koalas died following release into burnt habitat after rehabilitation from burns (Lunney et al., 2004). The burnt habitat may have given the dogs in the study a predatory advantage, and the koalas may also have moved more frequently as they would not have occupied established and stable home ranges.

The findings of the Lunney and the Beyer wild dog studies are not replicated in data held for the MidCoast area. Here, the degree or frequency to which dingoes or wild dogs attack koalas is not well understood.

Council has collected and analysed 43 dingo / wild dog scats for their prey items, and none of these scats contained evidence of koala predation. Some of the scats analysed were collected in the landscape of very high-density koala population areas, at Gangat, Bunyah and Bootawa. Further, the preliminary results from dingo scat collection and prey eDNA analysis from the eastern Myall Lakes area has not identified any koala presence in those dingo scats (Dr Neil Jordan, UNSW, pers. comm.). Koalas are known to be present in the areas from which the scats were collected.

Dingoes and koalas have co-existed in Australia for over 6,000-years, suggesting that koalas would not have prey naivety with regards to dingoes.

This Strategy has advocated for more research into the degree of threat posed by dingoes or wild dogs across the MidCoast, with applied management to be devised following the publication of the results of that research.

It is noted that dingoes in parts of the MidCoast area (such as the Myall Lakes area) exhibit high genetic purity (Cairns et al., 2021) and have special ecological and Aboriginal cultural significance.

2.6.7 Cattle and horse attack

Injury and mortality from trampling by cattle or horses (and even sheep) has been reported by veterinarians, farmers and wildlife carers (Hill, Keogh and Anderson, 2019; Jiang *et al.*, 2021, 2022).

Data from wildlife hospitals show that although incidents are low relative to all koala admissions, they are increasing, and are also believed to be under-reported (Jiang *et al.*, 2022). Cattle and other stock may confuse koalas with a threat like a dog (Mitchell-Whittington 2017). Cattle trampling has been described by a wildlife rescuer as being as frequent as dog attacks (Mitchell-Whittington, 2017). For koalas, the presence of grazing cattle within their home range has been shown to reduce their travel distance and their home range size (Jiang *et al.*, 2022).

The risk of death or injury from cattle or horse attack is likely to be reduced where scattered paddock trees offer koalas an opportunity to escape and seek refuge from the stock, although no research has been done. Paddock trees, or other treed areas such as shelter belts, could be valuable refuge spaces for koalas, but have also proven to be economically beneficial to agricultural production systems because of reduced heat stress to cattle and other agroecological benefits.

2.6.8 Stress

There is scientific evidence that stress is a significant issue. Stress levels in koalas can be measured by the cortisol levels in their blood or their scats. There is a new body of research in this area. The highest stressors for wild koalas as measured by high cortisol rates are associated with:

- loss of habitat / land clearing,
- the proximity of roads,
- the effects of bushfires, and
- encounters with dogs (presumably inclusive of domestic dogs, wild dogs or dingoes).

Long-term stress caused by environmental trauma is known to lead to significant problems in koalas. It causes:

- increased signs of koala stress syndrome,

- increased risk of infection and disease,
- suppressed reproduction, growth, and development, and
- high mortality rates.

The negative impacts of stress on koalas can be avoided or reduced by providing reduced-stress environments. This is a primary goal of the MidCoast Koala Safe Spaces program.

2.6.9 Feral deer impacts

Several feral deer species have established populations in the MidCoast region:

- Rusa deer (*Rusa timorensis*) occur in coastal areas between Smiths Lake and Old Bar and west to the Pacific Highway (in the Wallingat NP ARKS), and near Crowdy Bay in the north-east. They can be present in high densities in some areas.
- Fallow deer (*Dama dama*) are a herding deer, which occur at present on the northern foreshores of Port Stephens, and in western areas around Curricabark.
- Sambar (*Rusa unicolor*) are Australia's largest deer species and are presently confined in the MidCoast to an area in the north-east, near Crowdy Bay / Coopernook.
- Red deer (*Cervus elaphus*) are typically in low densities but are widespread in the more mountainous areas of the slopes of the eastern Great Dividing Range.

All feral deer species are increasing in distribution and abundance. Feral deer impact the habitat of koalas and other native wildlife by over-grazing and competition, impacting soil structure and killing plants by ringbarking (Davis *et al.*, 2016). Feral deer may cause significant damage to koala habitat in sensitive areas. Feral deer are also known to browse, damage and destroy new tree plantings included new habitat planted for koalas. While Koalas in Care (Taree) hold no reports of incidents of feral deer attacking koalas (Koalas in Care Taree, pers. comm), feral deer have the potential to aggressively attack koalas that are on the ground in the same way that cattle and horses sometimes do. Feral deer control techniques are limited and population scale control is difficult. It relies on a nil-tenure, coordinated and sustained approach. Further research is required on the impacts of feral deer on koalas. The outcomes of this research should be incorporated into management actions, with robust evaluation mechanisms. Koala tree planting programs need to factor in deer control or exclusion during the tree establishment phase.

2.6.10 Drowning risks

There are records of koalas drowning in backyard swimming pools. There have been no recent reports of this in the MidCoast Council area. The human safety measures associated with swimming pools has probably been effective in isolating koalas from accessing residential pools in most instances. Pools designed with shallow, sloping edges or with a piece of stout rope allow koalas to climb out if they have fallen in.

Koalas in Care (Taree) has admitted and had reports of koalas becoming trapped in muddy dam walls or drowning in rural dams during drought conditions whilst trying to access drinking water (Koalas in Care Taree, pers. comm.).

2.7 Summary of threats within ARKS

Existing threats to koalas in the MidCoast were assessed in the Framework for the Spatial Prioritisation of Koala Conservation Action in NSW (DPIE, 2020) and were assigned a 'threat likelihood'. Threat likelihood is the potential for koala values to be impacted upon across an ARKS and therefore, the likelihood of diminishing habitat integrity and koala viability. Dog attack was considered a 'high' threat likelihood in all ten ARKS. Five ARKS (i.e. Comboyne, Karuah-Myall Lakes, Khappinghat, Kiwarrak and Wang Wauk SF) recorded a 'high' threat likelihood for habitat fragmentation. Vehicle strike was considered a 'high' threat likelihood in four ARKS (Karuah-Myall Lakes, Khappinghat, Kiwarrak and Wallingat). Three ARKS contained a 'high' threat likelihood for wildfire (Barrington, Nowendoc and Wang Wauk SF) and Kiwarrak was considered a 'very high' threat likelihood for disease.

Council's koala project team has re-evaluated the previous threat likelihoods published in DPIE (2020) based on their expert knowledge of koala populations and the threats that each ARK is facing. The revised threat likelihood in each MidCoast ARKS is provided in Table 2.3.

Table 2-3 Threat likelihood in each MidCoast ARKS

ARK name	Frag-mentation	Wildfire	Vehicle strike	Heat stress	Disease	Dog attack	Climate change
Barrington	High	High	Moderate	High	High	Moderate	High
Comboyne	Moderate	Very High	Low	High	High	Moderate	High
Crowdy Bay	Moderate	Very High	Moderate	Moderate	Low	Moderate	Moderate
Hawks Nest	High	High	Moderate	Moderate	Moderate	High	Moderate
Karuah – Myall Lakes	Moderate	High	Moderate	Moderate	Low	Low	Moderate
Khappinghat	High	High	Moderate	Moderate	Very High	Moderate	Moderate
Kiwarrak	Moderate	High	Very High	Moderate	High	High	High
Nowendoc	Moderate	High	Moderate	High	Moderate	Moderate	High
Wallingat NP	Low	Moderate	Low	Moderate	Low	Low	Moderate
Wang Wauk SF	Moderate	Moderate	Moderate	Moderate	Low	Low	Moderate

STRATEGY TARGETS

3 Strategy targets

3.1 Strategy targets relative to the NSW koala strategy

The Strategy seeks to align with and feed into seven of the NSW Koala Strategy conservation targets (DPE, 2022) (Table 3-1). Council will report its annual progress against local scale versions of these targets which feed into the State Government's Koala Strategy targets.

Table 3-1 MidCoast Strategy targets aligned with the State Government's Koala Strategy targets.

NSW Koala Strategy Targets	NSW Government (by 2026)	MidCoast Council (by 2029)^
Protected koala habitat	22,000-hectares	800-hectares of koala habitat permanently protected (Strategy Action 1.2)
Restored koala habitat	25,000-hectares	1,000-hectares of koala habitat on private or public land restored or replanted through Council programs (Action 1.3)
Land use planning	-	Koala habitat values included in all land use planning decisions (Action 2.1)
Assets of Intergenerational Significance for koalas	20 assets secured	1 new asset identified and advocated for (Action 1.12) 1 existing asset supported (Crowdy Bay Asset of Intergenerational Significance) (Action 1.12)
Regional partnerships	Up to 8 regional koala conservation partnerships	1 regional koala conservation partnership delivered (Action 5.1) Local communities engaged in local koala actions (Action 3.2)
Develop koala habitat maps	10+ councils supported to develop koala habitat maps	Extend koala habitat mapping across the LGA (Action 4.1)
Baseline surveys	Up to 50 populations surveyed	>4 surveys of priority for immediate investment and / or knowledge gap populations supported (Action 4.4)

^ These are the targeted contributions by Council to the state-wide targets. They do not include contributions to these targets by other agencies and organisations across the MidCoast region, such as the NPWS Reserve Acquisition team, etc. This Strategy separately identifies our local targets for koala habitat conservation, improving the safety and health of koalas, supporting local communities to conserve koalas and building our knowledge of koalas. These are identified in s3.

3.2 Council strategy targets

MidCoast Council has adopted a range of local targets for actions within this Strategy. The contributions to the NSW Koala Strategy targets as well as the local MidCoast targets are identified in the table below.

Table 3-2 Combined local and State targets with performance measures

Target	Performance measurement	Contributing Actions
>1,000 ha of koala habitat has been restored or planted including through devolved grant landholder projects by 2029	Number of hectares of koala habitat restored Number of hectares of koala habitat planted Number of koala habitat trees planted	1.3
A register of Koala Safe Spaces landholders has been maintained	Number of landholders	1.4
Council's efforts have been strategically aligned and communicated to the wider koala network	Number of meetings with stakeholders held Number of joint koala conservation projects delivered	1.5
>500 ha of Council owned land has been designated, restored, and actively managed as koala safe spaces by 2029	Number of hectares managed as Council Koala Safe Spaces	1.1
>800 ha of koala habitat has been acquired or permanently protected by 2029	Number of hectares acquired or permanently protected Number of Council referrals to Biodiversity Conservation Trust (BCT) Number and area in hectares of BCT Agreements in koala habitats Number of BCT revolving fund investments in koala habitats Number of Council referrals to National Parks & Wildlife Service (NPWS) for possible land acquisition Number and area in hectares of NPWS Reserve Acquisitions of koala habitats	1.6 1.7 2.12
>5,000 koala habitat trees have been given to the community by 2029	Number of trees provided in tree giveaway programs Number of trees provided by Council's nursery for koala projects	1.9

Target	Performance measurement	Contributing Actions
Koala habitat and koala populations have been considered in land use planning, development assessment and Council activity approval decisions	Legally defensible and high-quality DA, land use planning and strategic decisions have been made	2.1
>10 koala vehicle strike projects / actions have been delivered by 2029 >5 speed monitoring surveys have been conducted by 2029	Number of sites with different KVS actions Number of speed monitoring surveys at koala vehicle strike hotspots	2.5
Underpasses have been identified, maintained, and enhanced	Number of underpasses mapped Number of underpass enhancement or maintenance projects completed Area in hectares of land within 200-metres of underpasses protected and managed	2.6
>100 ha of ecological / cultural burns has been completed on Council owned land by 2029	Number of hectares Number of meetings or workshops relating to cultural burning attended	2.7
>4 priority koala populations have been surveyed and described by 2029	Number of populations subject to monitoring and surveys Number of surveys (songmeter, detection dog, etc) undertaken Number of populations with population estimates Number of koalas present in the Bootawa songmeter project area	2.8 4.4
Koala habitat has been identified on fire plans	Number of bushfire management plans, operational plans and hazard reduction plans where koala habitat has been identified Number of maps shared with fire management agencies identifying high priority koala habitat	2.8
Koala habitat has been protected as an asset in fire control operations and emergencies	Number of fire control operations and emergencies where koala habitat has been protected as an asset	2.8

Target	Performance measurement	Contributing Actions
>30 artificial watering stations have been installed in priority areas by 2029	Number of watering stations	2.11
>200-ha of climate change adaptation corridors and refuge nodes for koalas are conserved and managed by 2029	Number of hectares	2.12
Koala populations have been protected from domestic dog impacts in new developments	Number of restrictions or covenants Number of new off-leash areas locations in koala habitat that have koala exclusion fencing	2.14
Community koala sightings have been recorded and provided to BioNet	Number of community koala sightings Number of community awareness campaigns to promote reporting of koala sightings Number of trials of time-bound citizen science koala sighting reporting campaigns delivered	3.1
A koala education and engagement strategy has been prepared by 2025	Number of koala education and engagement strategies prepared	3.2
Traditional Owner projects have been supported by 2029	Number of Traditional Owner projects supported Number of projects co-designed with Traditional Owner groups	3.4 3.5
>3 MidCoast Koala Festivals have been delivered by 2029	Number of Koala Festivals Number of attendees	3.6
Koala habitat mapping has been extended across the MidCoast LGA by 2029	Number of hectares with fine-scale koala habitat mapping Number of koala habitat map upgrades	4.1
Support has been provided to care and rescue groups to increase the accuracy of sightings data	Number of meetings with care and rescue organisations involving support for increasing the accuracy of sightings data	4.5
>6 conferences, workshops or symposia have been attended by 2029	Number of events attended	4.6

Target	Performance measurement	Contributing Actions
MidCoast Koala Research Strategy prepared and delivered	Number of research strategies prepared Number of meetings with NSW Koala Strategy Research officers Number of research projects delivered Number of replanting sites monitored for koala use	4.7 4.8 4.11
>4 MidCoast specific koala research projects have been delivered by 2029	Number of research projects	4.8
Council has been informed of scientific knowledge of the impacts of public and private forestry	Number of research articles compiled	4.13
Koala education and engagement has been delivered	Number of participants Number of events Number of views Number of awareness campaigns to promote reporting of injured koalas Number of education and engagement campaigns that have been co-designed with partners A Friends of the Koala Landcare Group has been evaluated	4.15 3.3
Advocacy for koalas has been delivered by 2029	Number of advocacy actions undertaken Number of forestry-related advocacy undertaken Number of major projects related advocacy undertaken Number of KVS-related advocacy undertaken Number of Crown Land-related advocacy undertaken Number of 10-50 and Rural Boundary Clearing Code related advocacy undertaken Number of Companion Animals Act related advocacy undertaken Number of reviews attended relating to koala legislation	5.2 5.3 5.4 1.11 2.4 2.15

Target	Performance measurement	Contributing Actions
Carbon Farming projects have been supported	Number of Carbon Farming projects supported, where there have been outcomes for koalas	5.8
The Council offsets procedure for council activities has been reviewed by 2025	Number of reviews of the Council offsets procedure for Council activities	2.2
A Koala Emergency Response Plan prepared by 2025	Number of Emergency Response Plans Number of emergency events where support is provided to wildlife care and rescue organisations	2.9 4.14
A map of important koala corridors across the MidCoast LGA has been published by 2025	Number of koala corridors maps Number of koala corridor maps that include climate adaptation nodes and refuges Number of koala corridor implementation plans prepared Number of hectares of koala corridors protected	4.2 4.12 1.2
The mapping in this Strategy has been expanded to include State Forest and NPWS estates by 2025	Number of maps of likely and occupied habitat published for State Forests and NPWS estates	4.3
Final koala habitat tree list prepared by 2025	Number of koala habitat tree lists	4.16
The MidCoast Regional Partnership with the NSW Government has been successfully extended	Number of Regional Partnerships extended	5.1
Partnerships in koala recovery and conservation have been delivered	Number of partnerships Number of partnerships with farming organisations	5.5 5.6
Regional koala connectivity has been protected at The Gate by 2027	Area of corridor protected Area of corridor restored	1.8
All IKPOMS are in-compliance by 2027	Number of compliant IKPOMs	1.10

Target	Performance measurement	Contributing Actions
1 new asset of intergenerational significance for the koala has been identified to the NSW Government by 2027	Number of assets of intergenerational significance identified to the NSW Government	1.12
>2 local koala conservation action plans have been prepared by 2027	Number of local koala conservation action plans prepared	1.13
Tinonee has been managed as an urban safe space for koalas by 2027	Number of trees planted Number of signs installed Areas of habitat protected in hectares	2.3
By 2027, all hazard reduction burns and prescribed burns have had a pre-burn koala inspection	Number of burns Number of koala inspections	2.10
Domestic dog incidents have been prevented	Number of domestic dog attacks on koalas Number of domestic dog education campaigns Number of domestic dog attacks recorded in a central database	2.13
By 2027, priority koala habitats have been communicated to agencies involved in feral deer controls	Number of priority koala habitat area maps communicated with deer control agencies	2.17
>1 Annual Report Card has been prepared for a priority koala population by 2027	Number of report cards	3.7
A lantana focussed research project has been delivered by 2027	Number of lantana focussed research projects delivered	4.9
A LGA-wide research project on prey analysis of dingo / wild dog scats has been delivered by 2027	Number of prey analysis projects delivered	4.10

Target	Performance measurement	Contributing Actions
Koala offsets have been delivered	Number of offset trees planted by Council to offset losses during Council activities Number of offset hectares conserved by Council to offset losses during Council activities Number of local offsets delivered for local development approvals	2.2
Private sector investment in koala conservation has been delivered	Estimated value of investment	5.7
A model paddock layout for koala refuge has been planned and trialled by 2029	Number of paddock trials undertaken to better protect koalas from stock	2.16

STRATEGY ACTIONS

4 Strategy actions

The actions within this Strategy give reference to the NSW Koala Strategy pillars and have been grouped under five (5) categories:

1. Habitat protection, restoration, and connectivity
2. Threat mitigation
3. Education, engagement, and the integrating Traditional Owner knowledge
4. Research, monitoring, health, and welfare
5. Advocacy, funding and partnerships.

Council is one of numerous land managers within the LGA. Our duty to protect and conserve koala populations and their habitat is shared with all government agencies, and a range of other stakeholders.

Council recognises the knowledge of Traditional Owners, koala care providers, community groups, environmental volunteer organisations and private landholders, and the crucial roles they play. Potential partner entities are noted as 'additional stakeholders' within the management action tables.

Table 4-1 Council management categories aligned to NSW Koala Strategy pillars

Management category	1. Koala habitat conservation	2. Supporting local communities to conserve koalas	3. Improving the safety and health of koalas	4. Building our knowledge
1. Habitat protection, restoration, and connectivity	✓	✓	✓	
2. Threat management	✓	✓	✓	
3. Education, engagement and integrating Traditional Owner knowledge	✓	✓	✓	✓
4. Research, monitoring, health, and welfare	✓	✓	✓	✓
5. Advocacy, funding and partnering	✓	✓	✓	✓

Management actions are allocated a timeframe for when they are to be undertaken (Table 4-2).

Table 4-2 Timeframes

Timeframe	Definition
Ongoing	Action to be delivered in an ongoing basis
Short	Action to be completed by the end of Year One
Medium	Action to be completed by the end of Year Three
Long	Action to be completed by the end of Year Five

4.1 Habitat protection, restoration, and connectivity

Koala recovery and conservation requires the creation of coordinated safe spaces and safe connections and reducing the operation of threats and stresses in the landscape. Local Government is well placed to work collectively with other agencies and the community to assist deliver the Safe Spaces program outcomes. In the Safe Spaces model, well-managed public forests and Council reserves are linked with protected freehold land and key threats to koalas are managed throughout the wider landscape.

Funding provided by the NSW Government through the NSW Koala Strategy is already helping to create new koala habitat through plantings, and restoring existing koala habitat that is impacted by weeds or stock in priority ARKS (and their buffers). Our partners and the community play an important role in hosting plantings of koala feed and shelter trees to enable safe movement and safe habitat for koalas. Council's nurseries have assisted in this effort through provision of local koala food tree seedlings to landholders.

Table 4-3 Habitat protection actions

Action ID.	Action	Additional Stakeholders	Timeframe
1.1	Designate and manage Council land and reserves that contain koala habitat as "*koala safe spaces*" and enhance their size, condition and connectivity through management and active restoration. This may involve works such as access controls, weed removal, strategic planting / revegetation, signage, etc). *Within the first five-years of this Strategy, the Council owned lands that are to be designated as koala safe spaces shall include (but not be limited to):* • *Bootawa Dam perimeter lands* • *Bucketts Way Waste Management Centre perimeter lands* • *Tinonee playing fields perimeter lands* • *Peg Leg Creek future dam perimeter lands* • *Cattai Wetlands* • *Darawakh Creek / Frogalla Swamp Wetlands* • *Red Head / Seascapes Koala corridor* • *Kore Kore Creek Reserve*	-	Long
1.2	Prepare a priority koala corridor implementation plan and program for the MidCoast LGA. The plan / program shall detail the actions to protect, enhance and / or create priority koala connectivity across the MidCoast LGA. Implement the actions set-out in this plan. *The area of the Barrington ARKS between the Gloucester township and the Barrington Tops Flora Reserve shall be considered one of the priority areas for connectivity improvement in the program.* *This will follow the corridor mapping exercise in Action 4.2.*	NPWS DCCEEW BCT Landholders	Long

Action ID.	Action	Additional Stakeholders	Timeframe
1.3	Maintain the ability to deliver devolved funding programs to private landholders and public lands to restore existing koala habitat and create new koala habitat. Funded works are to include bush regeneration, control of weeds that impact koalas and the quality of their habitat, fencing for stock exclusion, planting, facilitated natural regeneration, and seeding. Habitat restoration programs shall bring about strategic, long-term improvement. Programs will be delivered in identified priority areas.	Landholders Public land managers	Ongoing
1.4	Maintain a register of landholders across the MidCoast that are willing to support koala habitat creation, restoration, and monitoring programs on their land (as part of the MidCoast Koala Safe Spaces program).	Landholders	Ongoing
1.5	Communicate and (where possible) align Council's koala recovery and conservation efforts with the community and other stakeholders. Assist the capacity of partnering organisations (where possible) to deliver koala habitat restoration and conservation programs by providing information, resourcing, support, or cooperative effort.	All stakeholders	Ongoing
1.6	Partner with the BCT and the NSW Credits Supply Taskforce to increase the amount of koala habitat that is protected under private land covenants, instruments, and agreements. Identify strategically important areas of koala habitat on private land that should be evaluated for protection using private land conservation instruments. Connect potential customers with the BCT or Credit Supply Taskforce. Encourage the BCT to utilise the revolving fund mechanism to protect koala habitat by understanding the BCT considerations associated with this program and by identifying suitable properties to the BCT for possible application of the revolving fund scheme. Inform and promote the uptake of private land conservation and the revolving fund scheme for koala conservation in priority areas.	BCT Credits Supply Taskforce Landholders	Ongoing

Action ID.	Action	Additional Stakeholders	Timeframe
1.7	Identify strategically important areas of koala habitat on private land that should be evaluated for addition to the National Parks estate. Understand the NPWS Reserve Acquisition priorities and considerations for koala habitat reservations. Connect potential vendors with the NPWS Reserve Acquisitions team.	NPWS – Reserve Acquisitions Landholders	Ongoing
1.8	Develop an action plan for securing connectivity outcomes at *The Gate* – the regional wildlife corridor area between Myall Lakes NP, Wallingat NP and Booti Booti NP. Implement the actions within the Plan.	NPWS LALC Community BCT Philanthropists	Medium
1.9	Hold annual koala food tree giveaways. Maintain the capacity of the Council nurseries to collect seed and grow-out koala food trees for giveaways and planting programs.	-	Ongoing
1.10	Audit all Individual Koala Plans of Management (IKPOMs) across the MidCoast LGA. Redress any issues of non-compliance detected during the audit.	IKPOM stakeholders	Medium
1.11	Advocate for a program of protection and management of Travelling Stock Reserves, unformed Crown Roads and other Crown Reserves that are of high conservation value for koalas.	Hunter LLS	Medium
1.12	Identify and nominate to the NSW Government one new asset of intergenerational significance for the koala in the MidCoast region. Support the management of the existing Crowdy Bay Asset of Intergenerational Significance for koalas.	NPWS	Medium
1.13	Develop and implement local koala conservation action plans in priority areas that will define the conservation actions and targets for securing viable long-term safe populations of koalas for that landscape. Implement adopted local koala conservation action plans.	Community	Medium

4.2 Threat mitigation

Koalas face many current and emerging threats in our region including habitat loss, bushfire, climate change, vehicle strike, disease, and domestic dog attack (s2.6).

Eliminating or reducing these threats is an integral part of any strategy for protecting koalas and ensuring their long-term survival.

Because different parts of the MidCoast are subject to varying levels or effects of these threats. Council will prioritise funding toward targeted locations and mitigation activities. It will also seek out partnerships to leverage additional resources and up-scale threat reduction activities.

For mitigation actions to be effective, all stakeholders need to work together, in a coordinated and tenure-blind approach.

Table 4-4 Threat management actions

Action ID.	Action	Additional Stakeholders	Timeframe
2.1	Implement a best management practice framework and a continuous improvement regime for processes associated with the assessment of impacts to koalas in planning proposals, development applications and Council activities. Wherever possible, incorporate the delivery of local offsets in development and planning proposal outcomes. Identify strategically-important local offset sites and develop local area offset schemes, which include appropriate long-term maintenance frameworks.	DCCEEW DPHI	Ongoing
2.2	Review and improve the MidCoast Council offsets procedure for Council activities in relation to the loss of koala habitat / loss of koala food tree species. Focus on achieving improved program effectiveness and delivery.	-	Short
2.3	Manage Tinonee as an urban koala safe space. Develop an Urban Koala Safe Space Strategy for Tinonee, including a tree audit, street and public tree planting programs, KVS measures, as well as education and interpretation features.	Community	Medium

Action ID.	Action	Additional Stakeholders	Timeframe
2.4	Write to the NSW Government requesting an amendment to the process of the 10:50 Code to require that landholders formally register their application of the Code. Write to the NSW Government requesting that the Rural Boundary Clearing Code be rescinded. Participate in any opportunities for review of the 10:50 Code and Rural Boundary Clearing Code.	RFS	Medium
2.5	Deliver koala vehicle strike avoidance and mitigation measures at priority locations (ie reduced speeds, variable message signs, roadside letterbox / garbage bin stickers, pavement treatments, directive fencing, crossing structures, road verge maintenance, lighting, request for speed patrols). Monitor traffic speeds at koala roadkill hot-spot areas and communicate the results to the NSW Police and the community.	DCCEEW NSW Police Community	Ongoing
2.6	Create a register of wildlife underpasses throughout the LGA. Audit and monitor the structures and deliver or advocate to the responsible authority for active maintenance work that ensures proper underpass performance (including the integrity of directional fencing). Target the area on each side of wildlife underpasses for conservation instruments and management to ensure that koala habitat on each side of each underpass is secure and well-managed.	TfNSW	Ongoing
2.7	Assist the work being undertaken with relevant practitioners to expand the use of traditional ecological knowledge and cultural burning practices to assist protect koala habitat from risks associated with high intensity bushfire and other threats. Assistance may be provided through scheme promotion, connecting landholders with burn practitioners, education, planning, workshops or delivery.	DCCEEW TIDE LALCs NPWS Hunter LLS	Ongoing

Action ID.	Action	Additional Stakeholders	Timeframe
2.8	Identify and map priority koala habitat areas (high density koala populations and population refuge areas) and provide this mapping to relevant agencies so it can be identified in Bushfire Management Plans, operational fire plans and hazard reduction plans to better protect koala populations when managing bushfire control and hazard reduction burns. Advocate for the protection of priority koala habitat areas as an asset to be actively protected in bushfire control situations and emergencies. Provide maps of the locations of priority koala habitat areas to the relevant agencies. Share occupied koala habitat and important fire refuge areas for koalas maps with local fire responders and emergency management teams.	RFS NPWS FCNSW	Ongoing
2.9	Develop a MidCoast Koala Emergency Response Plan to guide collective action following a natural disaster event. *In implementing this Action, consider the NSW Government response to Recommendation 53 of the NSW Bushfire Inquiry ("that the government develop and implement a policy for injured wildlife response, rescue and rehabilitation in bushfires, including developing a framework for interaction with emergency operations and consideration of wildlife response in operational plans")*	Care organisations NPWS Hunter LLS	Short
2.10	Liaise with authorities or land managers to advance that all prescribed burns in or near koala habitat are conducted in a way that minimises impact to koala habitat and individual koalas. Advocate for the requirement for koala inspections immediately prior to the burn within the burn area using skilled RFS / agency personnel or knowledgeable volunteers.	RFS Fire & Rescue NSW NPWS FCNSW	Medium
2.11	Deliver a dedicated koala drinking water program to landholders to increase water availability in known koala habitats that are susceptible to heat-stress events and which have limited availability of existing surface water (dams, creeks, etc).	FAWNA Koalas in Care	Ongoing

Action ID.	Action	Additional Stakeholders	Timeframe
2.12	For climate change adaptation, deliver projects that increase the area of koala habitat that is protected in public and private conservation areas, and manage such lands in a way that improves the ecological condition and function of the vegetation (thus increasing resilience). Identify and protect climate adaptation corridors and climate refuge / nodes, particularly altitudinal corridors and north – south corridors and re-connect populations to improve genetic diversity. *The mapping of wildlife corridors and nodes (Action 4.2) shall identify the important climate corridors and refuge nodes. Action 4.12 is also linked to this Action.*	All stakeholders	Ongoing
2.13	Identify areas where domestic dog attacks are a key threat to koalas and develop a plan to engage and communicate with and change the behaviour of local dog owners. Promote responsible dog ownership and the importance of keeping on dogs on leads and in properly fenced enclosures in koala habitat areas. Record the accurate locations of domestic dog attacks in a central database.	Care organisations	Medium
2.14	Use restrictions and covenants on new developments to avoid or manage domestic dog impacts on koalas near koala populations and habitat. Plan off-leash dog areas only within areas distant from koala populations and habitat or securely fence the off-leash area with koala proof fencing.	Ecological consultants	Ongoing
2.15	Advocate for amendments to the *Companion Animals Act 1998* or its *Regulation* to increase the prosecution capabilities of authorities for property owners whose dogs wantonly attack and kill a koala (by amending the "*trespass*" consideration).	DCCEEW	Medium
2.16	Work with landholders to design model paddock tree or climbing refuge pole arrangements in cattle, horse or sheep paddocks near high density koala habitats and corridors to help protect koalas from stock. Systematically audit every stock attack incident on koalas to develop a greater understanding of the influencing factors and conditions, and effective responses. Develop and circulate communications material to rural landholders about livestock risks to koalas.	Care organisations Hunter LLS	Long

Action ID.	Action	Additional Stakeholders	Timeframe
2.17	Communicate the locations of important koala habitat and populations to relevant agencies and organisations so that regional feral deer control efforts can be prioritised within these habitats. Evaluate and manage the risks of impacts of feral deer on koala habitat plantings, particularly in areas where feral deer are present in high-densities ** such as the Coomba Park area.*	Hunter LLS	Medium

4.3 Education, engagement and integrating Traditional Owner knowledge

Education and engagement leading to positive outcomes associated with level of awareness, willingness to participate and behaviour change are critical to the success of koala conservation and recovery programs.

The principles in the 2036 MidCoast Cultural Plan include 'Caring for Country' and 'Connected to Nature',. They encourage us all to be involved in protecting and conserving the environment, including koalas and their habitat.

The NSW Koala Strategy (DPE, 2022) recognises that "*many Aboriginal cultures have a strong connection to koalas and their habitat. Aboriginal knowledge of the land and its management is based on deep spiritual connections with Country… This strategy values the koala as an important cultural feature of the NSW landscape and recognises the importance of embedding Aboriginal cultural knowledge in all aspects of koala conservation and management… This strategy recognises Aboriginal communities have a strong role to play in ensuring the long-term health of koalas and their habitat*". This Strategy shares this perspective. The MidCoast is on the traditional lands of the Gathang-speaking People.

Council hosts and supports various forms of education and engagement on koalas for the community such as the MidCoast Koala Festival, the Koala Safe Spaces Program, workshops, koala walks, citizen science opportunities and tree planting days. The MidCoast Council Partnership supports the appointment of a dedicated Koala Officer, who coordinates and administers local projects with our community. The role is currently funded by the NSW Koala Strategy until December 2026.

The NSW Koala Strategy is administering the Koala Smart program in primary and high schools, using NPWS Discovery Rangers and other supporting partners. The Myall Koala and Environment Group advocates for the value of primary school education programs for koalas, as the students often enthusiastically engage with their carers and families after these experiences.

To date, within the MidCoast Koala Safe Spaces project, there have been six (6) main objectives for engagement:

- Raise awareness of the NSW Koala Strategy and MidCoast Regional Koala Partnership,
- Increase landholder involvement in koala habitat restoration and conservation across the region,
- Raise general community awareness of koalas, their needs, and threats,
- Gain landholder participation in field surveys to determine populations levels and identify key threats,
- Encourage community input and support for the development of a Koala Conservation Strategy for the MidCoast, and
- Increase engagement of the public in citizen science including submitting koala sightings reports.

Table 4-5 Education management actions

Action ID.	Action	Additional Stakeholders	Timeframe
3.1	Maintain and promote the community Koala Sightings Register and provide regular uploads of this data to the BioNet database. Assess whether a time-bound citizen science campaign (such as a month-long koala count) or a program that encourages sightings all year is more effective at obtaining koala sightings from the community. Trial the benefits of a time-bound citizen science campaign during koala breeding season.	Community BioNet	Ongoing
3.2	Outline Council koala education and engagement actions within a documented *Koala Education and Engagement Strategy*. The Strategy will define the measures used for evaluating the success of the program. This will consider level of awareness or behaviour change analysis, where feasible.	Community	Ongoing
3.3	Co-design koala conservation education and engagement campaigns with key stakeholders. Potential target audiences are to include rural landholders and schools (using Koala Smart). Potential activities may include workshops, art experiences, symposia, field days, koala walks, community tree planting, spotlighting, etc. Consider the feasibility and value of the formation of a Friends of the Koala Landcare Group to assist with information and education.	Community Hunter LLS Conservation groups Businesses Landcare NPWS	Short
3.4	Build partnership and co-design initiatives with Traditional Owner people and groups, including Elders and knowledge holders, where appropriate. Only share knowledge and stories on koalas, if appropriate. Learn about Traditional Owner knowledge and perspective to aid future recovery and conservation actions.	Traditional Owners	Medium
3.5	Support local Traditional Owner people to implement, monitor and evaluate koala projects on their lands.	Traditional Owners	Ongoing

Action ID.	Action	Additional Stakeholders	Timeframe
3.6	Deliver a biannual (two-yearly) MidCoast Koala Festival. Continue to raise awareness in the community about local koala populations and their conservation needs through the Koala Safe Spaces Program and citizen science projects. Deliver special koala engagement events, including art / science and educational programs for koalas.	All stakeholders	Ongoing
3.7	Trial the development of an Annual Report Card for one priority ARKS in the MidCoast. Report on the achievements and deliverables and synthesise the findings of any monitoring and research. *If successful, roll out Report Cards for other priority ARKS over time.*	DCCEEW	Medium

4.4 Research, monitoring, health and welfare

Filling gaps in our knowledge and understanding threats to koalas requires ongoing monitoring and research so that we can best respond to issues and identify emerging matters. Ongoing monitoring and research will help improve the health and safety of koalas in the short, medium and long-terms. Priority knowledge gaps, such as understanding the density of and trends in koala populations in the western parts of the MidCoast region or understanding the impacts of lantana infestations on koala habitat use and movement, need to be addressed to provide for enhanced management outcomes.

The research agenda for this Strategy needs to be targeted to local knowledge gaps, and research findings must be applied to future management. There is also a need to consider the economic implications (cost / benefits analysis) of research and research findings. Finally, when the outcomes of research are implemented, there needs to be robust evaluation mechanisms to assess the effectiveness of the resulting action(s).

Table 4-6 Research management actions

Action ID.	Action	Additional Stakeholders	Timeframe
4.1	Invest in additional koala habitat mapping to fill knowledge gaps and extend the area covered by fine-scale koala habitat mapping (likely and occupied koala habitat). Revise as-held mapping as new data becomes available.	DCCEEW NPWS FCNSW Community	Ongoing
4.2	Publish a map of the spatial locations of important movement corridors (and buffers and nodes) for koalas across the entire MidCoast LGA using a recognised connectivity mapping / modelling tool. *This mapping work shall consider existing corridor mapping products and resources, including but not limited to, DECC key regional corridors, corridor mapping by adjacent Councils, the Great Eastern Ranges Initiative, and Barrington – Hawkesbury climate corridors and others.*	DCCEEW Connectivity scientists	Short
4.3	With permission, extend the habitat mapping process used in this Strategy to the areas of the Forestry Corporation estate to assist compile a complete koala habitat mapping dataset for the LGA.	FCNSW	Short
4.4	Undertake on-ground koala and habitat surveys and monitoring throughout the LGA and update relevant databases with the latest data. Compile population estimates for priority koala habitat areas within the MidCoast. Continue the Bootawa song-meter program every two years to track population changes at the local level (sentinel monitoring site).	DCCEEW Hunter LLS NPWS FCNSW Community	Ongoing

Action ID.	Action	Additional Stakeholders	Timeframe
4.5	Provide support (if needed) to koala care and rescue groups to maintain or increase the accuracy of sightings data that are provided to BioNet.	Care organisations	Ongoing
4.6	Attend conferences and symposia that offer the latest findings and research on koala knowledge, data gaps or koala programs. Incorporate learnings into this Koala Conservation Strategy implementation.	DCCEEW Universities / researchers	Ongoing
4.7	Prepare a research strategy to identify focus areas for applied knowledge gathering for key threats to koalas in the LGA. Liaise with the Research Team within the NSW Koala Strategy with regards to our local research needs and priorities. Seek collaborative research opportunities, where possible.	Universities / researchers NPWS Community	Short
4.8	Support, promote and / or facilitate scientific investigation of actions identified in the MidCoast Koala Research Strategy.	Universities / researchers DCCEEW Consultants	Ongoing
4.9	Support a scientific evaluation as to the impact of lantana on koala occupancy and movement and scientifically investigate and publish a report on koala habitat use following lantana control.	Universities / researchers	Medium
4.10	Support or oversee a LGA-wide collection and analysis (hair / DNA) of dingo / wild dog scats to increase knowledge of dingo / wild dog predation of koalas in different landscapes. Publish the results in appropriate public forums and, if applicable, journal articles. Promote management in line with the outcomes of the local research.	Universities / researchers Consultants Community	Medium
4.11	Document, map and actively monitor the replanting sites associated with the MidCoast Koala Safe Spaces Program to track patterns of koala use. Use the results of this monitoring to improve habitat creation processes and activities in the future.	Universities / researchers Consultants	Ongoing

Action ID.	Action	Additional Stakeholders	Timeframe
4.12	Collaborate with researchers on climate change data and modelling that predicts the impacts of climate change on koalas and their habitat. Use this information to prioritise the identification, adaptation actions and investment in key habitat refugia and climate change adaptation corridor protection and restoration (in Action 4.2).	Universities / researchers DCCEEW NPWS	Medium
4.13	Stay informed of evaluations and knowledge-gathering regarding the impacts and management of koalas in relation to public and private native forestry.	FCNSW NRC EPA	Ongoing
4.14	Support volunteer wildlife rehabilitators, vets, and other partner organisations to enhance coordination of emergency response for koalas and other wildlife due to bushfire or extreme weather events.	Care organisations DCCEEW	Medium
4.15	Promote to the community to urgently report sick, injured, or at-risk koalas to the appropriate koala care and rescue organisation across the MidCoast. Seek to break-down barriers to community reporting of koalas involved in vehicle strike or dog attack incidents.	Care organisations Community	Ongoing
4.16	Undertake a review, consult and engage, and publish a final list of koala habitat tree species for the MidCoast region, with notes on the geographic landscapes associated with each species (eg. coastal sites, high elevation sites, etc).	DCCEEW Care organisations	Short

4.5 Advocacy, funding and partnerships

Council is one of several authorities on the MidCoast responsible for land and biodiversity management, including koala conservation and protection.

Council is a planning authority, making decisions on local developments, planning for strategies, and determining land use zones. There are statutory frameworks and processes associated with development assessment and land use planning that consider the koala.

Further, there are approximately 6,000-hectares of Council natural area reserves across the MidCoast, some of which provide important koala habitat. This is only a fraction of the total land area on the MidCoast. It is essential that actions within this Strategy can be delivered in a coordinated manner with our partners, and the community.

It is important to note that some of the issues associated with koala management, such as the issue of logging in public State Forests, is not regulated by Council. Public forestry is managed by the NSW Government through the Forestry Corporation of NSW. It is regulated by the NSW Environment Protection Authority and reviewed by the Natural Resources Commission.

MidCoast Council has a history of science-backed advocacy. For example, on the 8 February 2023, MidCoast Councillors "*unanimously supported a notice of motion to advocate to NSW Forestry and National Parks for a cease to logging in compartments 41 and 43 of the Bulga Forest and transition these compartments to National Parks, and advocate to the NSW Government to develop a plan for the transition of Forestry's native forest sector to ecologically sustainable plantations*". In September, Mayor Pontin of MidCoast Council wrote to the NSW Forestry Corporation asking that the proposed logging in compartments 7, and 10 – 13 in Kiwarrak SF be "*substantially postponed or abandoned*" because:

> *"The koala population within this forest was reduced by 50 to 80% because of the 2019 bushfires. The planned introduction of logging activities at this time has the potential to physically endanger and add to the stressors affecting the remaining, depleted koala population, thus markedly inhibiting its recovery,*
>
> *Council's partner in koala recovery and conservation activities, the Hunter LLS has invested in ecological burning trials for koala recovery and conservation in this state forest. This is an important area of applied research. The planned logging will disrupt this research,*
>
> *The operation (particularly in Compartments 10 – 13) will likely be associated with significant controversy and community opposition. This has the potential to damage the MidCoast Regional Koala Partnership brand and the substantial positive momentum that has been generated to date. Timber harvesting at this time will potentially conflict with the positive narrative associated with providing "koala safe spaces" in the Kiwarrak ARKS that are intended to safeguard the koala population and allow it to recover from the combination of legacy and contemporary impacts (including the 2019 bushfires)."*

This Strategy prompts the continuation of advocacy to the NSW and Commonwealth Governments and other parties on local koala conservation matters.

In relation to funding, Council will utilise locally relevant data to continue to apply for and attract government funding to this Koala Conservation Strategy and the implementation of its actions. Council may also investigate or leverage opportunities in co-investment for restoration and planting programs from the private sector seeking to meet environment and social governance objectives such as the nature repair market, natural capital, or net-zero commitments.

This Strategy will only be successful if partnerships between Council and stakeholders are maintained, created, and / or expanded. Partnerships, shared efforts / shared outcomes and

collaborative, strategic action are essential to koala recovery and conservation across the MidCoast. It is important that Council cultivates, invites, facilitates, and establishes effective partnerships with relevant stakeholders. Opportunities for partnerships can arise spontaneously and the Strategy implementation needs to be agile and adaptive to respond to these.

Table 4-7 Advocacy management actions

Action ID.	Action	Additional Stakeholders	Timeframe
5.1	Advocate to the NSW Government to extend the NSW Koala Strategy program and funding of the MidCoast Regional Partnership, including extending the role of the MidCoast Koala Project Officer, until June 2029.	DCCEEW	Short
5.2	Participate in and contribute to reviews of environmental legislation and strategies in NSW and Australia; advocating for positive improvements to the protection and conservation of koalas.	DCCEEW DPHI	Ongoing
5.3	Continue to engage and advocate to the NSW Government and NRC regarding forestry practices and koala conservation (particularly in Wang Wauk SF, Kiwarrak SF, Nerong SF, Bulga SF and Wallaroo SF) and in relation to private native forestry. Engage and advocate for koala conservation in state-significant developments and major projects, including resources developments and public infrastructure.	NSW Government NRC Community	Ongoing
5.4	Advocate to State Government (Transport for NSW) to install koala barrier fencing and crossings at new road construction projects and vehicle strike hotspots on State managed roads and to maintain existing vehicle strike avoidance assets. Advocate to State Government (Transport for NSW) where speed limit reductions are considered beneficial for protecting koalas at vehicle strike hotspots.	NSW Government TfNSW	Ongoing
5.5	Foster partnerships with neighbouring councils, Traditional Owners, universities, schools, MidCoast 2 Tops Landcare, community groups, non-government organisations, and local experts to expand the delivery of the Koala Smart and the Koala Safe Spaces programs. Work in a collaborative way to assist all relevant stakeholders to align and coordinate their koala recovery and conservation efforts.	All stakeholders	Short

Action ID.	Action	Additional Stakeholders	Timeframe
5.6	Partner with farming organisations to explore new ways to encourage landholders to protect koala habitat on their land while maintaining or increasing agricultural production.	Community Hunter LLS DPI Agriculture	Short
5.7	Explore opportunities to guide or inform private sector organisations to leverage action and investment in koala conservation across the MidCoast.	Industry Private sector	Medium
5.8	Work to support the NSW Government (and other relevant organisations) to deliver Carbon Farming projects that incorporate the planting of new koala habitat.	Net Zero Land Clean Energy Regulator Private sector	Ongoing

4.6 Priority focus areas for conservation

The mapping compiled for this Strategy will be evaluated to identify priority focus areas for conservation, recovery, and research investment and action. This analysis will be commenced within the first year of the implementation of the Strategy and be revised and updated adaptively.

The MidCoast Biodiversity Framework (MCC, 2020) has established some initial koala area priorities. This includes populations in the Kiwarrak, Hawks Nest, Crowdy Bay, Hallidays Point and The Bucketts (Gloucester) localities (MidCoast Council, 2020).

Further, the NSW Koala Strategy has its identified priorities – being the populations for immediate investment or populations prioritised for filling key knowledge gaps and delivering local actions.

Within these broad populations, there is a need for the extensive, high-quality occupied and likely koala habitat mapping generated for this Strategy to be used to identify local intervention priorities and targets. This can help identify:

- Valuable additions to the public conservation estate (National Park acquisitions),
- Land of importance for private land conservation (conservation agreements, stewardship agreements, revolving fund investment),
- Private land partnerships and devolved grant investment priorities, and
- Suitable development offset sites.

Local priority sites for recovery and conservation actions should be identified spatially. Local priority sites should consider (but not be limited to):

- Important koala connecting habitats and corridors, including climate change adaptation corridors,
- Climate change refuge nodes,
- Existing protected areas (to increase the area reserved or improve the shape or management of an existing reserve),
- High density koala populations that are unprotected or subject to imminent risks and threats, and
- Unoccupied or lightly occupied but otherwise highly suitable koala habitat.

At local priority sites, information should be published on koala population and habitat targets, including minimum habitat area and connectivity thresholds and criteria. This analysis should utilise population viability assessment and other modelling, where appropriate.

This Strategy will be effective only if it uses the mapping to adaptively guide strategic recovery and conservation effort into priority locations. Implementation planning will need to define where, how, and when interventions are delivered.

IMPLEMENTATION

5 Implementation

5.1 Adaptive framework

This Strategy utilises an adaptive management framework that can be updated where new data and information becomes available. This Strategy will be reviewed and updated at least every five years. The Strategy itself may require updates where changes to policy, legislation, resourcing, or technology occur.

5.2 Reporting and review

This Strategy outlines sixty-one (61) actions to be delivered over five-years:

- Ongoing .....30 actions
- Short (completed by the end of year 1) .....10 actions
- Medium term (completed by the end of year 3) .....18 actions
- Long term (completed by the end of year 5).....3 actions

Thirty (30) of the listed actions are already being implemented and will be continued under this Strategy.

The timeframes of the different actions are identified in Appendix E.

Progress on each of the actions within this Strategy will be reported to Council and the community annually and will detail the status of each action as either:

- Planned (and the expected commencement date)
- Commenced (and the expected duration of implementation)
- Ongoing (and the expected completion date, where relevant)
- Completed (date of completion).

An annual reporting template shall be prepared within the first 12-months of the implementation of this Plan.

Reporting against Strategy targets will be a focus of the annual reporting. It will include reference to performance that aligns with the State Government (Table 3-1) as well as local targets set out in Section 3.2:

REFERENCES

6 References

Adams-Hosking, C. *et al.* (2011) 'Modelling climate-change-induced shifts in the distribution of the koala', *Wildlife Research*, 38(2), pp. 122–130. Available at: https://doi.org/doi.org/10.1071/WR10156.

Bachmann, N.L. *et al.* (2014) 'Comparative genomics of koala, cattle and sheep strains of Chlamydia pecorum', *BMC genomics*, 15, pp. 1–14.

Ballantyne, K. *et al.* (2015) 'Seasonal oestrous cycle activity of captive female koalas in south-east Queensland', *Australian Mammalogy*, 37(2), pp. 245–252.

Beale, P., Marsh, K. and Youngentob, K. (2022) 'Revegetating koala habitat'. Available at: https://www.dcceew.gov.au/environment/epbc/publications/revegetating-koala-habitat.

Biolink (2017) *Mapping and Analysis of Koala Records - Myall Koala and Environment Group Community Koala Sightings*. Report for MIdCoast Council.

Biolink (2019) *The Kiwarrak and Khappinghat ARKS: Aspects of the distribution and abundance of koalas.* Final report to MidCoast Council. Uki.

Biolink (2022) *Koala Habitat Connectivity in the Kirrawak ARKS: Modelling and evaluating revegetation scenarios*. Prepared for MidCoast Council. Pottsville.

Blyton, M.D. *et al.* (2022) 'Characterization of the juvenile koala gut microbiome across wild populations', *Environmental Microbiology*, 24(9), pp. 4209–4219.

Briscoe, N.J. *et al.* (2014) 'Tree-hugging koalas demonstrate a novel thermoregulatory mechanism for arboreal mammals', *Biology letters*, 10(6), p. 20140235.

Collins, L. *et al.* (2019) 'Wildfire refugia in forests: Severe fire weather and drought mute the influence of topography and fuel age', *Global Change Biology*, 25(11), pp. 3829–3843.

DAWE (2022) 'National Recovery Plan for the Koala: Phascolarctos cinereus (combined populations for Queensland, New South Wales and the Australian Capital Territory)'. Australian Government.

DES (2022) *Koala facts*, *Department of the Environment and Science*. Available at: https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/facts#reproduction_and_lifecycle (Accessed: 7 July 2023).

DoE (2013) 'Matters of National Environmental Significance, Significant impact guidelines 1.1 Environment Protection and Biodiversity Conversation Act 1999'. Department of the Environment. Commonwealth of Australia. Available at: https://www.awe.gov.au/sites/default/files/documents/nes-guidelines_1.pdf.

DPE (2022) 'NSW Koala Strategy'. Available at: https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/koala-strategy-2022-220075.pdf.

DPIE (2020) 'Framework for the spatial prioritisation of koala conservation actions in NSW; Saving our Species Iconic Koala Project'. NSW Government.

Ellis, W. *et al.* (2010) 'Climate change and the koala Phascolarctos cinereus: water and energy', *Australian Zoologist*, 35(2), pp. 369–377.

Fabijan, J. *et al.* (2017) ‘Lymphoma, koala retrovirus infection and reproductive chlamydiosis in a koala (Phascolarctos cinereus)’, *Journal of comparative pathology*, 157(2–3), pp. 188–192.

Gentle, M. *et al.* (2019) ‘Genetic sampling identifies canid predators of koalas (Phascolarctos cinereus) in peri-urban areas’, *Landscape and Urban Planning*, 190, p. 103591.

Gonzalez-Astudillo, V. (2018) *Analysis of Morbidity and Mortality of Wild Koalas in South-East Queensland using Passive Surveillance Data*. University of Queensland. Available at: https://core.ac.uk/download/pdf/189933096.pdf.

Grogan, L.F. *et al.* (2017) ‘Current trends and future directions in koala chlamydial disease research’, *Biological Conservation*, 215, pp. 179–188.

Hill, A., Keogh, S. and Anderson, B. (2019) ‘Case study: Cattle-associated traumatic injuries in koalas’, *Wildlife Rehabilitation*, 39(1), pp. 11–15.

Jiang, A. *et al.* (2021) ‘Do Livestock Injure and Kill Koalas? Insights from Wildlife Hospital and Rescue Group Admissions and an online survey of livestock-koala conflicts’, *Animals*, 11.

Jiang, A. *et al.* (2022) ‘Insights from Koala-Cattle Interaction Experiments: Koalas and Cattle May See Each Other as a Disturbance’, *Animals*, 12(872).

Law, B.S. *et al.* (2022) ‘Fire severity and its local extent are key to assessing impacts of Australian mega-fires on koala (Phascolarctos cinereus) density’, *Global Ecology and Biogeography*, 31(4), pp. 714–726.

Legislative Council Portfolio Committee No. 7 - planning and Environment (2020) *Koala populations and habitat in New South Wales*. 3. NSW Parliament.

Lunney, D. *et al.* (2004) ‘Post-fire survival and reproduction of rehabilitated and unburnt koalas’, *Biological Conservation*, 120(4), pp. 567–575.

Marsh, K.J. *et al.* (2018) ‘Intraspecific variation in nutritional composition affects the leaf age preferences of a mammalian herbivore’, *Journal of chemical ecology*, 44, pp. 62–71.

Martin, R. and Handasyde, K.A. (1999) *The koala: natural history, conservation and management*. UNSW press.

McAlpine, C. *et al.* (2015) ‘Conserving koalas: A review of the contrasting regional trends, outlooks and policy challenges’, *Biological Conservation*, 192, pp. 226–236.

McCallum, H. *et al.* (2018) ‘Assessing the significance of endemic disease in conservation—koalas, chlamydia, and koala retrovirus as a case study’, *Conservation Letters*, 11(4), p. e12425.

McLean, N. and Handasyde, K.A. (2007) ‘Sexual maturity, factors affecting the breeding season and breeding in consecutive seasons in populations of overabundant Victorian koalas (Phascolarctos cinereus)’, *Australian Journal of Zoology*, 54(6), pp. 385–392.

Mella, V. *et al.* (2020) ‘An insight into natural koala drinking behaviour’, *Ethology*, (126), pp. 858–863.

MidCoast Council (2020) ‘Biodiversity Framework 2020-2030; A roadmap for conserving natural heritgae of the MidCoast’.

MidCoast Council (2023a) *Koala Safe Spaces Program*. Available at: https://haveyoursay.midcoast.nsw.gov.au/koala-safe-spaces-program.

MidCoast Council (2023b) ‘MidCoast Council - Protecting Koalas’. Available at: https://www.midcoast.nsw.gov.au/files/assets/public/document-resources/environment-docs/animals-threatened-speices/mcc-koala-dog-brochure-280318.pdf#:~:text=The%20owner%20or%20person%20in%20charge%20of%20a,restricted%20dog%29%20and%20the%20dog%20can%20be%20seized.

Mitchell-Whittington, A. (2017) ‘Koalas are being attacked by cattle, horses as trees are felled: wildlife carer’, *Brisbane Times*, 19 June. Available at: https://www.brisbanetimes.com.au/national/queensland/koalas-are-being-attacked-by-cattle-horses-as-trees-are-felled-wildlife-carer-20170619-gwtucn.html.

Narayan, E. (2019) ‘Physiological stress levels in wild koala sub-populations facing anthropogenic induced environmental trauma and disease.’, *Scientific Reports*, 9, p. 6031.

Narayan, E.J. and Williams, M. (2016) ‘Understanding the dynamics of physiological impacts of environmental stressors on Australian marsupials, focus on the koala (Phascolarctos cinereus)’, *BMC zoology*, 1(1), pp. 1–13.

NSW DPE (2022) ‘NSW Koala Strategy’. NSW Government. Available at: https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/koala-strategy-2022-220075.pdf.

NSW Government (2023) *Gumbaynggirr Good Koala Country Plan*. Available at: https://www.koala.nsw.gov.au/news/gumbaynggirr-good-koala-country-plan.

NSW OEH (2019) ‘Bionet data records: koala roadkill’. Bionet.

Polkinghorne, A., Hanger, J. and Timms, P. (2013) ‘Recent advances in understanding the biology, epidemiology and control of chlamydial infections in koalas’, *Veterinary microbiology*, 165(3–4), pp. 214–223.

Predavec, M. *et al.* (2017) ‘Using repeat citizen science surveys of koalas to assess their population trend in the north-west of New South Wales: scale matters’, *Australian Mammalogy*, 40(1), pp. 47–57.

Quigley, B.L. and Timms, P. (2020) ‘Helping koalas battle disease–Recent advances in Chlamydia and koala retrovirus (KoRV) disease understanding and treatment in koalas’, *FEMS Microbiology Reviews*, 44(5), pp. 583–605.

Rennison, B. and Fisher, M. (2018) ‘Framework for the Spatial Prioritisation of Koala Conservation Actions in NSW–A report for the Save our Species Iconic Koala Project’, *Report to the NSW Office of Environment and Heritage* [Preprint].

Rhodes, J.R. *et al.* (2011) ‘Using integrated population modelling to quantify the implications of multiple threatening processes for a rapidly declining population’, *Biological conservation*, 144(3), pp. 1081–1088.

Stalenberg, E. *et al.* (2014) ‘Nutritional correlates of koala persistence in a low-density population’, *PLoS One*, 9(12), p. e113930.

TierraMar (2021) *Koala Action Plan for the NSW MidCoast Local Government Area*. Prepared for Hunter Local Land Services as part of the Regional Land Partnerships Program. Sutherland.

Ward, M.S. *et al.* (2019) ‘Lots of loss with little scrutiny: The attrition of habitat critical for threatened species in Australia’, *Conservation Science and Practice*, 1(11), p. e117.

Wildlife Health Australia (2023) ‘Koala retrovirus (KoRV) Fact Sheet’. Available at: https://wildlifehealthaustralia.com.au/Portals/0/ResourceCentre/FactSheets/Mammals/Koala_Retrovirus.pdf.

Youngentob, K.N., Marsh, K.F. and Skewes, J. (2021) *A review of koala habitat assessment criteria and methods*. The Australian National University. Available at: https://www.dcceew.gov.au/sites/default/files/documents/review-koala-habitat-assessment-criteria-and-methods-2021.pdf.

APPENDICES

Appendix A Legislative context

Commonwealth legislation

Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)

On 12 February 2021, the koala was listed as endangered under the EPBC Act and hence is defined as a Matter of National Environmental Significance (MNES).

The EPBC Act requires that proponents of activities assess whether their proposed actions will have a significant impact on koala populations and koala habitat based on an Assessment of Significance. The Significant Impact Guidelines 1.1 (DoE, 2013) for critically endangered and endangered species are used to assist this process.

Under the EPBC Act, any action (which includes a development, project, or activity) that may have a significant impact on MNES must be referred to the Commonwealth Minister for a determination as to whether that action is controlled.

Controlled actions require Commonwealth approval.

State legislation

Biodiversity Conservation Act 2016 (BC Act)

This Act outlines the list of threatened species, populations, and ecological communities in NSW. The koala is listed as endangered under the BC Act.

This legislation requires that a proponent of a development assess whether the proposed actions will have a significant impact on koala populations and koala habitat based on a Biodiversity Assessment Methodology (BAM). The BC Act links to other legislation including the *Environmental Planning and Assessment Act 1979* (EP&A Act) (see below). The Act includes a Biodiversity Offsets Scheme (BOS), which may be triggered by the proposed development. Council and other planning authorities, such as the Independent Planning Commission, regulates development in accordance with the provisions of this Act.

If a Biodiversity Development Assessment Report (BDAR) is required, an accredited assessor must prepare it.

The BOS may also apply if a proposed activity under Part 5 of the EP&A Act is likely to significantly affect koalas and koala habitat, and the proponent opts into the BOS, otherwise a Species Impact Statement (SIS) must be prepared.

The BOS is intended to measure the biodiversity loss of development proposals and the gains in biodiversity value achieved at offset sites.

The BAM establishes an avoid - mitigate – offset hierarchy for development, which means that avoiding impacts on biodiversity values is paramount and must be clearly demonstrated in development applications. Offset measures are to be applied to residual impacts only after biodiversity impacts have been firstly avoided and then mitigated.

The BOS applies to local development (assessed under Part 4 of the EP&A Act) where the project exceeds any one of the BOS thresholds according to s7.1 of the NSW Biodiversity Conservation Regulation 2019 (BC Regulation). Likewise, it applies to all State Significant projects unless the Secretary of the Department of Planning and Environment and the Chief Executive of DCCEEW determine that the project is not likely to have a significant impact.

The Biodiversity Conservation Act 2016 also provides a framework for private land conservation in NSW, principally through conservation agreements and biodiversity stewardship sites administered by the NSW Biodiversity Conservation Trust.

Environmental Planning and Assessment Act 1979

The EP&A Act is the legislation for planning in NSW. Part 4 (Development Assessment) and Part 5 (Environmental Assessment) are the most relevant for koalas.

Environmental planning instruments are also created through the EP&A Act. These include State Environmental Planning Policies (SEPPs), Local Environment Plans (LEPs) and Development Control Plans (DCPs).

The State Environmental Planning Policy for koala habitat protection is in two chapters (Chapter 3 and 4) of the State Environmental Planning Policy (Biodiversity and Conservation) 2021 (SEPP 2021).

Local Land Services Act 2013 (LLS Act)

The LLS Act controls and regulates clearing of native vegetation on rural land.

Companion Animals Act 1993

The *Companion Animals Act 1998* and the *Companion Animals Regulation 2008* provide for the identification and registration of cats and dogs, how they are managed and the duties and responsibilities of their owners in NSW. Pet owners must ensure that their dog (or cat) does not threaten or harm a person or animal (such as a koala) and is prevented from straying or causing nuisance. *The Companion Animals Act 1998* also provides for Council to prohibit dogs and cats on public land for the purpose of protecting wildlife.

Local Government Act 1993

This Act provides for a framework of classifying and managing natural area / bushland reserves and provides Councils with land acquisition and ownership powers. It establishes the requirement for Ecologically Sustainable Development to be factored into Council decision making. It also provides regulatory powers in relation to reserves and notices.

Appendix B Koala survey methods and results

Mid Coast Council Koala Habitat Mapping Project
2023 Koala Surveys and Results
Report date - January 2024

Koala habitat surveys and mapping for this project commenced in early April 2023 as part of funding provided to council through the NSW Government Koala Strategy to provide a koala habitat map layer for three priority areas of the Mid Coast Local Government Area (LGA). The surveys were focused on private lands and targeted to priority data gap areas to assess koala occupancy. The results of the surveys are detailed below.

Acknowledgements

Report prepared by

John Turbill, Koala Program, Northern NSW, and Dr. Mark Cameron, Senior Project Officer, Koalas, both from Department of Climate Change, Energy, the Environment and Water, Biodiversity, Conservation and Science (BCS) Group, and *Mark Fisher, 3D Ecological Mapping Consultancy, Coffs Harbour.*

This project was funded through the NSW Government Koala Strategy under Pillar 2 key deliverable: '*Supporting local communities to conserve koalas'* with the priority action to '*support councils to deliver koala habitat maps'*. The project aimed to develop fine-scale koala habitat maps, to enable council to strategically identify, conserve and manage koala habitat. The koala habitat maps were developed following spatial analysis of existing koala records and targeted on-ground surveys and ecological assessment.

Field surveys for this project were undertaken by contractors 'Canines for Wildlife', Bellingen and 'Tate Animals', Port Macquarie, using specialised koala detection dogs. Additional floristic surveys were undertaken by contractor '3D Ecological Mapping'.

Significant input to the project was provided by officers in Mid Coast Council specifically Nicholas Colman, *Environmental Projects Offic*er and Caitlin Orr, *Koala Project Officer*, as well as DCCEEW Koala Team Senior Project Officer Mid Coast & Hunter, Reegan Walker.

.

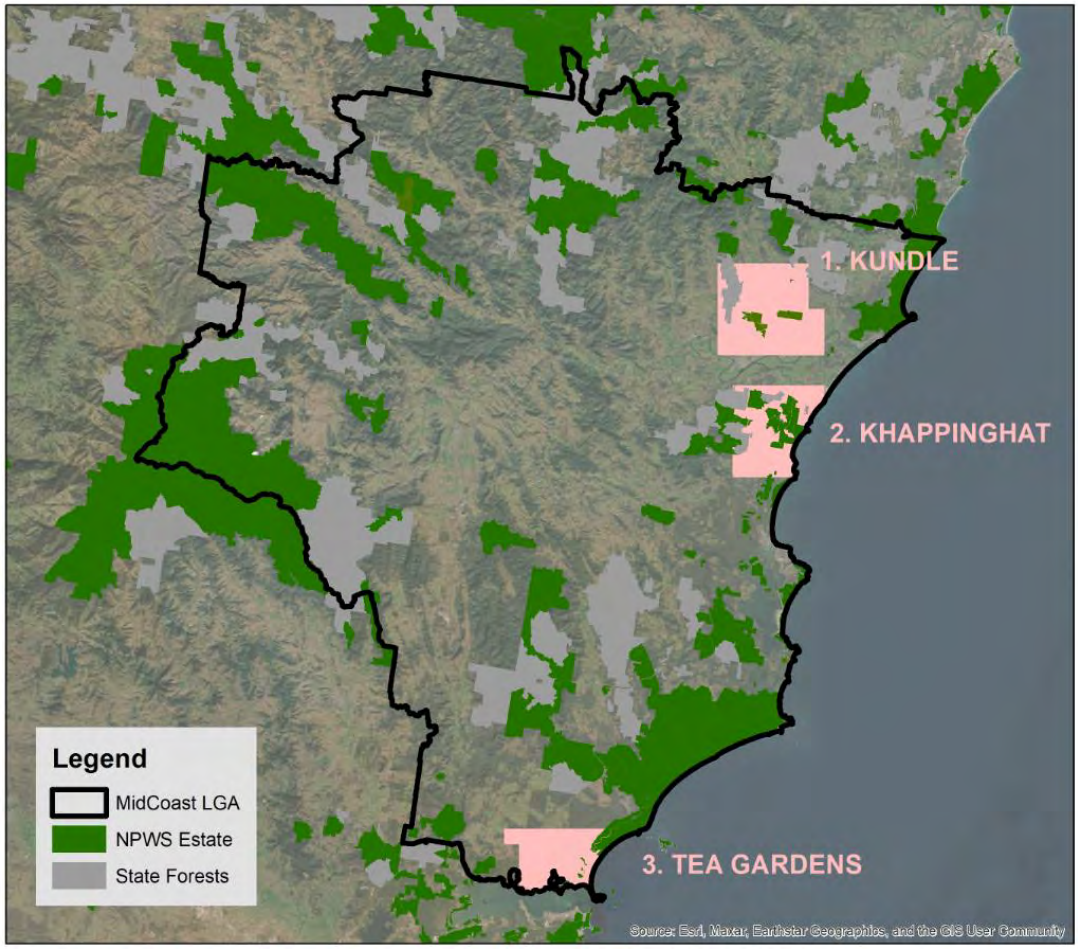
Table of Contents

1.0 Survey Methods and Results

Site surveys for koala presence were undertaken at 66 pre-selected sites and an additional 60 opportunistic sites across the 3 priority study sites identified by council for this project. These areas are referred to as Kundle, Knappinghat and Tea Gardens (refer to Map 1). Pre-selected survey sites were targeted to sample Plant Community Types (PCTs) that were determined to meet the definition of "Likely Koala Habitat" based on the estimated presence and percentage of koala feed trees (KFTs). At all 66 pre-selected sites a count of trees with a DBH greater than 10cm was undertaken by a botanist so that a percentage of KFTs could be assessed against all tree stems present. The additional 60 sites were opportunistic in site selection and used a rapid survey transect method. No additional floristic information was recorded at these sites.

Site surveys commenced in early April 2023 and finished in mid-December 2023. During this period a number of rain events delayed and impacted the timing of surveys. Out of the 66 pre-selected survey sites, 45 sites recorded a rain event within the previous 48 hours. The data from any additional survey sites undertaken post mid December 2023 are not included in this report.

Of the 66 pre-selected survey sites 50% of these were on private lands, with 30% on NPWS estate and 17% on Council reserves.



Map 1 – Study areas within the Mid Coast LGA

1.1 Results for Koala Detection dog teams

Results from the surveys of the pre-selected sites were relatively low with only 12 sites (18%) recording the presence of a koala scat. Results for the additional 60 opportunist sites within the study areas were higher with 20 sites (33%) recording a koala scat. The methodology for the pre-selected site surveys and additional surveys is detailed in Appendix B.

Specific site survey grid references to locate each pre-selected survey site were determined based on desk top analysis to sample priority PCTs identified as 'Highly likely koala habitat". In the field however it was determined at 54 sites that the pre-determined location was not suitable and the site was relocated nearby to better sample likely koala habitat. All survey site locations and results are shown in Maps 2, 3 and 4 below.

Out of the 12 pre-selected sites that recorded a koala scat Tallowwood (*E. microcorys*) was the dominant tree species recoding a scat at 5 sites (42%). Grey Gums (*E. punctata*) recorded scats at 2 sites (17%). Scats were also located under Small-fruited Grey Gum *(E. propinqua*), Forest Red Gum (*E. tereticornis*), Spotted Gum (*Corymbia maculata*) and Swamp Mahogany (*E. robusta*). For the 20 opportunistic sites that recorded a koala scat, Tallowwood (*E. microcorys*) was also the dominant species.

Tree diameter at breast height (DBH) for trees that recorded a scat were mostly in the 15 – 48cm range with the second range of trees to record a scat in the 48 – 81cm range. Forest type and structure at the survey sites were predominantly classed as Dry Sclerophyll (shrub/grass) forest (75%), with Dry Sclerophyll (shrubby) forest at 10% of sites and Wet Sclerophyll Forest at 15% of sites. Disturbance at sites varied as did forest structure with 'mixed' forest structure recorded at 58% of sites, regeneration forest at 30% of sites and mature forests at 12% of sites. The dominant recorded site disturbances were related to clearing (including logging), grazing, weeds and fire. In western area of the Tea Gardens study area Slash Pine (*Pinus radiata*) occurred at various levels on infestation.

The likely age of scats recorded at sites was mostly in the "Old" class (dry and hardened), with only 16% classed as fresh (relatively moist).

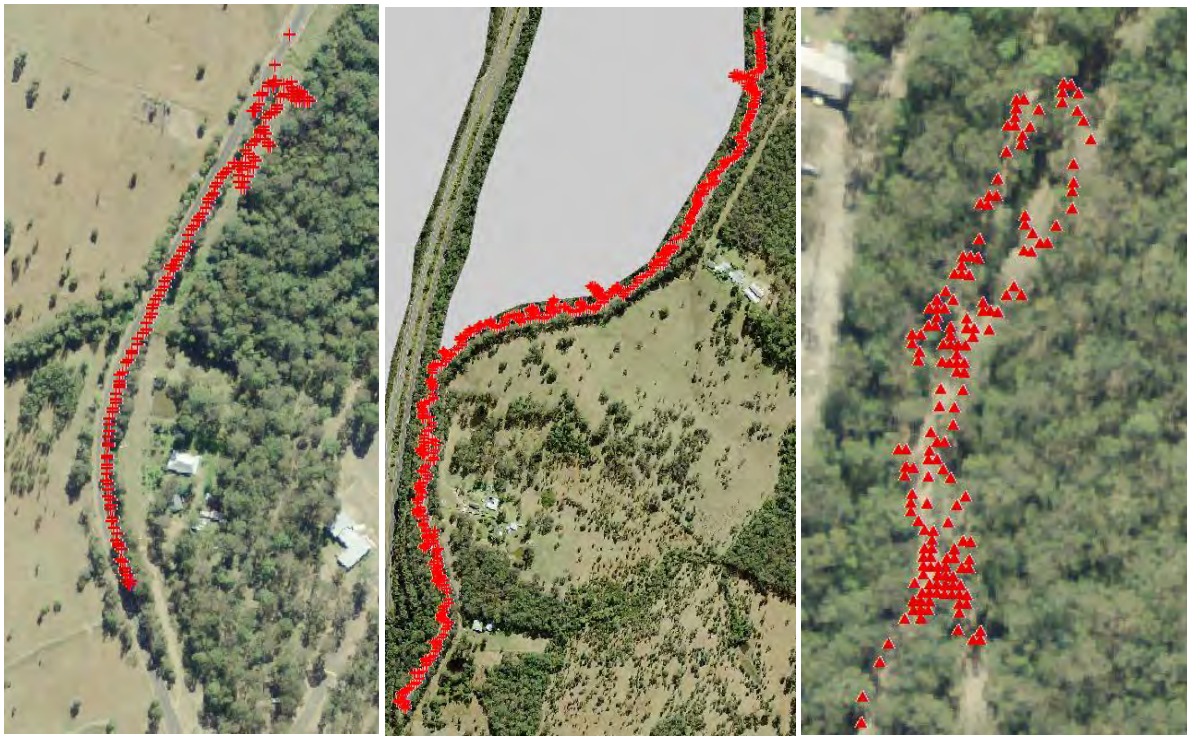


Figure 1- Survey site examples for Detection Dog paths for opportunistic sites (left and middle) and pre-selected site 1ha transect (right)

1.2 Results for site floristic data

A total of 7,321 trees with a DBH greater than 10cm were counted within the 66 pre-selected survey site 1ha transects to allow an analysis of each sites tree species diversity and densities. Of the 66 sites, 45 sites meet the floristic density of >15% of either a single species or combination of stems of the following SEPP21 (Chapter 3 of (BC) 2021) listed species – Tallowwood (*E. microcorys*), Grey Gums (*E. punctata/propinqua*), Forest Red Gum (*E. tereticornis*) and/or Swamp Mahogany (*E. robusta*).

The highest density of stems per tree species are shown in Table 1 below with Small-fruited Grey Gum (*E. propinqua*) recording 916 stems Tallowwood (*E. microcorys*) recording 817 stems and Spotted Gum (*Corymbia maculata*) recording 710 stems. Small-fruited Grey Gum (*E. propinqua*) was recorded at 43 (65%) of sites with Tallowwood recorded at 41 sites (62%) and for these species they were recorded at a density >15% at 27 (Small-fruited Grey Gum) and 23 (Tallowwood) sites.

Out of the 12 sites that recorded a koala scat, 8 sites recorded a single tree density or multiply trees density that meet the >15% definition of 'Potential Koala Habitat' under SEPP21. The four additional sites that also recorded a koala scat recorded less than the 15% threshold (site ID139, 115, 104 and 14). See Table 2 below for dominant species recorded at these sites.

The list of Koala Feed Trees (KFTs) relevant to the Mid Coast LGA under Chapter 3 and Chapter 4 of *SEPP (Biodiversity and Conservation) 2021* differ depending on the land zoning with the Chapter 3 list applying to all Rural lands. The lists are detailed in Appendix A. The priority KFTs used in this study to derive the priority PCTs to define 'Likely Koala habitat" are a subset of the 2 SEPP KFT lists and comprise 6 Primary trees and 8 Secondary trees as shown in Appendix A.

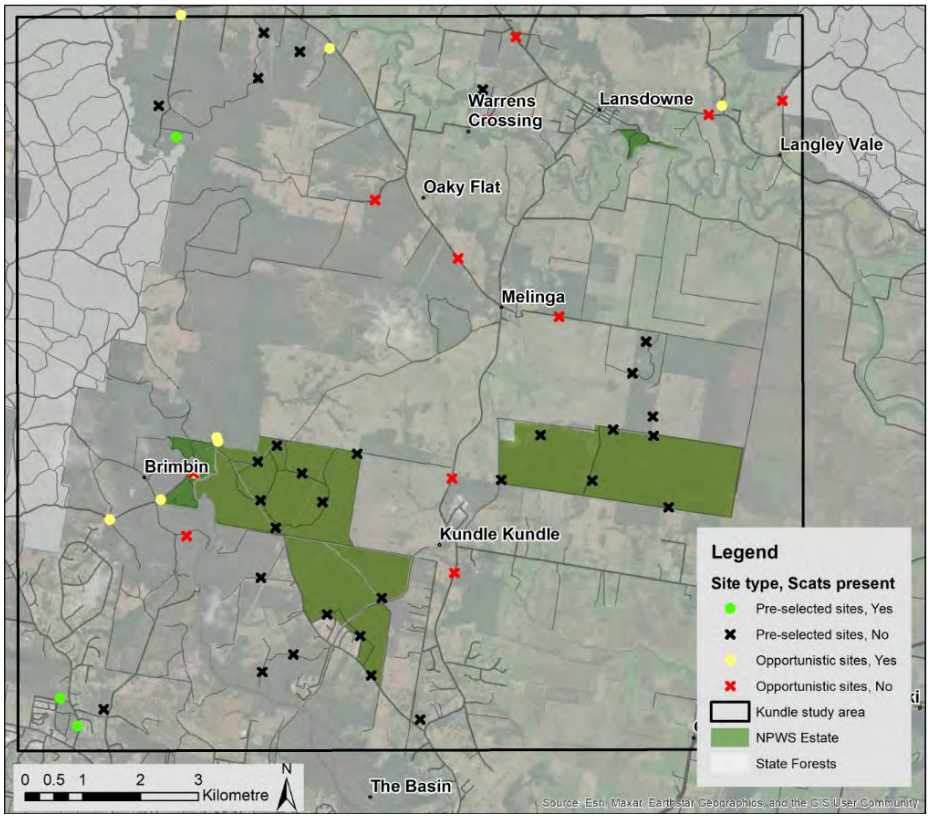
Tree count	Species	No of sites	Sites with >15% density SEPP21
916	Small-fruited Grey Gum (*E. propinqua*)	43 (65%)	27
817	Tallowwood *(E. microcorys*)	41 (62%	23
710	Spotted Gum (*Corymbia maculata*)	24 (36%)	
496	Grey Ironbark (*E. siderophloia*)	43 (65%)	
480	Broad-leaved White Mahogany *(E. carnea)*	23 (35%)	
382	Pink Bloodwood (*E. intermedia*)	41 (62%)	
259	White Stringybark (E. globoidea)	24 (36%)	
223	White Mahogany (*E. acmenoides*)	16 (23%)	
222	Blackbutt (*E. pilularis*)	17 (25%)	
151	Forest Oak (*Allocasuarina totulosa*)	10 (15%)	
124	Broad-leaved Paperbark (*M. quinquenervia)*	3 (4%)	
83	Forest Red Gum (*E. tereticornis*)	14 (21%)	1
69	Swamp Mahogany *(E. robusta*)	6 (9%)	2

Table 1- Highest no. of stems sampled at survey sites for 13 tree species

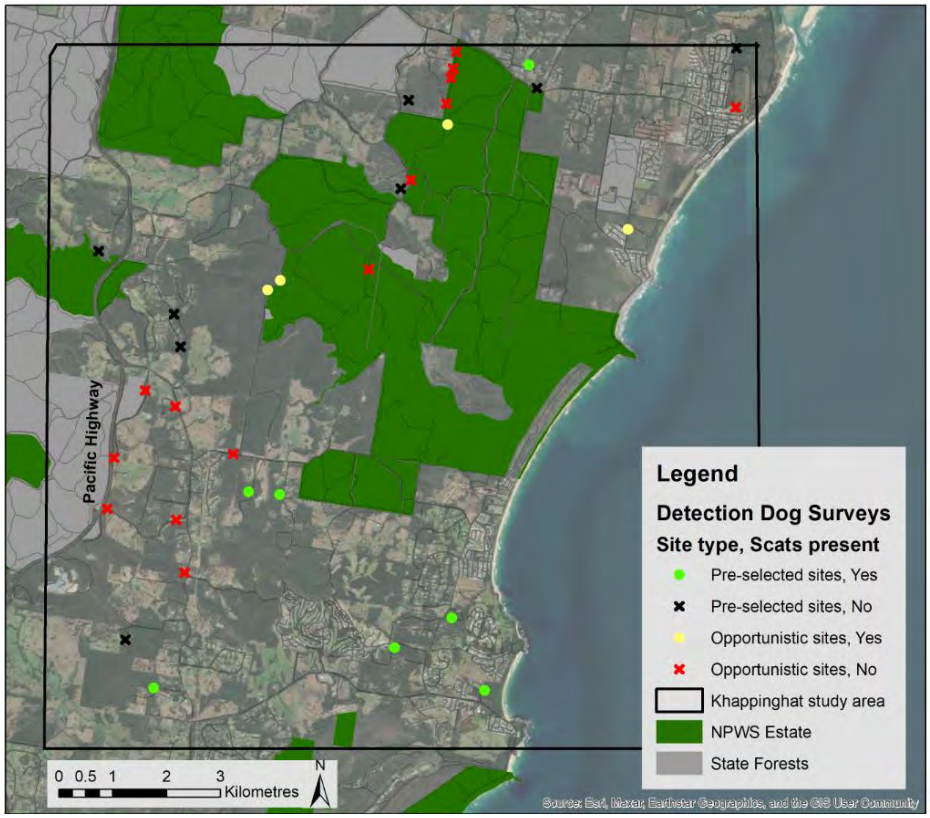
Site ID	Species	No of sites
ID139	Tallowwood *(E. microcorys*)	3%
	Sydney Peppermint (*E. piperita*)	82%
	Blackbutt (*E. pilularis*)	9%
ID115	White Mahogany (*E. umbra*)	36%
	Grey Ironbark (*E. paniculata*)	22%
	Spotted Gum (*Corymbia maculata)*	46%
ID104	Small-fruited Grey Gum (*E. propinqua)*	4%
	Grey Ironbark (*E. paniculata*)	7%
	Broad-leaved White Mahogany *(E. carnea)*	33%
	Spotted Gum (*Corymbia maculata)*	51%
ID14	Grey Ironbark (*E. siderophloia*)	12%
	Grey Box (*E. macrocarpa*)	18%
	White Stringybark (*E. globoidea*)	8%
	Broad-leaved White Mahogany *(E. carnea)*	13%
	Smooth-barked Apply (*Angophora costata*)	14%
	Forest Oak (*Allocasuarina totulosa*)	5%

Table 2- Tree species at sites with a koala scat but did not meet the 15% threshold

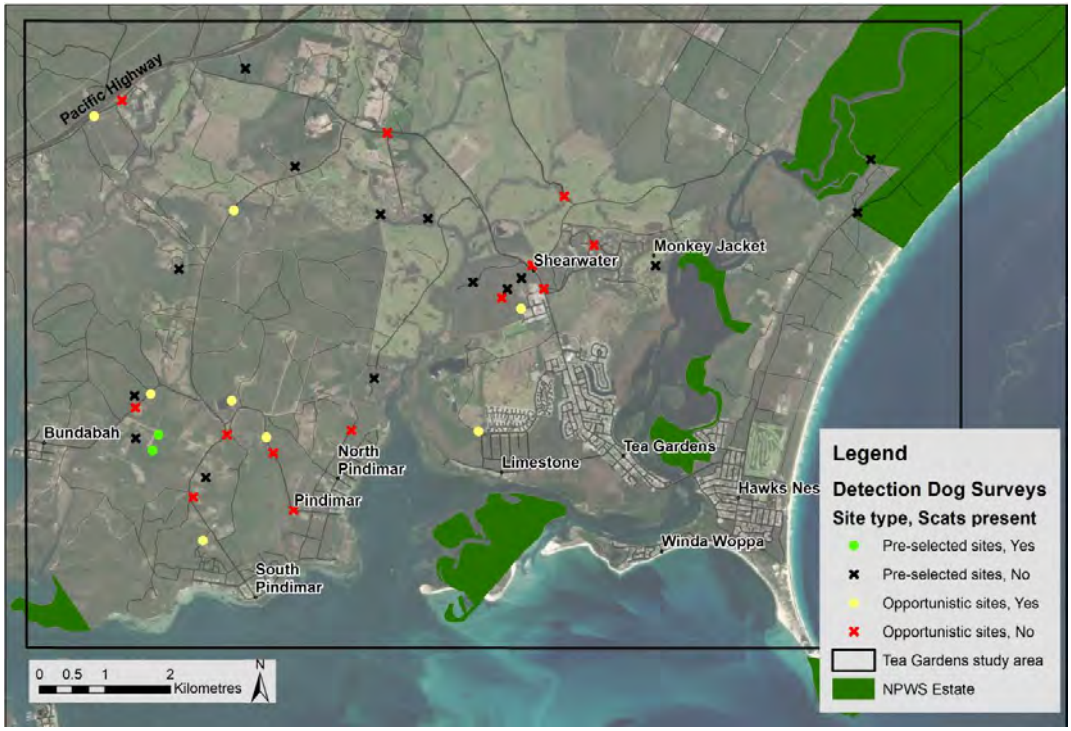
Koala detection dog team (Canines for Wildlife) and Botanist Survey123 data app entry



Map 2 - Pre-selected surveys sites and opportunistic sites in the Kundle study area



Map 3 – Pre-selected surveys sites and opportunistic sites in Knappinghat study area



Map 4 - Pre-selected surveys sites and opportunistic sites inTea Gardens study area

2.0 Plant Community Type (PCT) mapping

The identification of the vegetation communities (Plant Community Types- PCTs) likely to support koalas was determined by analysis of the likely presence/absence of the locally significant Koala Feed Trees (KFTs) species identified for the Mid Coast LGA (refer Appendix A).

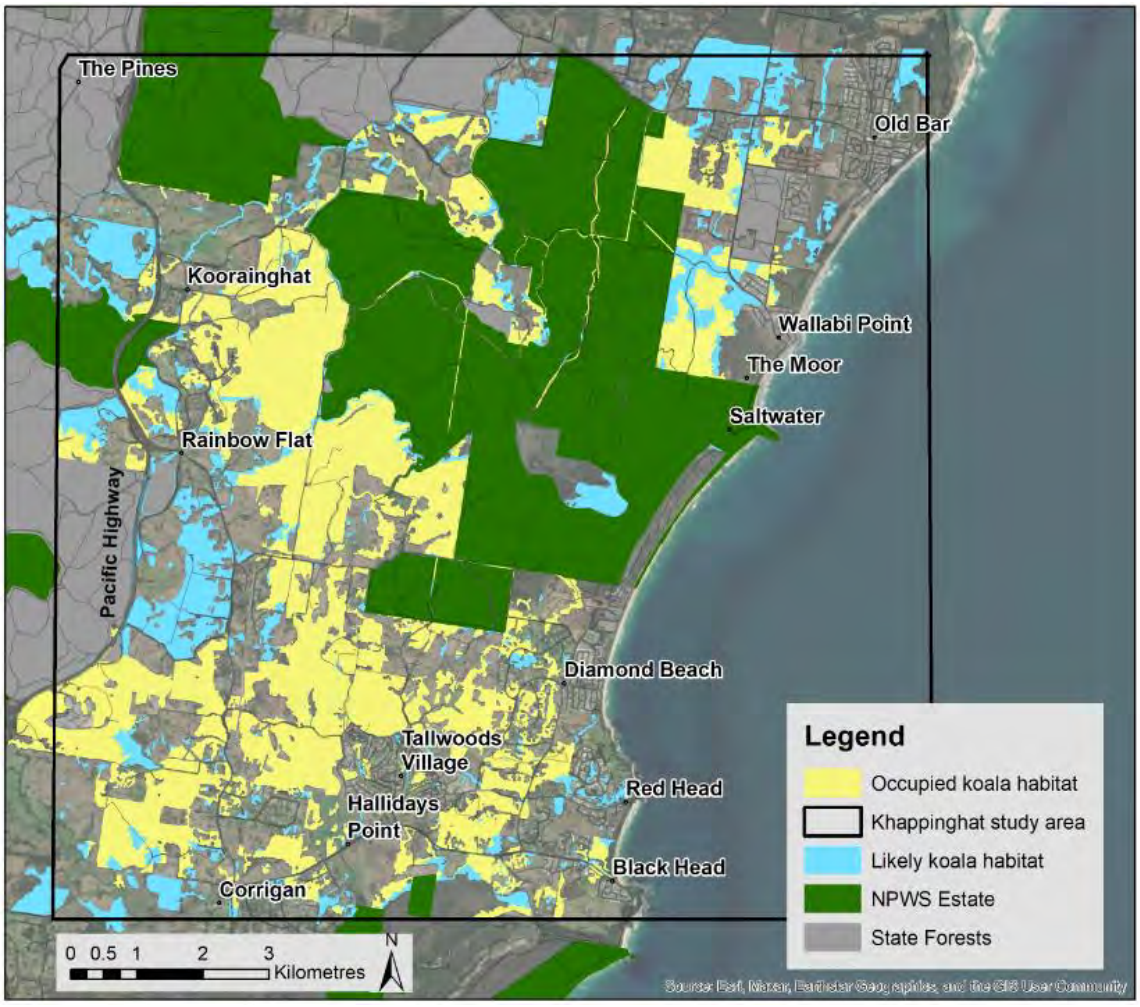
The Eucalypt (and some other genus species) component of the mapped PCTs within the NSW State-wide Plant Community Type mapping was used to identify which PCT's are likely to meet the criteria as 'Highly Suitable Koala Habitat' by reviewing the cover and frequency of occurrence of KFT species within each PCT in the BioNet Vegetation Classification database. Using this assessment, 'Likely Koala Habitat', was derived based on the likely presence of 15% or greater of KFT's in each PCT using the Eucalypt vegetation data within the BioNet Vegetation Classification VIS database.

For the Mid Coast Council LGA 179 PCTs were mapped in the NSW State-wide Plant Community Type data base and out of these 41 PCTs were derived to meet the thresholds for 'Likely Koala Habitat' across the LGA area based on tree floristics and cover scores. For the three prioritised study areas, 59 PCTs were mapped in the NSW State-wide Plant Community Type mapping and out of these 45 PCTs were derived to meet the thresholds for 'Likely Koala Habitat'.

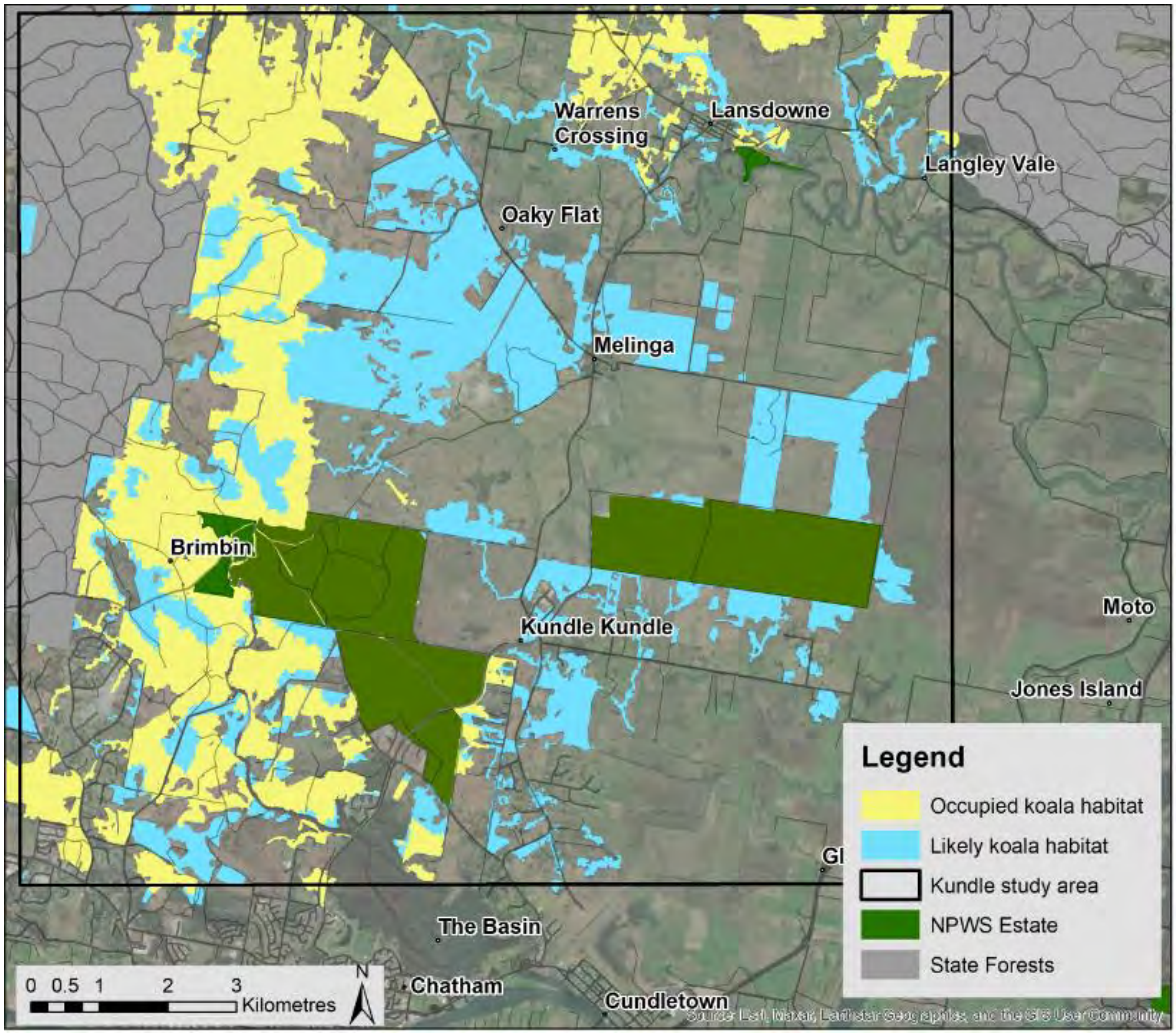
The derived PCTs were combined into one habitat layer and used to prioritise and target koala field surveys to assess koala presence using a standardised survey methodology and specialised Koala Detection dog teams. Floristic sampling of all tree stems greater than 10cm DBH at all 66 pre-selected survey sites was also completed to allow an, 'on average', analysis of KFT composition and percentage against all other species.

'Likely Koala habitat' was derived were PCTs meet the criteria of 15% of koala feed trees, with 'Occupied Koala Habitat' being an overlay of these PCTs were records and surveys demonstrated koala occupancy over time. Habitat maps are shown below for the 3 study areas and the LGA. It should be noted that the PCTs as shown are derived from 'modelled' data and in some case maybe be inaccurate with respect to both floristic composition and/or vegetation extant boundaries.

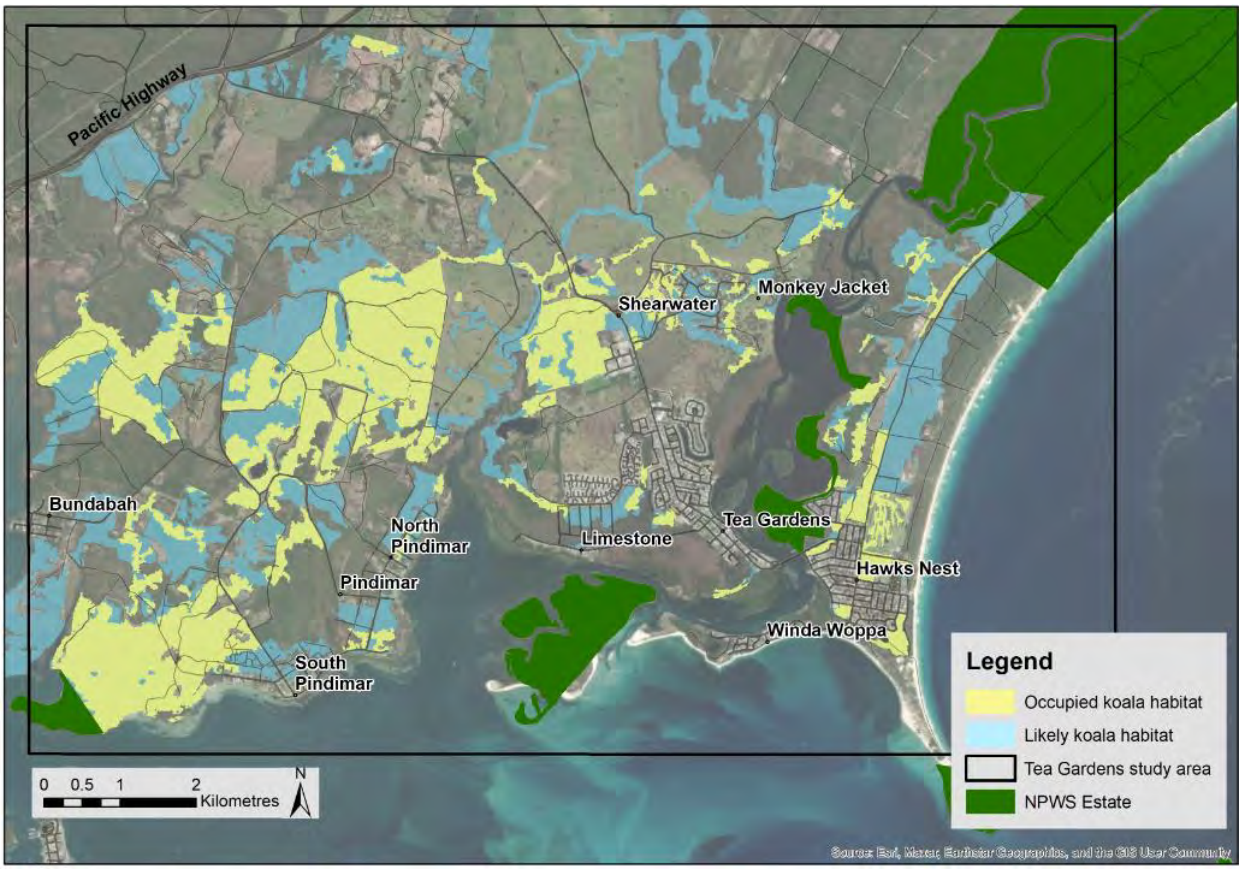
Map 8 and Map 9 indicate the likely koala habitat across the Mid Coast Council LGA based on displaying of PCTs tagged to likely meet the threshold of greater than 15% of KFTs. Map 8 shows the Generational Persistence (GP) grid cells (2.5km * 2.5kms) that demonstrate koala occupancy by way of multiply records recorded over the last 3 koala generational periods (18 years). This analysis is based on present records and survey knowledge and it should be noted that a vacant grid cell does not necessarily equate to koala absence but likely lack of surveys and data. Maps 8 and 9 therefore need to be interpreted with caution subject to further ground based surveys and verification.



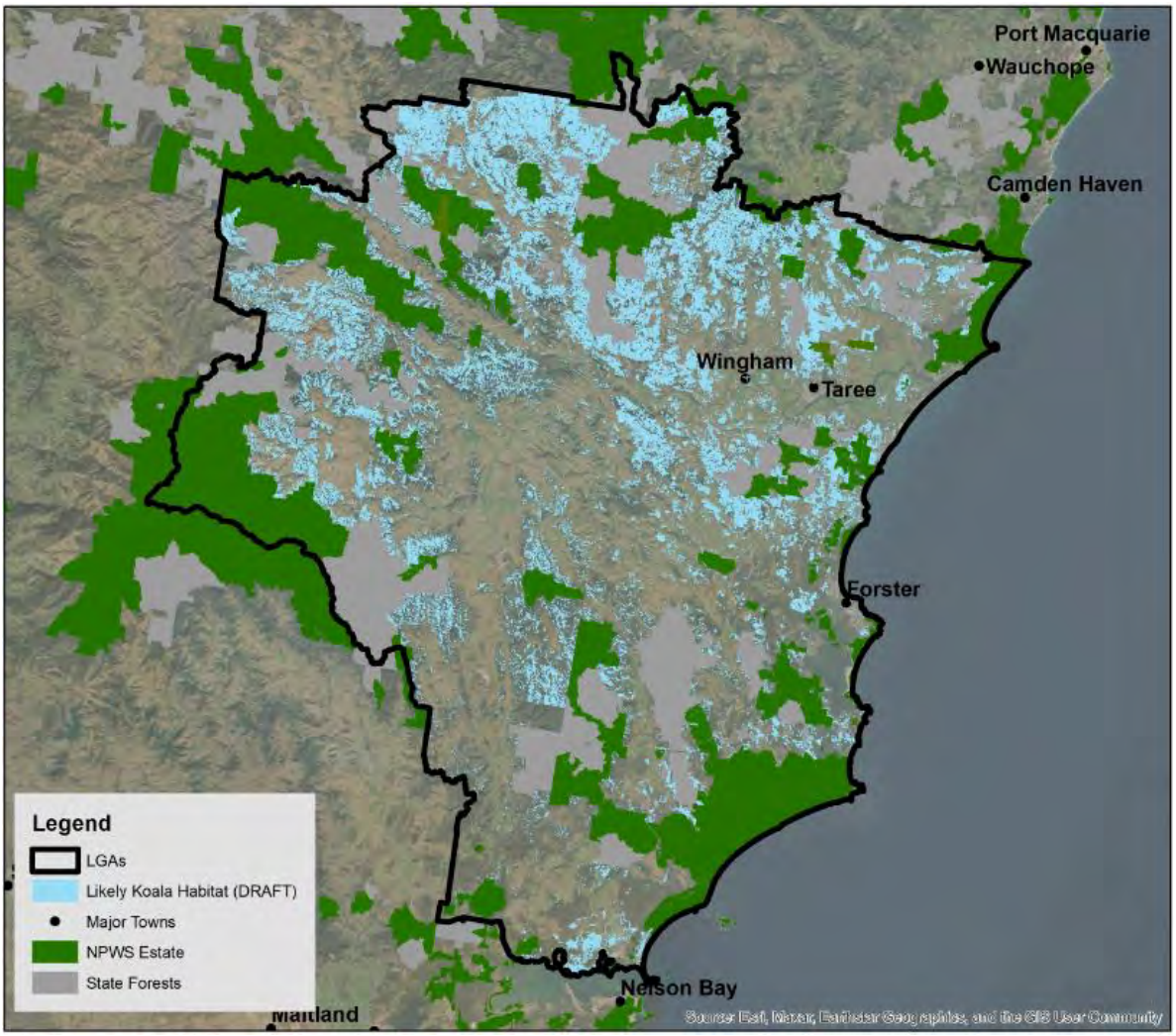
Map 5 – Khappinghat Likely Koala Habitat and Occupied Koala Habitat



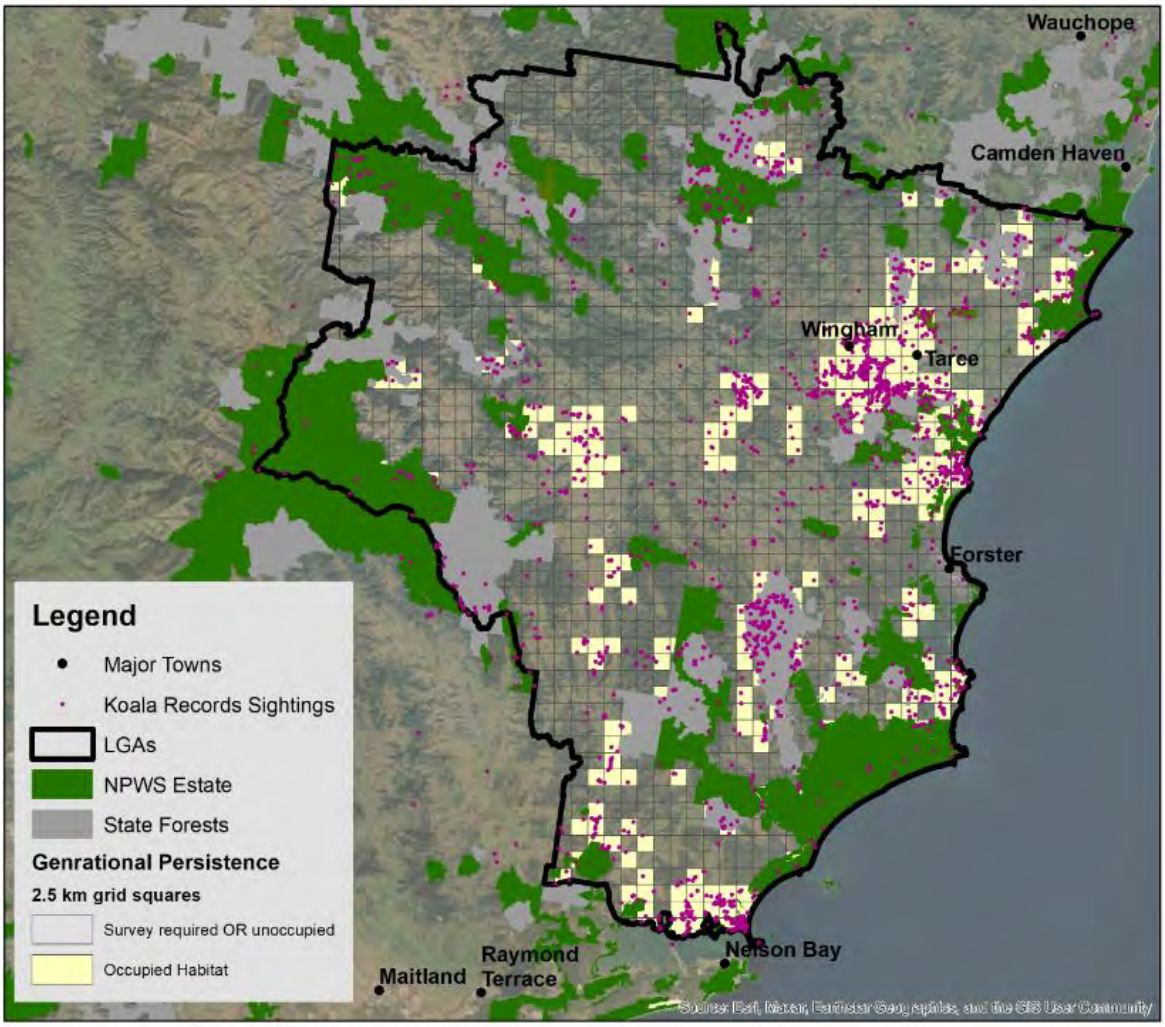
Map 6 – Kundle Likely Koala habitat and Occupied Koala Habitat



Map 7 – Tea Gardens Likely Koala Habitat and Occupied Koala Habitat



Map 8 – Mid Coast Council LGA Likely Koala Habitat (draft)



Map 9 – Mid Coast Council LGA , Generational Persistence Grid Cells (2.5km * 2.5Kms) with koala records over the last 18 years

Appendix A

Koala Feed Tree lists relevant to the Mid Coast LGA

Chapter 4 BC SEPP2021 North Coast	Chapter 3 BC SEPP2021 North Coast	This Study Priority KFTs Primary (P) or Secondary (S)
Allocasuarina torulosa		
Angophora floribunda		
Corymbia gummifera		
Corymbia henryi		
Corymbia intermedia		
Corymbia maculata		
Eucalyptus acmenoides		
Eucalyptus amplifolia		
Eucalyptus bancroftii		
Eucalyptus biturbinata		YES (S)
Eucalyptus campanulata		
Eucalyptus canaliculata		YES (S)
Eucalyptus carnea		
Eucalyptus crebra		
Eucalyptus eugenoides		
Eucalyptus fibrosa		
Eucalyptus glaucina		YES (P)
Eucalyptus globoidea		YES (S)
Eucalyptus grandis		YES (S)
Eucalyptus laevopinea		
Eucalyptus largeana		
Eucalyptus microcorys	YES	YES (P)
Eucalyptus moluccana		YES (S)
Eucalyptus nobilis		
Eucalyptus pilularis		
Eucalyptus placita		
Eucalyptus planchoniana		
Eucalyptus propinqua		YES (P)
Eucalyptus psammitica		
Eucalyptus punctata	YES	YES (P)
Eucalyptus resinifera		YES (S)
Eucalyptus robusta	YES	YES (P)
Eucalyptus rummeryi		
Eucalyptus saligna		YES (S)
Eucalyptus scias		
Eucalyptus seeana		

Eucalyptus siderophloia		
Eucalyptus signata	YES	YES (S)
Eucalyptus racemosa		YES (S)
Eucalyptus tereticornis	YES	YES (P)
Eucalyptus tindaliae		
Eucalyptus umbra		
Melaleuca quinquenervia		

Blue shading indicates species identified in this study as a Primary KFTs which also are included in either or both Chapter 3 and Chapter 4 of SEPP2021.

Yellow shading indicates species identified in this study as a Secondary KFTs which also are included in either or both Chapter 3 and Chapter 4 of SEPP2021.

Appendix B

Recommended Koala Detection Dog Survey Method

1. The field team will comprise a koala detection dog (primarily for scat detection) and dog handler/ ecologist (a person that can verify koala scat identification, identify the likely tree species and collect field data at each site such as disturbances/weeds).

2. Survey methodology at each site will involve a walking transect up and back of a 200m by 50m sample area with the detection dog sampling koala feed trees (and all other trees) within the 1ha sample area.

3. Where a scat is located, the time taken to find this scat from the start time is recorded, as is information on estimated age of the scat (scat to be collected if determined to be 'fresh'), the likely tree species and diameter (DBH)) and if a koala is present in the tree.

4. Rapid Survey Method - after first scat is found the survey is completed and move to the next site.

5. Each transect is to be orientated on a pre-determined compass bearing (that best samples within the PCT/habitat map) preferably along the contour of the topography. Any amendment to the site location or bearing must be recorded.

6. Record any other site disturbances that maybe relevant or impacting on koala habitat (ie logging, dieback, weeds or recent fire).

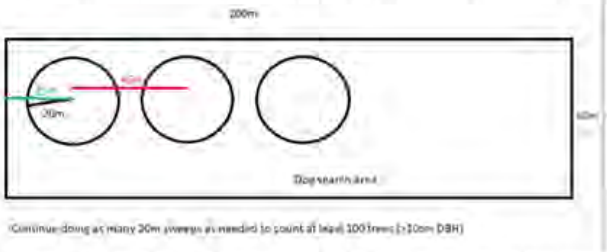
Recommended field method for Botanist to Validate Koala Habitat

1. Once navigated to the predetermined survey site, the Botanist will sample the trees within the 200m by 50m 1ha sample area.

2. The survey area is to be oriented to best fit within the 1ha (200m x 50m) sample area.

3. At each of the 200m x 50m sites, a count of trees present is required to allow an assessment (average) of koala feed trees against all trees present. A minimum, if present, of 100 trees greater than 10cm should be sampled and recorded in the provided Survey123 app.

4. At each site, undertake enough 20m circular sweeps to count 100 trees, starting at approximately 25m into the survey site area from the starting point coordinates(see diagram below).



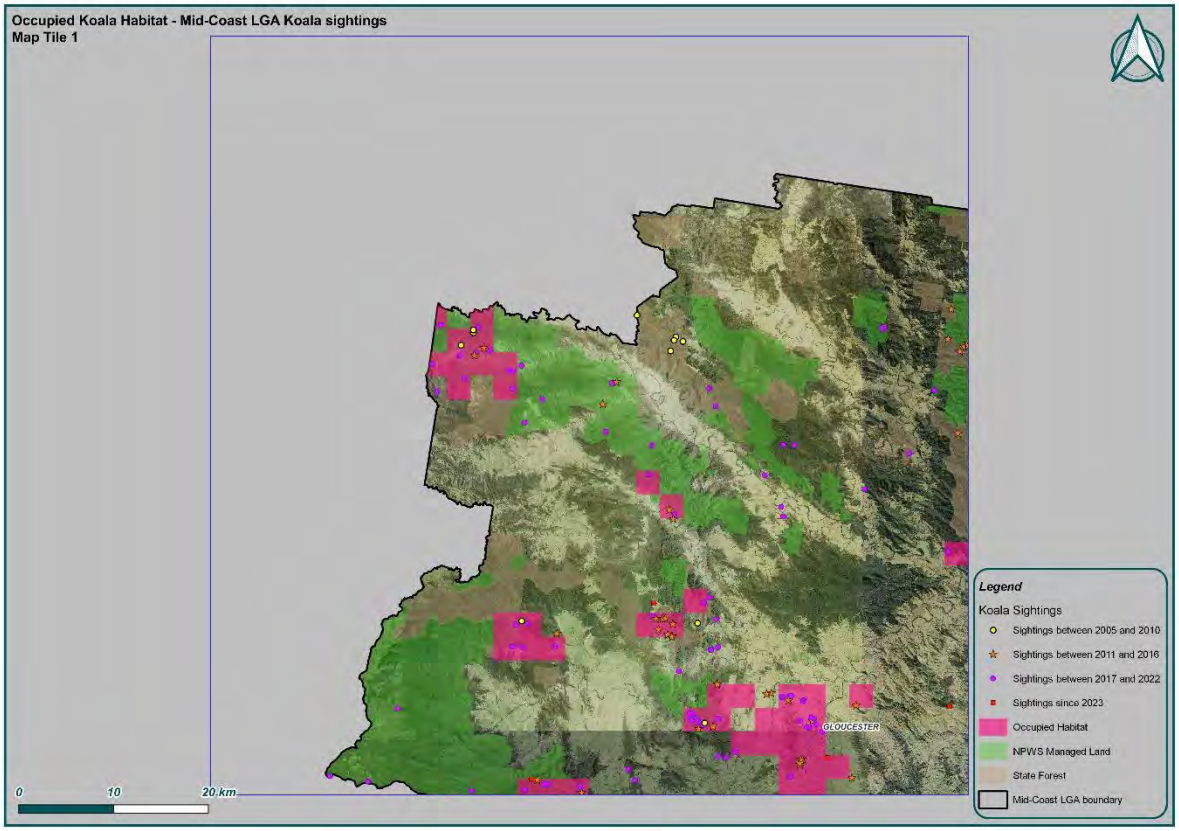
Continue doing as many 20m sweeps as needed to count at least 100 trees (>10cm DBH)

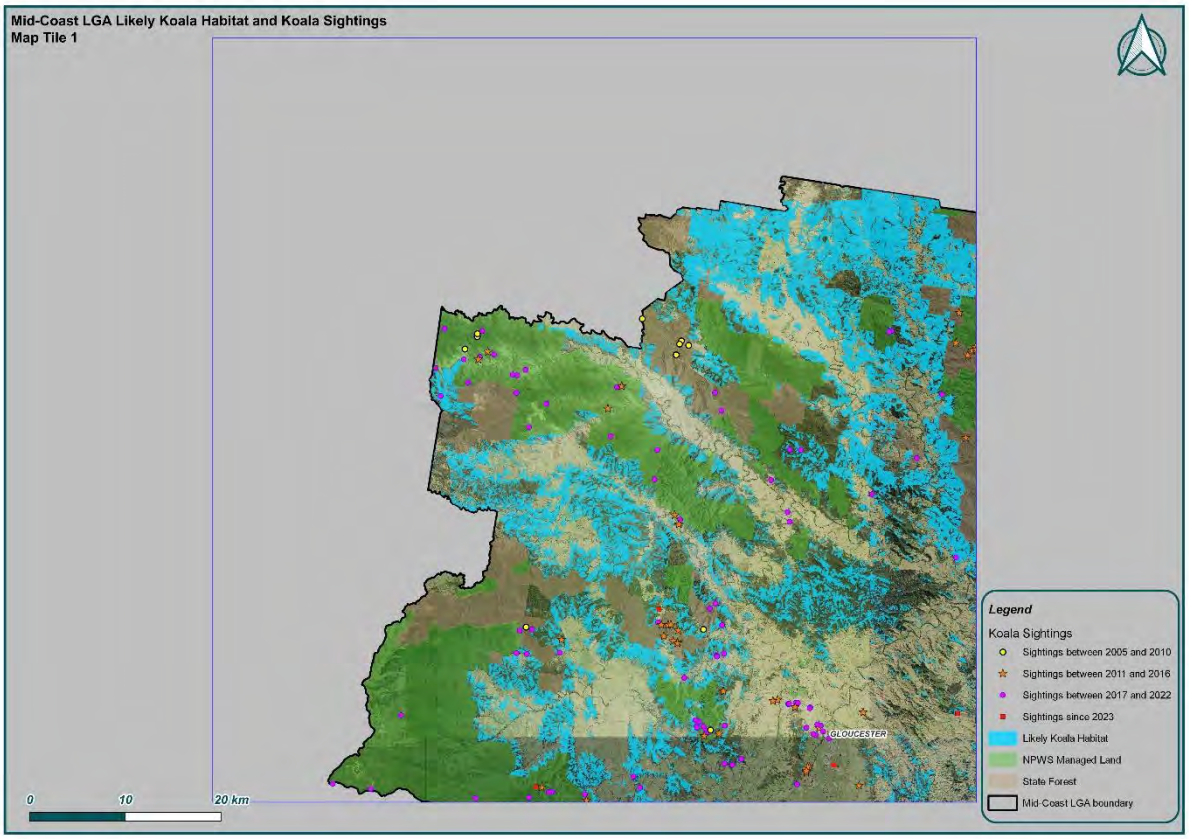
5. Record the species of all trees within the 20m sweep and then proceed to the next sample point (45m) generally along the contour keeping within the sampling 1ha search area. Repeat the 20m sweep until 100 trees or more have been counted or the end of the 200m transect is reached. If 100 trees are not present within sampling 1ha area, count all available trees.

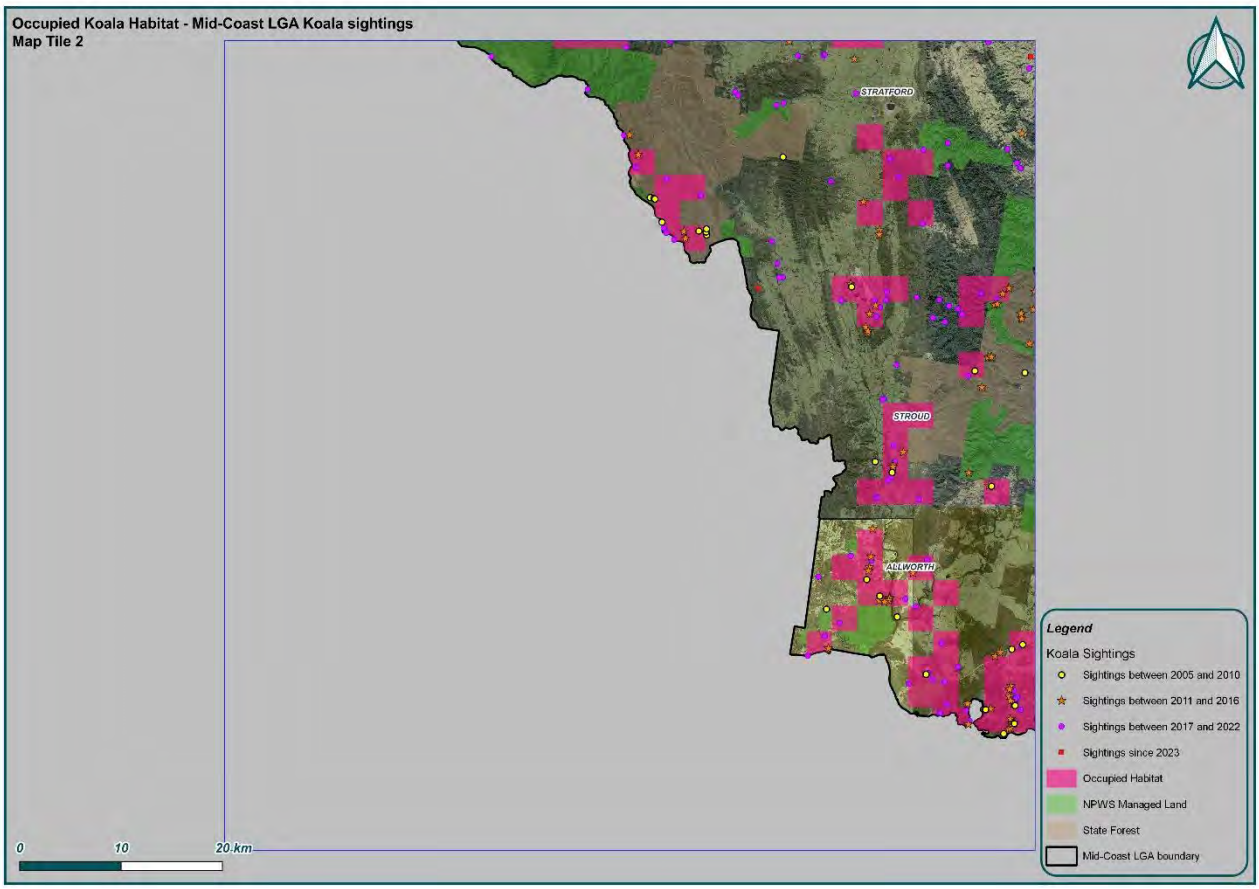
6. To ensure a representative sample is recorded, avoid fire response regrowth areas or other areas of heavy disturbance where numerous pioneer species will affect the sampling results. Examples may include dense regeneration areas of Acacia sp., Allocasuarina sp. and Melaleuca sp. Swamp forests of Melaleuca and Casuarina have naturally single specie dense stands and should be included in the count where KFT are present.

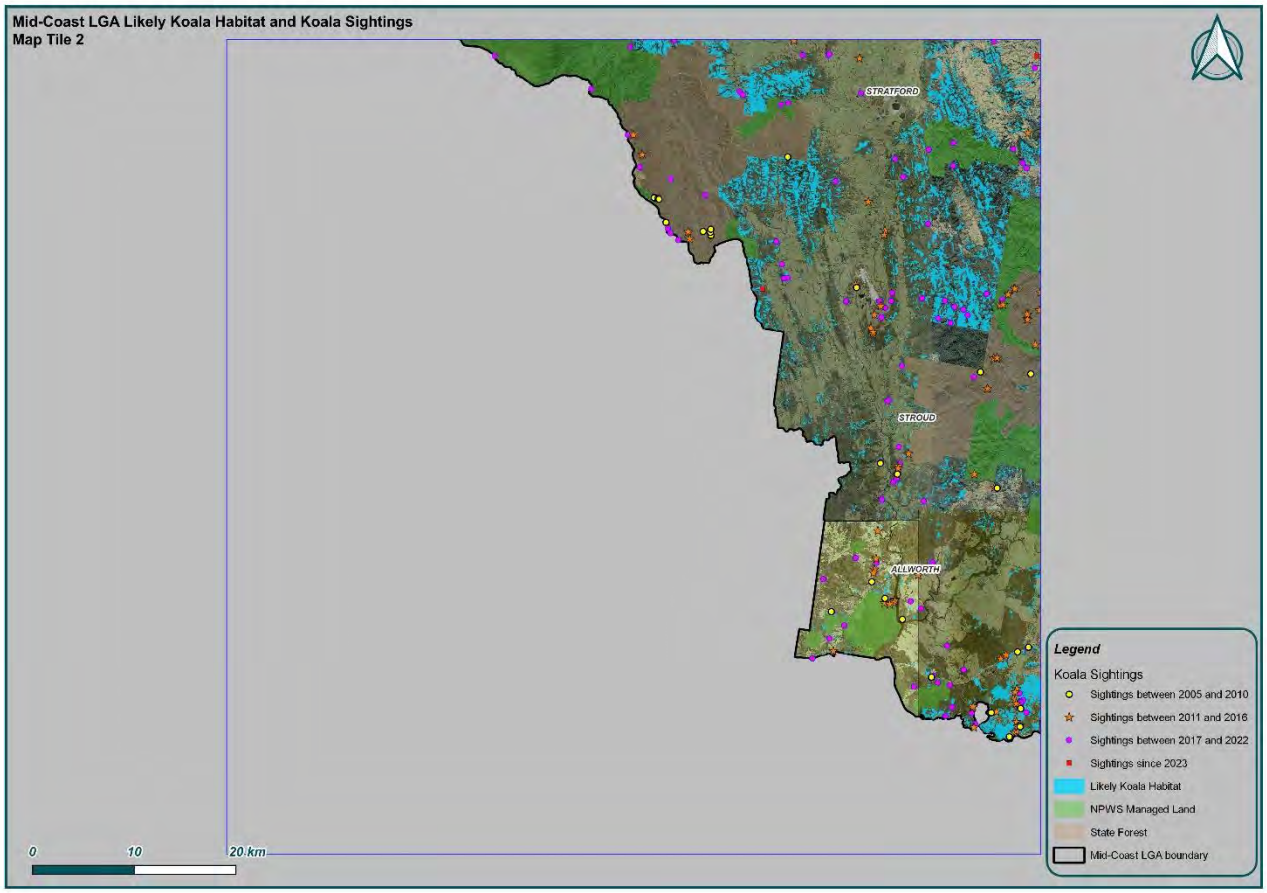
7. Rainforest species such as palms, cycads or other pioneer regenerating rainforest species are not to be counted. In areas of mixed Eucalypt and rainforest specie vegetation types, rainforest species are to be counted where they are clearly not presenting as high-density pioneers and are forming part of the canopy. These can be recorded as 'Rainforest sp.

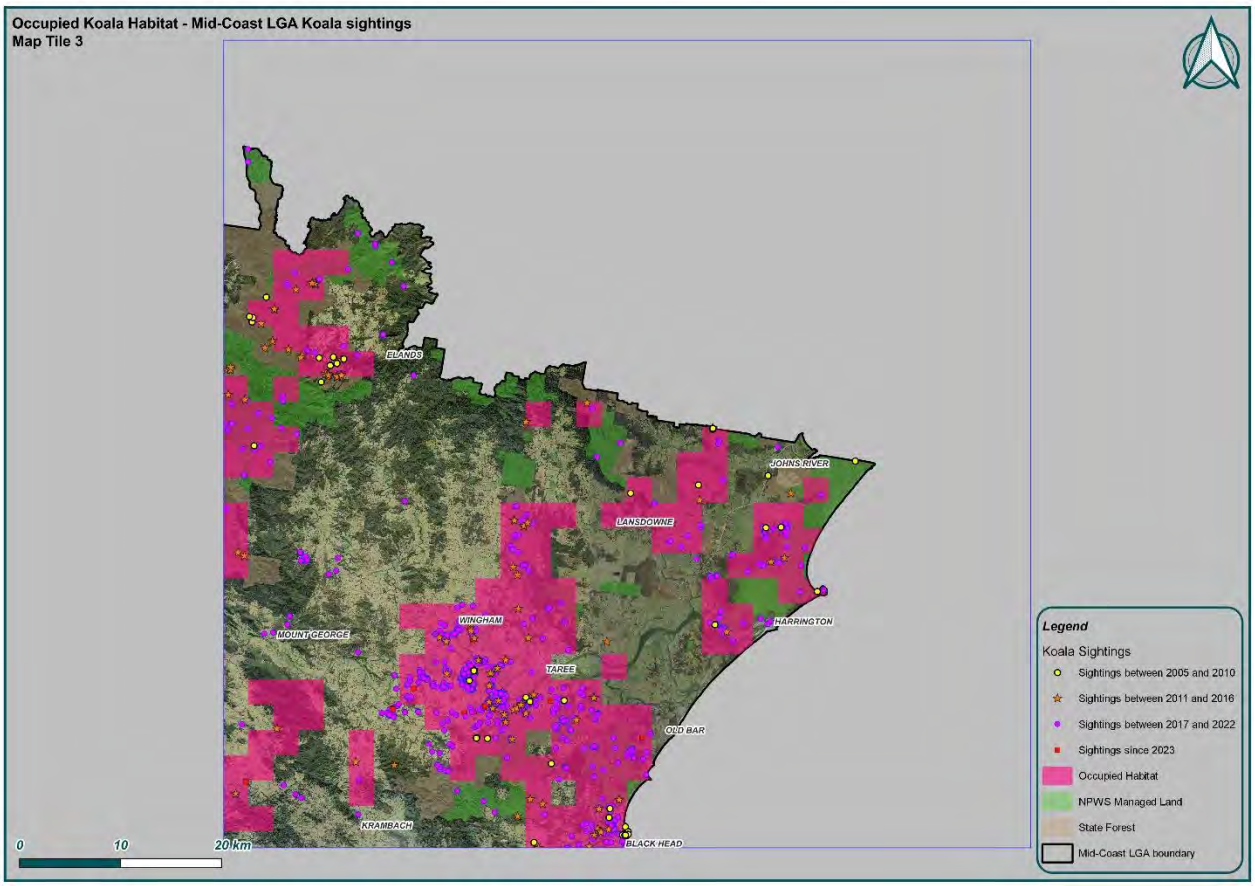
Appendix C LGA wide habitat mapping

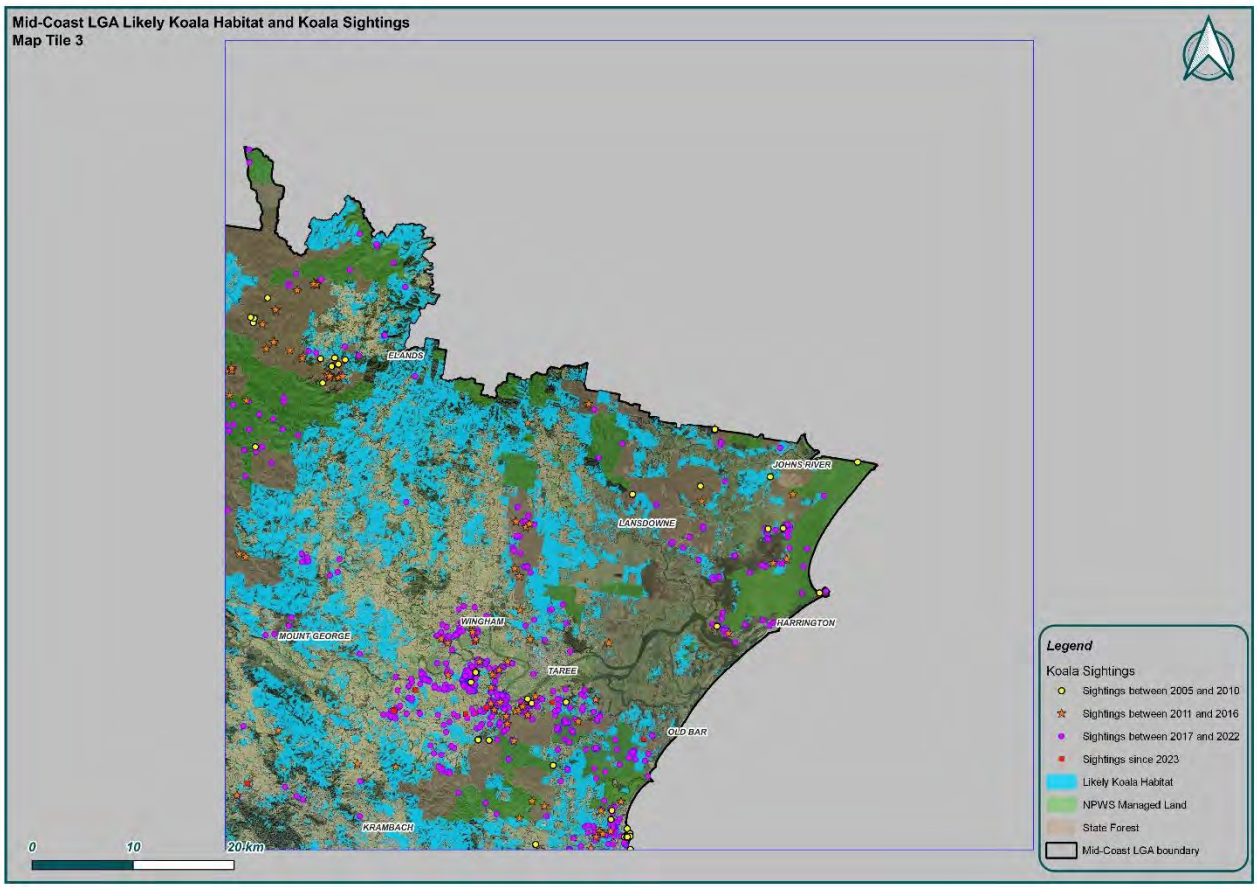


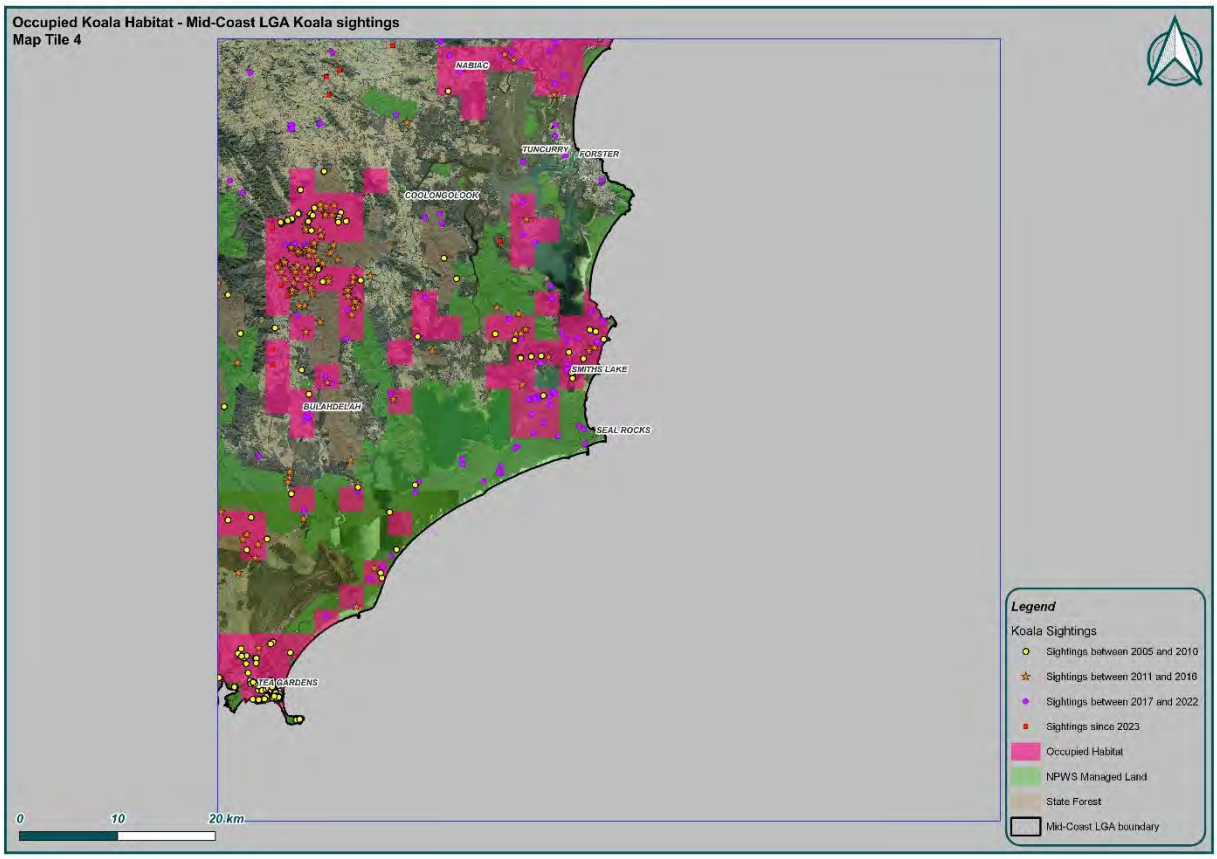


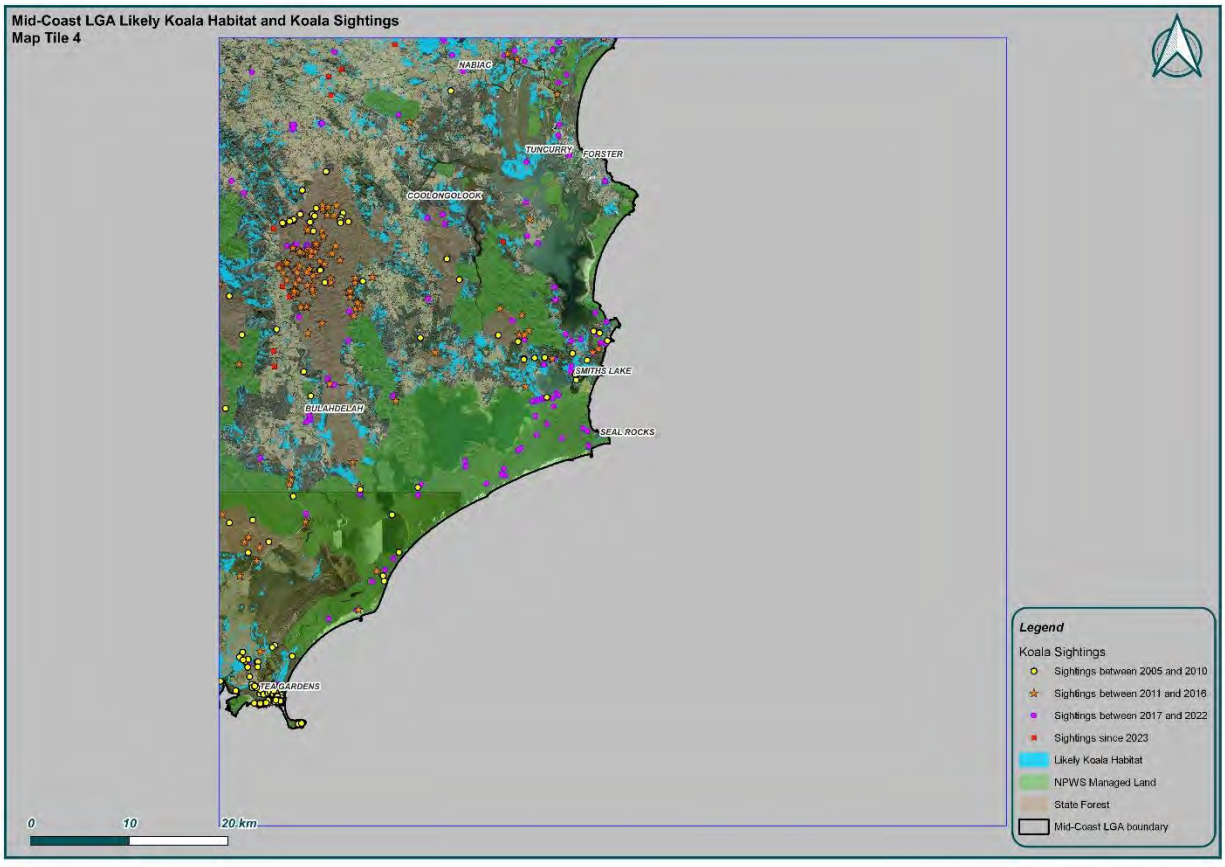

Occupied Koala Habitat - Mid-Coast LGA Koala sightings
Map Tile 2
STRATFORD
STROUD
ALLWORTH
0
10
20 km
Legend
Koala Sightings
Sightings between 2005 and 2010
Sightings between 2011 and 2016
Sightings between 2017 and 2022
Sightings since 2023
Occupied Habitat
NPWS Managed Land
State Forest
Mid-Coast LGA boundary


Mid-Coast LGA Likely Koala Habitat and Koala Sightings
Map Tile 2
STRATFORD
STROUD
ALLWORTH
0
10
20 km
Legend
Koala Sightings
Sightings between 2005 and 2010
Sightings between 2011 and 2016
Sightings between 2017 and 2022
Sightings since 2023
Likely Koala Habitat
NPWS Managed Land
State Forest
Mid-Coast LGA boundary


Occupied Koala Habitat - Mid-Coast LGA Koala sightings
Map Tile 3
ELANDS
JOHNS RIVER
LANSDOWNE
WINGHAM
HARRINGTON
MOUNT GEORGE
TAREE
OLD BAR
KRAMBACH
BLACK HEAD
0
10
20 km
Legend
Koala Sightings
Sightings between 2005 and 2010
Sightings between 2011 and 2016
Sightings between 2017 and 2022
Sightings since 2023
Occupied Habitat
NPWS Managed Land
State Forest
Mid-Coast LGA boundary


Mid-Coast LGA Likely Koala Habitat and Koala Sightings
Map Tile 3
ELANDS
JOHNS RIVER
LANSDOWNE
WINGHAM
HARRINGTON
MOUNT GEORGE
TAREE
OLD BAR
KRAMBACH
0
10
20 km
Legend
Koala Sightings
Sightings between 2005 and 2010
Sightings between 2011 and 2016
Sightings between 2017 and 2022
Sightings since 2023
Likely Koala Habitat
NPWS Managed Land
State Forest
Mid-Coast LGA boundary


Occupied Koala Habitat - Mid-Coast LGA Koala sightings
Map Tile 4
NABIAC
TUNCURRY
FORSTER
COOLONGOLOOK
SMITHS LAKE
BULAHDELAH
SEAL ROCKS
TEA GARDENS
0
10
20 km
Legend
Koala Sightings
Sightings between 2005 and 2010
Sightings between 2011 and 2016
Sightings between 2017 and 2022
Sightings since 2023
Occupied Habitat
NPWS Managed Land
State Forest
Mid-Coast LGA boundary


Mid-Coast LGA Likely Koala Habitat and Koala Sightings
Map Tile 4
NABIAC
TUNCURRY
FORSTER
COOLONGOLOOK
SMITHS LAKE
BULAHDELAH
SEAL ROCKS
TEA GARDENS
0
10
20 km
Legend
Koala Sightings
Sightings between 2005 and 2010
Sightings between 2011 and 2016
Sightings between 2017 and 2022
Sightings since 2023
Likely Koala Habitat
NPWS Managed Land
State Forest
Mid-Coast LGA boundary

Appendix D MidCoast koala habitat trees

Source: MidCoast Council, 2024

Primary (feed trees)

Grey gum (*Eucalyptus biturbinata*)

Bangalay (*Eucalyptus botryoides*)

Large-fruited grey gum (*Eucalyptus canaliculata*)

Thick-leaved white mahogany (*Eucalyptus carnea*)

Slaty red gum (*Eucalyptus glaucina*)

Flooded gum (*Eucalyptus grandis*)

Tallowwood (*Eucalyptus microcorys*)

Grey box (*Eucalyptus moluccana*)

Drooping red gum (*Eucalyptus parramattensis* subsp. *decadens*)

Small-fruited grey gum (*Eucalyptus propinqua*)

Grey gum (*Eucalyptus punctata*)

Red mahogany (*Eucalyptus resinifera*)

Swamp mahogany (*Eucalyptus robusta*)

Narrow leaved red gum (*Eucalyptus seeana*)

Grey ironbark (*Eucalyptus siderophloia*)

Forest red gum (*Eucalyptus tereticornis*)

Secondary / Supplementary (Including browse and shelter trees)

Black oak (*Allocasuarina littoralis*)

Forest oak (*Allocasuarina torulosa*)

Smooth-barked apple (*Angophora costata*)

Rough-barked apple (*Angophora floribunda*)

Rough-barked apple (*Angophora subvelutina*)

River oak (*Casuarina cunninghamiana*)

Red bloodwood (*Corymbia gummifera*)

Pink bloodwood (*Corymbia intermedia*)

Spotted gum (*Corymbia maculata*)

White mahogany (*Eucalyptus acmenoides*)

Cabbage gum (*Eucalyptus amplifolia*)

Thin-leaved stringybark (*Eucalyptus eugenioides*)

Broad-leaved red ironbark (*Eucalyptus fibrosa*)

Blue-leaved stringybark (*Eucalyptus agglomerata*)

White stringybark (*Eucalyptus globoidea*)

Ribbon gum (high altitude) (*Eucalyptus viminalis*)

Silver-top stringybark (*Eucalyptus laevopinea*)

Craven grey box (*Eucalyptus largeana*)

Forest ribbon gum (*Eucalyptus nobilis*)

Messmate stringybark (high altitude) (*Eucalyptus obliqua*)

Blue Mountains ash (*Eucalyptus oreades*)

Grey ironbark (*Eucalyptus paniculata*)

Blackbutt (*Eucalyptus pilularis*)

Sydney peppermint (*Eucalyptus piperita*)

Grey ironbark (*Eucalyptus placita*)

Rudder's box (*Eucalyptus rudderi*)

Sydney blue gum (*Eucalyptus saligna*)

Scribbly gum (*Eucalyptus signata*)

Broad-leaved white mahogany (*Eucalyptus umbra*)

Broad-leaved paperbark (*Melaleuca quinquenervia*)

Turpentine (*Syncarpia glomulifera*)

Appendix E Strategy action timings

Action ID.	Action	Timeframe	Progress
1.3	Maintain the ability to deliver devolved funding programs to private landholders and public lands to restore existing koala habitat and create new koala habitat. Funded works are to include bush regeneration, control of weeds that impact koalas and the quality of their habitat, fencing for stock exclusion, planting, facilitated natural regeneration, and seeding. Habitat restoration programs shall bring about strategic, long-term improvement. Programs will be delivered in identified priority areas.	Ongoing	
1.4	Maintain a register of landholders across the MidCoast that are willing to support koala habitat creation, restoration, and monitoring programs on their land (as part of the MidCoast Koala Safe Spaces program).	Ongoing	
1.5	Communicate and (where possible) align Council's koala recovery and conservation efforts with the community and other stakeholders. Assist the capacity of partnering organisations (where possible) to deliver koala habitat restoration and conservation programs by providing information, resourcing, support, or cooperative effort.	Ongoing	

Action ID.	Action	Timeframe	Progress
1.6	Partner with the BCT and the NSW Credits Supply Taskforce to increase the amount of koala habitat that is protected under private land covenants, instruments, and agreements. Identify strategically important areas of koala habitat on private land that should be evaluated for protection using private land conservation instruments. Connect potential customers with the BCT or Credit Supply Taskforce. Encourage the BCT to utilise the revolving fund mechanism to protect koala habitat by understanding the BCT considerations associated with this program and by identifying suitable properties to the BCT for possible application of the revolving fund scheme. Inform and promote the uptake of private land conservation and the revolving fund scheme for koala conservation in priority areas.	Ongoing	
1.7	Identify strategically important areas of koala habitat on private land that should be evaluated for addition to the National Parks estate. Understand the NPWS Reserve Acquisition priorities and considerations for koala habitat reservations. Connect potential vendors with the NPWS Reserve Acquisitions team.	Ongoing	
1.9	Hold annual koala food tree giveaways. Maintain the capacity of the Council nurseries to collect seed and grow-out koala food trees for giveaways and planting programs.	Ongoing	
2.1	Implement a best management practice framework and a continuous improvement regime for processes associated with the assessment of impacts to koalas in planning proposals, development applications and Council activities. Wherever possible, incorporate the delivery of local offsets in development and planning proposal outcomes. Identify strategically-important local offset sites and develop local area offset schemes, which include appropriate long-term maintenance frameworks.	Ongoing	

Action ID.	Action	Timeframe	Progress
2.5	Deliver koala vehicle strike avoidance and mitigation measures at priority locations (ie reduced speeds, variable message signs, roadside letterbox / garbage bin stickers, pavement treatments, directive fencing, crossing structures, road verge maintenance, lighting, request for speed patrols). Monitor traffic speeds at koala roadkill hot-spot areas and communicate the results to the NSW Police and the community.	Ongoing	
2.6	Create a register of wildlife underpasses throughout the LGA. Audit and monitor the structures and deliver or advocate to the responsible authority for active maintenance work that ensures proper underpass performance (including the integrity of directional fencing). Target the area on each side of wildlife underpasses for conservation instruments and management to ensure that koala habitat on each side of each underpass is secure and well-managed.	Ongoing	
2.7	Assist the work being undertaken with relevant practitioners to expand the use of traditional ecological knowledge and cultural burning practices to assist protect koala habitat from risks associated with high intensity bushfire and other threats. Assistance may be provided through scheme promotion, connecting landholders with burn practitioners, education, planning, workshops or delivery.	Ongoing	
2.8	Identify and map priority koala habitat areas (high density koala populations and population refuge areas) and provide this mapping to relevant agencies so it can be identified in Bushfire Management Plans, operational fire plans and hazard reduction plans to better protect koala populations when managing bushfire control and hazard reduction burns. Advocate for the protection of priority koala habitat areas as an asset to be actively protected in bushfire control situations and emergencies. Provide maps of the locations of priority koala habitat areas to the relevant agencies. Share occupied koala habitat and important fire refuge areas for koalas maps with local fire responders and emergency management teams.	Ongoing	

Action ID.	Action	Timeframe	Progress
2.11	Deliver a dedicated koala drinking water program to landholders to increase water availability in known koala habitats that are susceptible to heat-stress events and which have limited availability of existing surface water (dams, creeks, etc).	Ongoing	
2.12	For climate change adaptation, deliver projects that increase the area of koala habitat that is protected in public and private conservation areas, and manage such lands in a way that improves the ecological condition and function of the vegetation (thus increasing resilience). Identify and protect climate adaptation corridors and climate refuge / nodes, particularly altitudinal corridors and north – south corridors and re-connect populations to improve genetic diversity. *The mapping of wildlife corridors and nodes (Action 4.2) shall identify the important climate corridors and refuge nodes. Action 4.12 is also linked to this Action.*	Ongoing	
2.14	Use restrictions and covenants on new developments to avoid or manage domestic dog impacts on koalas near koala populations and habitat. Plan off-leash dog areas only within areas distant from koala populations and habitat or securely fence the off-leash area with koala proof fencing.	Ongoing	
3.1	Maintain and promote the community Koala Sightings Register and provide regular uploads of this data to the BioNet database. Assess whether a time-bound citizen science campaign (such as a month-long koala count) or a program that encourages sightings all year is more effective at obtaining koala sightings from the community. Trial the benefits of a time-bound citizen science campaign during koala breeding season.	Ongoing	
3.2	Outline Council koala education and engagement actions within a documented *Koala Education and Engagement Strategy*. The Strategy will define the measures used for evaluating the success of the program. This will consider level of awareness or behaviour change analysis, where feasible.	Ongoing	

Action ID.	Action	Timeframe	Progress
3.5	Support local Traditional Owner people to implement, monitor and evaluate koala projects on their lands.	Ongoing	
3.6	Deliver a biannual (two-yearly) MidCoast Koala Festival. Continue to raise awareness in the community about local koala populations and their conservation needs through the Koala Safe Spaces Program and citizen science projects. Deliver special koala engagement events, including art / science and educational programs for koalas.	Ongoing	
4.1	Invest in additional koala habitat mapping to fill knowledge gaps and extend the area covered by fine-scale koala habitat mapping (likely and occupied koala habitat). Revise as-held mapping as new data becomes available.	Ongoing	
4.4	Undertake on-ground koala and habitat surveys and monitoring throughout the LGA and update relevant databases with the latest data. Compile population estimates for priority koala habitat areas within the MidCoast. Continue the Bootawa song-meter program every two years to track population changes at the local level (sentinel monitoring site).	Ongoing	
4.5	Provide support (if needed) to koala care and rescue groups to maintain or increase the accuracy of sightings data that are provided to BioNet.	Ongoing	
4.6	Attend conferences and symposia that offer the latest findings and research on koala knowledge, data gaps or koala programs. Incorporate learnings into this Koala Conservation Strategy implementation.	Ongoing	

Action ID.	Action	Timeframe	Progress
4.8	Support, promote and / or facilitate scientific investigation of actions identified in the MidCoast Koala Research Strategy.	Ongoing	
4.11	Document, map and actively monitor the replanting sites associated with the MidCoast Koala Safe Spaces Program to track patterns of koala use. Use the results of this monitoring to improve habitat creation processes and activities in the future.	Ongoing	
4.13	Stay informed of evaluations and knowledge-gathering regarding the impacts and management of koalas in relation to public and private native forestry.	Ongoing	
4.15	Promote to the community to urgently report sick, injured, or at-risk koalas to the appropriate koala care and rescue organisation across the MidCoast. Seek to break-down barriers to community reporting of koalas involved in vehicle strike or dog attack incidents.	Ongoing	
5.2	Participate in and contribute to reviews of environmental legislation and strategies in NSW and Australia; advocating for positive improvements to the protection and conservation of koalas.	Ongoing	
5.3	Continue to engage and advocate to the NSW Government and NRC regarding forestry practices and koala conservation (particularly in Wang Wauk SF, Kiwarrak SF, Nerong SF, Bulga SF and Wallaroo SF) and in relation to private native forestry. Engage and advocate for koala conservation in state-significant developments and major projects, including resources developments and public infrastructure.	Ongoing	

Action ID.	Action	Timeframe	Progress
5.4	Advocate to State Government (Transport for NSW) to install koala barrier fencing and crossings at new road construction projects and vehicle strike hotspots on State managed roads and to maintain existing vehicle strike avoidance assets. Advocate to State Government (Transport for NSW) where speed limit reductions are considered beneficial for protecting koalas at vehicle strike hotspots.	Ongoing	
5.8	Work to support the NSW Government (and other relevant organisations) to deliver Carbon Farming projects that incorporate the planting of new koala habitat.	Ongoing	
2.2	Review and improve the MidCoast Council offsets procedure for Council activities in relation to the loss of koala habitat / loss of koala food tree species. Focus on achieving improved program effectiveness and delivery.	Short	
2.9	Develop a MidCoast Koala Emergency Response Plan to guide collective action following a natural disaster event. *In implementing this Action, consider the NSW Government response to Recommendation 53 of the NSW Bushfire Inquiry ("that the government develop and implement a policy for injured wildlife response, rescue and rehabilitation in bushfires, including developing a framework for interaction with emergency operations and consideration of wildlife response in operational plans")*	Short	
3.3	Co-design koala conservation education and engagement campaigns with key stakeholders. Potential target audiences are to include rural landholders and schools (using Koala Smart). Potential activities may include workshops, art experiences, symposia, field days, koala walks, community tree planting, spotlighting, etc. Consider the feasibility and value of the formation of a Friends of the Koala Landcare Group to assist with information and education.	Short	

Action ID.	Action	Timeframe	Progress
4.2	Publish a map of the spatial locations of important movement corridors (and buffers and nodes) for koalas across the entire MidCoast LGA using a recognised connectivity mapping / modelling tool. *This mapping work shall consider existing corridor mapping products and resources, including but not limited to, DECC key regional corridors, corridor mapping by adjacent Councils, the Great Eastern Ranges Initiative, and Barrington – Hawkesbury climate corridors and others.*	Short	
4.3	With permission, extend the habitat mapping process used in this Strategy to the areas of the Forestry Corporation estate to assist compile a complete koala habitat mapping dataset for the LGA.	Short	
4.7	Prepare a research strategy to identify focus areas for applied knowledge gathering for key threats to koalas in the LGA. Liaise with the Research Team within the NSW Koala Strategy with regards to our local research needs and priorities. Seek collaborative research opportunities, where possible.	Short	
4.16	Undertake a review, consult and engage, and publish a final list of koala habitat tree species for the MidCoast region, with notes on the geographic landscapes associated with each species (eg. coastal sites, high elevation sites, etc).	Short	
5.1	Advocate to the NSW Government to extend the NSW Koala Strategy program and funding of the MidCoast Regional Partnership, including extending the role of the MidCoast Koala Project Officer, until June 2029.	Short	
5.5	Foster partnerships with neighbouring councils, Traditional Owners, universities, schools, MidCoast 2 Tops Landcare, community groups, non-government organisations, and local experts to expand the delivery of the Koala Smart and the Koala Safe Spaces programs. Work in a collaborative way to assist all relevant stakeholders to align and coordinate their koala recovery and conservation efforts.	Short	

Action ID.	Action	Timeframe	Progress
5.6	Partner with farming organisations to explore new ways to encourage landholders to protect koala habitat on their land while maintaining or increasing agricultural production.	Short	
1.8	Develop an action plan for securing connectivity outcomes at *The Gate* – the regional wildlife corridor area between Myall Lakes NP, Wallingat NP and Booti Booti NP. Implement the actions within the Plan.	Medium	
1.10	Audit all Individual Koala Plans of Management (IKPOMs) across the MidCoast LGA. Redress any issues of non-compliance detected during the audit.	Medium	
1.11	Advocate for a program of protection and management of Travelling Stock Reserves, unformed Crown Roads and other Crown Reserves that are of high conservation value for koalas.	Medium	
1.12	Identify and nominate to the NSW Government one new asset of intergenerational significance for the koala in the MidCoast region. Support the management of the existing Crowdy Bay Asset of Intergenerational Significance for koalas.	Medium	
1.13	Develop and implement local koala conservation action plans in priority areas that will define the conservation actions and targets for securing viable long-term safe populations of koalas for that landscape. Implement adopted local koala conservation action plans.	Medium	
2.3	Manage Tinonee as an urban koala safe space. Develop an Urban Koala Safe Space Strategy for Tinonee, including a tree audit, street and public tree planting programs, KVS measures, as well as education and interpretation features.	Medium	

Action ID.	Action	Timeframe	Progress
2.4	Write to the NSW Government requesting an amendment to the process of the 10:50 Code to require that landholders formally register their application of the Code. Write to the NSW Government requesting that the Rural Boundary Clearing Code be rescinded. Participate in any opportunities for review of the 10:50 Code and Rural Boundary Clearing Code.	Medium	
2.10	Liaise with authorities or land managers to advance that all prescribed burns in or near koala habitat are conducted in a way that minimises impact to koala habitat and individual koalas. Advocate for the requirement for koala inspections immediately prior to the burn within the burn area using skilled RFS / agency personnel or knowledgeable volunteers.	Medium	
2.13	Identify areas where domestic dog attacks are a key threat to koalas and develop a plan to engage and communicate with and change the behaviour of local dog owners. Promote responsible dog ownership and the importance of keeping on dogs on leads and in properly fenced enclosures in koala habitat areas. Record the accurate locations of domestic dog attacks in a central database.	Medium	
2.15	Advocate for amendments to the *Companion Animals Act 1998* or its *Regulation* to increase the prosecution capabilities of authorities for property owners whose dogs wantonly attack and kill a koala (by amending the "*trespass*" consideration).	Medium	
2.17	Communicate the locations of important koala habitat and populations to relevant agencies and organisations so that regional feral deer control efforts can be prioritised within these habitats. Evaluate and manage the risks of impacts of feral deer on koala habitat plantings, particularly in areas where feral deer are present in high-densities ** such as the Coomba Park area.*	Medium	

Action ID.	Action	Timeframe	Progress
3.4	Build partnership and co-design initiatives with Traditional Owner people and groups, including Elders and knowledge holders, where appropriate. Only share knowledge and stories on koalas, if appropriate. Learn about Traditional Owner knowledge and perspective to aid future recovery and conservation actions.	Medium	
3.7	Trial the development of an Annual Report Card for one priority ARKS in the MidCoast. Report on the achievements and deliverables and synthesise the findings of any monitoring and research. *If successful, roll out Report Cards for other priority ARKS over time.*	Medium	
4.9	Support a scientific evaluation as to the impact of lantana on koala occupancy and movement and scientifically investigate and publish a report on koala habitat use following lantana control.	Medium	
4.10	Support or oversee a LGA-wide collection and analysis (hair / DNA) of dingo / wild dog scats to increase knowledge of dingo / wild dog predation of koalas in different landscapes. Publish the results in appropriate public forums and, if applicable, journal articles. Promote management in line with the outcomes of the local research.	Medium	
4.12	Collaborate with researchers on climate change data and modelling that predicts the impacts of climate change on koalas and their habitat. Use this information to prioritise the identification, adaptation actions and investment in key habitat refugia and climate change adaptation corridor protection and restoration (in Action 4.2).	Medium	
4.14	Support volunteer wildlife rehabilitators, vets, and other partner organisations to enhance coordination of emergency response for koalas and other wildlife due to bushfire or extreme weather events.	Medium	

Action ID.	Action	Timeframe	Progress
5.7	Explore opportunities to guide or inform private sector organisations to leverage action and investment in koala conservation across the MidCoast.	Medium	
1.1	Designate and manage Council land and reserves that contain koala habitat as "*koala safe spaces*" and enhance their condition and connectivity through active restoration. This may involve works such as access controls, weed removal, strategic planting / revegetation, signage, etc). *Within the first five-years of this Strategy, the Council owned lands that are to be designated as koala safe spaces shall include (but not be limited to):* • *Bootawa Dam perimeter lands* • *Bucketts Way Waste Management Centre perimeter lands* • *Tinonee playing fields perimeter lands* • *Peg Leg Creek future dam perimeter lands* • *Cattai Wetlands* • *Darawakh Creek / Frogalla Swamp Wetlands* • *Red Head / Seascapes Koala corridor* • *Kore Kore Creek Reserve*	Long	
1.2	Prepare a priority koala corridor implementation plan and program for the MidCoast LGA. The plan / program shall detail the actions to protect, enhance and / or create priority koala connectivity across the MidCoast LGA. Implement the actions set-out in this plan. *The area of the Barrington ARKS between the Gloucester township and the Barrington Tops Flora Reserve shall be considered one of the priority areas for connectivity improvement in the program.* *This will follow the corridor mapping exercise in Action 4.2.*	Long	

Action ID.	Action	Timeframe	Progress
2.16	Work with landholders to design model paddock tree or climbing refuge pole arrangements in cattle, horse or sheep paddocks near high density koala habitats and corridors to help protect koalas from stock. Systematically audit every stock attack incident on koalas to develop a greater understanding of the influencing factors and conditions, and effective responses. Develop and circulate communications material to rural landholders about livestock risks to koalas.	Long	

midcoast.nsw.gov.au

MIDCOAST
council