ACT Government

Caring for Dhawura Ngunnawal

A natural resource plan for the ACT

ADDENDUM

Regional Land Partnerships
Outcomes in the ACT

Ngunnawal Acknowledgement

Dhawura nguna ngurumbangu gunanggu Ngunnawal
Nginggada dindi dhawura Ngunnawalbun yindjumaralidjinyin
Mura bidji mulanggaridjindjula
Naraganawaliyiri yarabindjula.

Ngunnawal Language Acknowledgement Translation

This country is Ngunnawal ancestral, spiritual homeland
We all always respect elders, male and female, as well as Ngunnawal country itself
They always keep the pathways of their ancestors alive
They walk together as one.

Photo Credits:
Brian Hawkins, Mark Jekabson, Mary Bonet, Marissa McDowell, Richard Snashall, Emma Carlson

To download the full version of the ACT NRM Plan and to find out how you can be part of the solution, visit https://www.environment.act.gov.au/act-nrm

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1. Introduction: The Regional Land Partnerships (RLP) program

The Regional Land Partnerships (RLP) program is the major component of the Australian Governments National Landcare Program Phase Two.

The RLP program is funded through the Natural Heritage Trust of Australia Account, established under the *Natural Heritage Trust of Australia Act 1997* (NHT Act). The RLP program is providing $450 million over five years from 2018–19 to 2022–23 for services that contribute to the achievement of four environmental and two agricultural outcomes.

Fifty service providers have been contracted to deliver 225 projects in 54 regions across Australia. This investment is being delivered through a reformed regional model that supports a range of projects contributing to four environment and two sustainable agriculture outcomes.

Projects are connecting efforts for the recovery of species identified under the Threatened Species Strategy, protecting threatened ecological communities, and reducing threats to our globally-important wetlands and world heritage sites.

Projects are also improving on-farm soil, biodiversity and vegetation, and increasing the capacity of our farms to adapt to climate change and evolving market demands.

The ACT NRM, through the ACT Government, Environment Planning and Sustainable Development Directorate (EPSDD), is the Australian Government's service provider for the NRM Management Unit in the ACT.

Service Providers are contracted to deliver Projects that contribute to achieving the six 5-year Outcomes for Regional Land Partnerships (5 in the ACT), as well as supporting services (Core Services) that aid the effective and efficient delivery of the Projects, such as Community engagement and NRM planning.

2. Requirements for Natural Resource Management Plans under RLP

The ACT Government, EPSDD is one of the 50 RLP service providers and one of the 54 'NRM regions' that is delivering the RLP and NLP2 programs. The Australian Government requires each funded NRM region to create and maintain an effective NRM plan.

These integrated plans outline pathways to protect and sustainably use natural resources within each region. Each plan identifies and prioritises integrated NRM goals, targets and associated actions.

The Australian Government requires that NRM Plans must:

i. identify and describe the 5-year Outcomes and Investment Priorities that are relevant to the Management Unit;

ii. describe stakeholder aspirations for natural resource management in the Management Unit, and where possible, how these align with the 5-year Outcomes and other relevant Australian Government priorities;

iii. identify and prioritise natural resource management actions based on knowledge of:

(a). location and condition of natural resources, including the Investment Priorities;

(b). threats to, or impacts on, natural resources;

(c). prioritisation methods for determining the most cost-effective management actions, including decision support and spatial mapping tools; and

(d). methodologies for assessing the effectiveness of management actions;

v. identify how the delivery of Projects will contribute to 5-year Outcomes and Investment Priorities for the Management Unit;

vi. identify how the Natural Resource Management Plan(s) will be implemented with comprehensive Community participation;

vii. identify Indigenous peoples' land and sea management aspirations for the relevant Management Unit, including how they relate to 5-year Outcomes, and strategies to prioritise and implement them;

viii. incorporate traditional ecological knowledge, where appropriate, in accordance with agreed protocols and with prior approval of the Indigenous custodians of the knowledge;

ix. describe key collaborations, for example between the Service Provider, industry and/or Community groups, for delivery of 5-year Outcomes;

x. identify the monitoring and reporting processes in place and how they are utilised to measure the achievements and the effectiveness of the Natural Resource Management Plan(s); and

xi. include any other content relevant to the Service Provider's obligations under clause 4.2(a) of the Statement of Work.

(a). The Service Provider must involve the Community, including the Indigenous community, in the development of a new Natural Resource Management Plan or revision of an existing Natural Resource Management Plan.

(b). The Service Provider must make the new Natural Resource Management Plan, or revised Natural Resource Management Plan, publicly available at no cost to the Community, within 3 months of it being formally approved by the organisation's Board of Directors or equivalent.

3. Australian Government 5-year RLP Outcomes and Investment Priorities

The six outcomes of the current Regional Land Partnerships program are:

- **OUTCOME 1** The ecological character of Ramsar sites is maintained or improved.
- **OUTCOME 2** The trajectory of species targeted under the Threatened Species Strategy, and other EPBC Act priority species, is improved.
- **OUTCOME 3** The natural heritage Outstanding Universal Value of World Heritage properties is maintained or improved.
- **OUTCOME 4** The condition of EPBC Act listed Threatened Ecological Communities is improved.
- **OUTCOME 5** The condition of soil, biodiversity and vegetation are improved.
- **OUTCOME 6** Agriculture systems have adapted to significant changes in climate and market demands.

3.1. **OUTCOME 1:** By 2023, there is a restoration of, and reduction in threats to, the ecological character of Ramsar sites, through the implementation of priority actions.

Ginini Flats Wetland Complex Ramsar Site

Ramsar sites are wetlands of international importance listed under the Ramsar Convention on Wetlands. The Ginini Flats Wetlands in Namadgi National Park is the only Ramsar site in the ACT.

The Ginini Flats Wetland Complex is the largest intact Sphagnum bog and fen community in the Australian Alps. It was first listed as a Ramsar wetland of international importance in 1996. In designating a wetland as a Ramsar site, countries agree to establish and oversee a management framework aimed at conserving the wetland and ensuring its wise use. Under Australia's obligations to the Ramsar convention, every Ramsar site needs an individual plan of management in place, to be reviewed at intervals of at least seven years. Under provisions of the ACT Nature Conservation Act 2014, the ACT Conservator of Flora and Fauna must report to the Minister about a Ramsar wetland management plan at least once every five years.

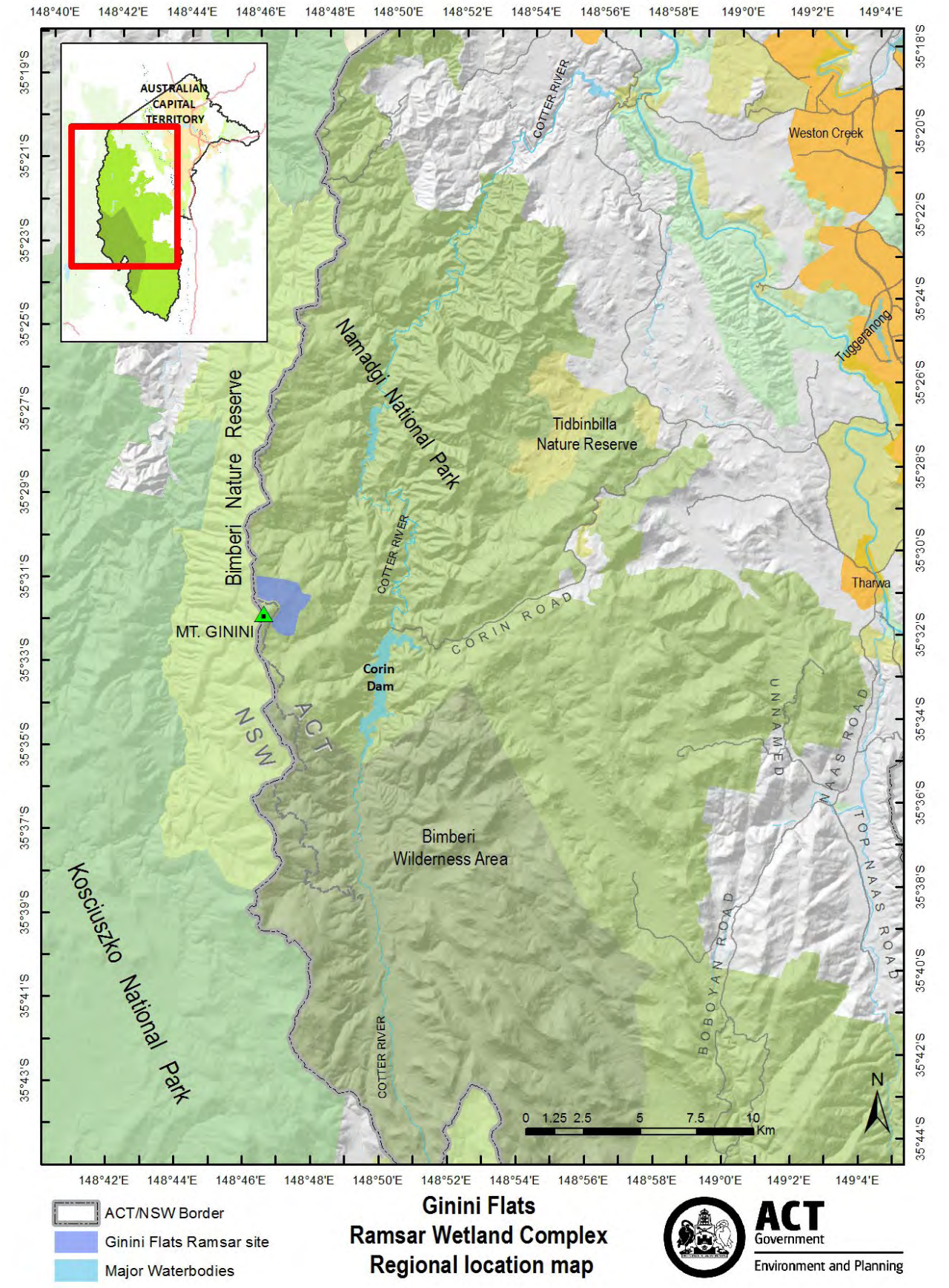


Figure 1 Map showing location of the Ginini Flats Ramsar Wetland Complex

Prioritisation

Prioritisation of NLP projects at the site to achieve related RLP outcomes is driven by:

- Expert elicitation, driven by existing management plans and current research. This includes the management plan for the Ginini Flats Wetland Complex.
- Strategic investment opportunities that can maximise RLP outcomes from minimum investment opportunities,
- Logistical considerations considering the remote location of the site.
- Review by appropriate ACT NRM governance bodies.

The below lists the priority actions related to the site:

Theme (From ACT NRM PLAN)	Priority Actions
Protection	→ Limit accessibility to the Ginini Flats Wetland Complex. → Promote community awareness about the Ramsar site and its vulnerability to damage by recreational activities to user groups through various media and interpretation methods, e.g. signage. Include information about avoiding entering Sphagnum bogs in the Ginini Flats area in camping permits for the Upper Cotter Catchment area. → Rehabilitate damaged areas of the Sphagnum bogs and fens ecological → community on the site (e.g. from fire, historic grazing, infrastructure damage, areas containing erosion tunnels, flow line incisions and bog collapse).
Managing threats	→ Incorporate appropriate management guidelines for fire suppression in the ecological community, as outlined in the ACT Ecological Guidelines for Fuel and Fire Management Operations, into the current ACT Strategic Bushfire Management Plan and regional fire management plans (e.g. for Bimberi Nature Reserve). All future fire management plans will continue to protect the Ginini Flats Wetland Complex from planned fire and wildfire, → Protect water quality in all streams by minimising the impact of erosion caused by management infrastructure and use (such as fire trails, road works and creek crossings). → Pest plant management programs developed to address the management of weeds (existing and emerging) within the Ginini Flats Wetland Complex. Continue delivering, monitoring, and evaluating existing pest plant management programs. → Establish an ongoing weed monitoring and mapping program in the immediate catchment area to track the extent of weed species of concern and the effectiveness of weed management programs. Adapt weed management to the findings. → Ensure that the co-operative invasive fauna management programs developed for Namadgi National Park address the management of feral pigs, feral horses and other pest animals within the Ginini Flats Wetland Complex. Continue delivering, monitoring and evaluating existing pest management programs for pigs and feral horses in Namadgi National Park. Invasive animal management programs should include consultation with stakeholders and neighbours and accord with the ACT Vertebrate Pest Management Strategy and threatened species action plans. → Develop pest management programs specifically for any new pest animal species identified in the existing and future monitoring programs. Avoid any new infrastructure, road and track construction and maintenance works within the catchment of the Ginini Flats Wetland Complex. → Ensure minimum infrastructure in the upper catchment. Where unavoidable reduce impact.

Theme (From ACT NRM PLAN)	Priority Actions
Research and monitoring	→ Continue to conduct systematic vegetation surveys, mapping and long-term monitoring to support research that assists in identifying specific management requirements for bogs and fens species and communities, including responses to: (a) planned and unplanned fire; (b) climate change; and (c) impacts of threats such as introduced species. → Establish a long-term climate change monitoring site in the immediate vicinity of the Ginini Flats Wetland Complex to measure the impacts of climate change on the wetland. Continue to collaborate with other agencies (e.g. Icon Water, Australian Alps national parks) in measuring the impacts of climate change on bogs, fens and affected biota in the vicinity of the Ginini Flats Wetland Complex (2). → Incorporate the knowledge gained from climate monitoring and assessment into management actions that maxim ecosystem resilience of the site. → Encourage and support further research to identify and assess the significance of Aboriginal sites in and surrounding the Ginini Flats Wetland Complex (2).
Community Collaboration	→ Develop and implement a Ginini Flats Wetland Complex Ramsar Site Communication, Education and Public Awareness Plan (2). → Continue to involve volunteers (such as ParkCare) in as many aspects of management implementation as possible, providing safe, supported, and engaging opportunities (1). → Look for opportunities for community participation and collaboration in site management actions. This included opportunities for traditional custodian engagement with the site.

The management of threats to the Ginini Flats complex of invasive pests has been a focus for ACT NRM over the last 5 years. This has been through the RLP - Reducing the impacts of Sambar Deer in the ACT's Ramsar site - the Ginini Flats Wetlands project (see case study below). After the review of data generated by all areas of the project by ecologists and stakeholders the project has determined to be a great success. This determination has led to the operationalisation of thermally assisted arial control for the removal of pests such as Sambar Deer and pigs from remote parts of Namadgi National Park including the Ginini Flats complex. It has greatly contributed to reaching RLP Outcome 1 for the ACT by 2023.

CASE STUDY 1

Reducing the impacts of Sambar Deer in the ACT's Ramsar site – the Ginini Flats Wetlands

In recognition that growing Sambar and other invasive pest populations are a significant emerging threat to environmental values of Namadgi National Park, including to the Ginini Flats Wetlands, the **Reducing the impacts of Sambar Deer in the ACT's Ramsar site - the Ginini Flats Wetlands** was developed and implemented.

To meet RLP outcomes the project trialled new methods and technology along with tried and tested methods and have developed a successful methodology for Sambar deer management in the Alpine area.

Impact and abundance monitoring is keeping ACT Government informed of the threat of Sambar deer on the Ramsar wetlands and alpine bog systems in the post bush fire landscape greatly contributing to RLP outcomes. Camera arrays have provided an initial abundance index of Sambar pre control. Post control results from the camera monitoring are pending due to the delays in the early part of the project. Drone imagery has provided a general baseline of condition in terms of vertebrate pest damage. Post control imagery shows a significant improvement in ground cover and condition of wallows.

Control of Sambar Deer has been implemented across the entire study area. Thermally assisted ground and aerial control programs were successfully run over 4 separate operations between 2019 and 2022. The project removed 229 animals from the Alpine sphagnum bog systems and surrounds, including 116 Sambar Deer, this is a significant reduction in the proportion of animals able to make an impact on the ecosystem.

Whilst final results from the camera monitoring are pending, control results have shown ongoing reduction in Sambar deer numbers indicating the development of a very effective methodology for Sambar deer in Alpine areas (*Figure 1: Thermally assisted aerial control results 2021 to 2022*).

The ACT government has also adopted this methodology across the ACT reserve system which help achieve RLP outcomes over the long term.

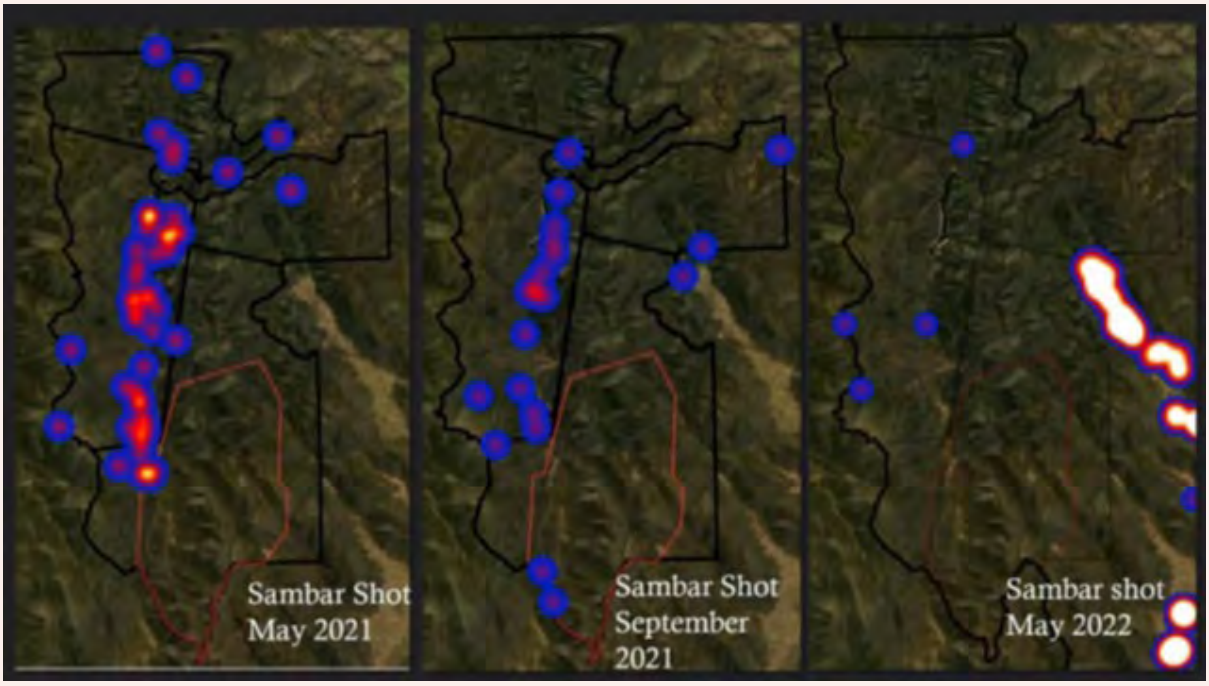


Figure 2 Thermally assisted aerial control results 2021 to 2022 (note in May 2022 the white hot spots to the east are outside the study site.)

3.2. **OUTCOME 2:** By 2023, the trajectory of species targeted under the Threatened Species Strategy and other EPBC Act priority species is stabilised or improved.

There are 51 EPBC-listed threatened species known to occur in the ACT, (8 critically endangered, 18 endangered, 25 vulnerable) and 3 ecological communities (2 critically endangered, 1 endangered) (See Appendix 1). There are 10 additional species (1 endangered and 9 vulnerable) which are listed under the ACT *Nature Conservation Act 2014* but are not currently listed under the EPBC ACT. One additional species not listed under the EPBC Act, the Eastern Bettong (*Bettongia gaimardi*) is classified as Regionally Conservation Dependent under the NC Act and exists as a translocated population of the Tasmanian subspecies inside a fenced predator proof enclosure at Mulligans Flat Nature Reserve.

Identifying and prioritising natural resource management actions

ACT NRM prioritises investment in species and ecological communities based on the following principles:

- regional importance of the listed entity
- the need to take action to prevent extinction of the species
- effectiveness of investment to maintain, restore, or enhance the health and function of a species, ecological community or natural ecosystems more broadly
- the practicality of the implementing actions
- whether opportunities to undertake activities can contribute to multiple outcomes for the benefit of the environment and listed species.

The *Nature Conservation Act 2014* (ACT) establishes a formal process for the identification and protection of threatened species and ecological communities in the ACT. The NC Act and associated Threatened Species Action Plans define the desired outcomes for each of the Threatened Species and Ecological Communities.

Once a species or ecological community is listed an Action Plan Decision for a threatened species is made by the ACT Minister for the Environment as advised by the Scientific Committee (Section 100A of the *Nature Conservation Act 2014*). Threatened Species Action Plans outline conservation and protection proposals for the species or community concerned or proposals to minimise the effect of threatening processes.

An action plan is not required for a species that does not occur, is not likely to occur or occurs infrequently in the ACT (e.g. locally extinct or vagrant species). This category of species are the lowest priority for implementing natural resource management actions. For other species or ecological communities prioritisation and drafting of action plans and undertaking subsequent recovery actions are dependent on responses to the questions:

> Will an ACT action plan for this species reduce the risk of extinction of this species?
>
> and
>
> Is there anything we are able to do within the ACT to help reduce the decline and support the recovery of the species?

An action plan may not be required for a species where there are no significant threats in the ACT that require management beyond what is already being done under other regional plans. For example if the range of this species in the ACT falls predominantly within Namadgi National Park and Tidbinbilla Nature Reserve where reserve management plans exist. In addition, in the ACT where the highest priority action necessary for a species or group of species (e.g. woodland birds) is improvement and management of habitat then this action will be described in the Action Plan for the relevant listed ecological community or management plans for nature reserves. It is a requirement that ACT government must report on the effectiveness of action plans as demonstrated by monitoring every five years.

Prioritising areas and sites within the landscape

The ACT Nature Conservation Strategy 2013-23 is the foundation document to guide a coordinated approach to nature conservation in the ACT. The Strategy, which followed on from the previous 1997 Nature Conservation Strategy, was designed to help guide management of the Territory's open spaces, rural areas, urban areas, riverine corridors and nature reserves, and guide investment of funding and resources. The Strategy also focussed on addressing gaps in management of native vegetation remnants outside of reserves, enhancing existing areas of habitat by restoring key areas to improve connectivity and improve ecosystem health and resilience, which will assist the ACT's biodiversity to adapt to a changing climate.

Given the most significant conservation gains in the ACT can be achieved in lowland areas, the Strategy focuses on better managing threats to existing lowland reserves and connecting these areas with well-managed native vegetation remnants outside these protected areas in line with larger landscape connectivity priorities. It was on this basis that ACT NRM has focussed restoration activities in these areas rather than actions targeted at specific threatened species. The advantage is that this approach will achieve benefits for numerous threatened species (such as woodland birds) and directly assist in the restoration and management of two of the EPBC-listed ecological communities in the ACT, Natural Temperate Grasslands and White Box-Yellow Box-Blakely's Red Gum Woodlands and derived native grasslands (Box-gum Woodlands).

ACT NRM will continue to use the mapping developed in as part of this strategy to prioritise sites and areas within the landscape in order to maximise conservation outcomes when undertaking natural resource management actions.

Investment focuses on areas where threatened priority species exist in the ACT, or where there is an opportunity to expand their range.

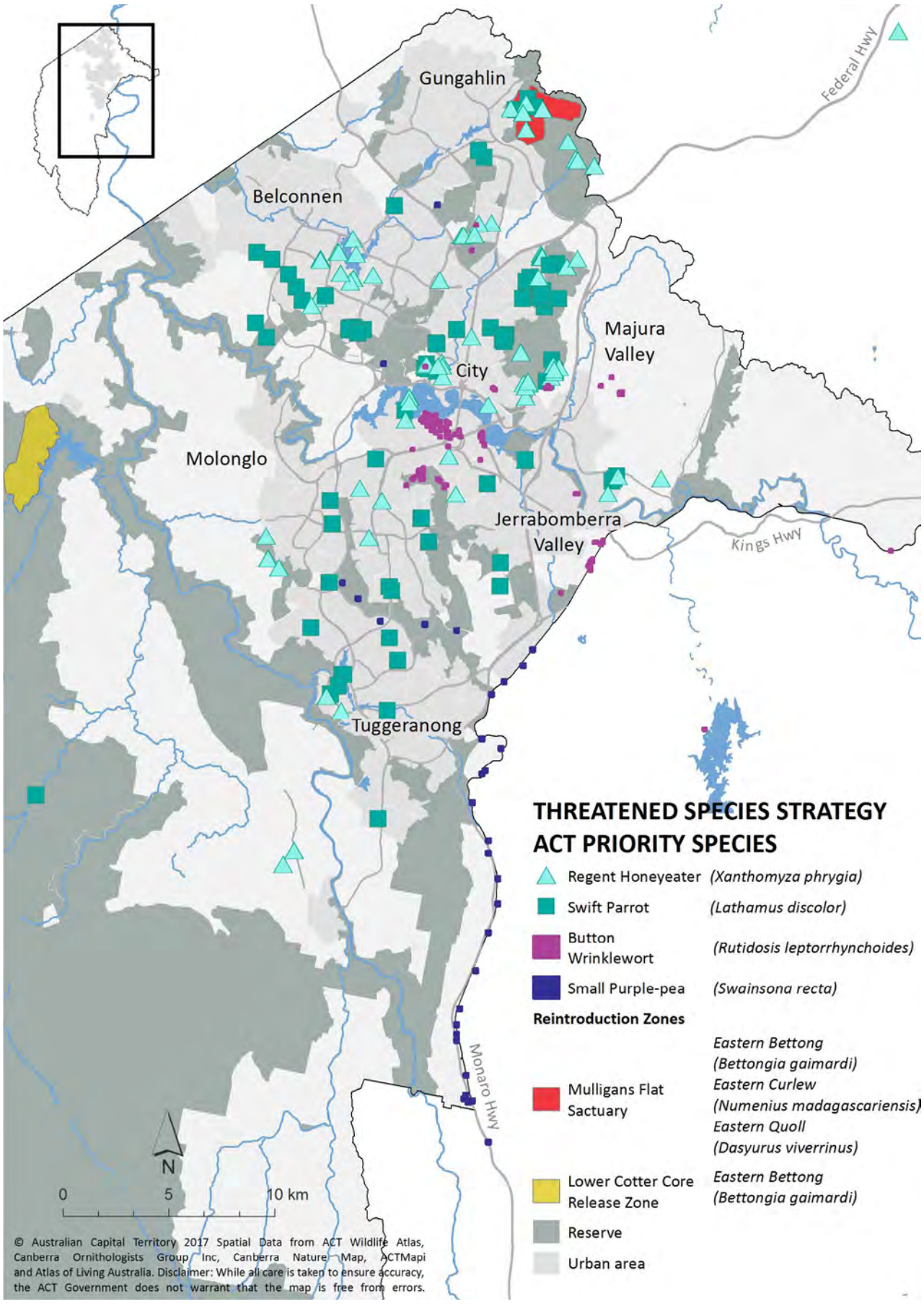


Figure 3 Threatened Species Strategy – ACT Priority Species

Prioritising actions for listed entities in the NRM plan 2022-2042

Action Plans are developed by ACT Conservation Research in a process involving consultation with experts and review of existing published information. ACT Conservation Research is in the process of developing an Action Plan Prioritisation Framework to enable best use of available resources, and transparency and justification for determining:

1. Which species are in most urgent need of Action Plan implementation; and
2. What objectives within an Action Plan are most urgent for each species

There were two identified angles for prioritisation BETWEEN species: a) prioritisation by management action and b) prioritisation by species/ecological attributes. The framework will potentially use a point system to score each species or ecological community against a set of criteria in each category with the total score will rank species.

For decisions on which recovery actions to take for each species an appointed species coordinator (with help from advisors and experts for each species) will be responsible for prioritising actions against objectives WITHIN the species action plan. Outstanding priorities should be noted/highlighted for special attention and resourcing when available. This framework should result in a more strategic approach to prioritising actions regionally in the future and can be updated as conditions change or to respond to emerging priorities. The obvious caveat is that implementation of actions will be dependent upon the availability of funding.

ACT NRM will seek to prioritise actions that complement existing threatened species programs and providing funding to partners where opportunities exist to undertake innovative management approaches. To this end ACT NRM investment is targeting ecological community restoration and management which will provide benefits for listed species that occur within those communities. This accords with arrangements for threatened species action plans and management of threatened grassland species and woodland species which have been which has been included in the ACT Conservation strategies for Natural Temperate Grassland and ACT Native Woodland respectively. In this document threatened species have been ranked (high, medium, low) based on the ability for ACT NRM investment in identified action to make a significant difference in stabilising or improving the overall trajectory of a species. Fauna species ranked as 'high" priority are discussed in the context of management of woodland or grassland habitats below. All other species are listed in Table 1 (threatened fauna) or Table 2 (threatened flora).

Response to emerging priorities

ACT will respond to emerging needs and funding opportunities to achieve related RLP outcomes for threatened species by:

- Expert elicitation, driven by existing management plans and current ACT government monitoring of key threatened species.
- Identifying strategic investment opportunities that can maximise efficiency and RLP outcomes from investment,
- Seeking available funding where it can be linked to RLP outcomes

Threatened Species Action Plan 2022-2032

The Australian Government's Threatened Species Action Plan 2022-2032 maps a pathway to protect, manage and restore Australia's threatened species and important natural places. The Action Plan targets 110 priority species and includes plants and animals found across Australia in a range of environments, from the arid deserts to rainforests, forests to grasslands, and inland waters to the sea. All taxonomic groups listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) are included. Recovery actions for many of the priority species in the list will also benefit other threatened species that share their habitat.

In the ACT NRM Region there are 9 fauna species that are included in the Australian Government's 110 Priority Species list. These include:

Birds	Australasian Bittern – *Botaurus poiciloptilus*
	Regent Honeyeater – *Anthochaera phrygia*
	Swift Parrot – *Lathamus discolor*
Mammals	Brush-tailed Rock-Wallaby – *Petrogale penicillata*
	Eastern Quoll – *Dasyurus viverinnus*
	Koala – *Phascolartos cinereus*
	New Holland Mouse, Pookila – *Pseudomys novaehollandiae*
Frogs	Growling Grass Frog, Southern Bell Frog – *Litoria raniformis*
Reptiles	Canberra Earless Dragon – *Tympanocryptis lineata*

All of the mammal and frog species above are considered extinct in the wild or to not exist as persistent populations in the ACT. Captive breeding and translocation programs are a measure of last resort for management of animal species because they are expensive and high risk. Nevertheless, they can be critical to the survival of species that are facing an extreme risk of extinction in the wild and are used to provide a safeguard when species in the wild are threatened.

The ACT Government a partnership between The Australian National University, the ACT Government and the James Cook University is currently successfully translocating and reintroducing many species into the ACT including the **Eastern Bettong**, **Eastern Quoll**, **Bush Stone Curlew**, **Brown Treecreeper** and **New Holland Mouse** as part of the Mulligans Flat Woodland Sanctuary and Mulligans Flat – Goorooyarroo Woodland experiment.

ACT Region Threatened Species listed under the EPBC Act

High Priority Woodland Bird Species

EPBC Listed Species	Priority Actions	Relevant regional strategy
Regent Honeyeater *Anthoceros phrygia* **Gang-gang Cockatoo** *Callocephalon fimbriatum* **Brown Treecreeper** *Climacteris picumnus victoriae* **Painted Honeyeater** *Grantiella picta* **Varied Sittella** *Daphoenositta chrysoptera* **White-winged Triller** *Lalage tricolor* **Swift Parrot** *Lathamus discolor* **Superb Parrot** *Polytelis swainsonii*	Implementation of conservation actions outlined in the ACT Native Woodland Conservation Strategy will be fundamental to making progress towards the conservation objectives for these highly mobile species. Key action include: → habitat protection and restoration (re-creation of connections) between woodland patches → encouraging efforts by landholders and conservation groups to ensure replacement of paddock trees, particularly species with potential to develop nest hollows and winter flowering eucalypts → Identify and monitor threats (including urban expansion, fragmentation, overgrazing, weed and pest invasion, firewood collection, dieback and fire) to Lowland Woodland and component species.	See management actions in ACT Woodland Conservation Strategy and Action Plans

CASE STUDY 2

Restoration of Woodland Bird Hotspots via Protecting and Connecting Endangered Woodlands in the ACT

Investment Focus – Targeted restoration of habitat patches and connectivity links to improve breeding and foraging opportunities for threatened and declining bird species in the ACT and Region.

Prioritise Areas – Based on bird occurrence, connectivity and vegetation data; analysis from NSW Government; and expert opinion, focal restoration hotspots are identified:

- → ACT hotspots: Molonglo, Murrumbidgee Valley and Googong
- → Connectivity partnerships: Monaro and Southern Tablelands Flyway

Based on analysis, the majority of investment should take place in rural areas and will involve significant engagement with landholders. Some complementary planning and investment will take place on public land in partnership with ACT and NSW land managers.

Desired Outcomes – Increased populations of threatened and declining birds and expansion of their current range.

Building on existing investment (2013-18) – The ACT Woodlands Restoration Program focussed on restoration in Belconnen Hills, Callum Brae, Majura Valley, Greater Goorooyaroo and Murrumbidgee Valley.

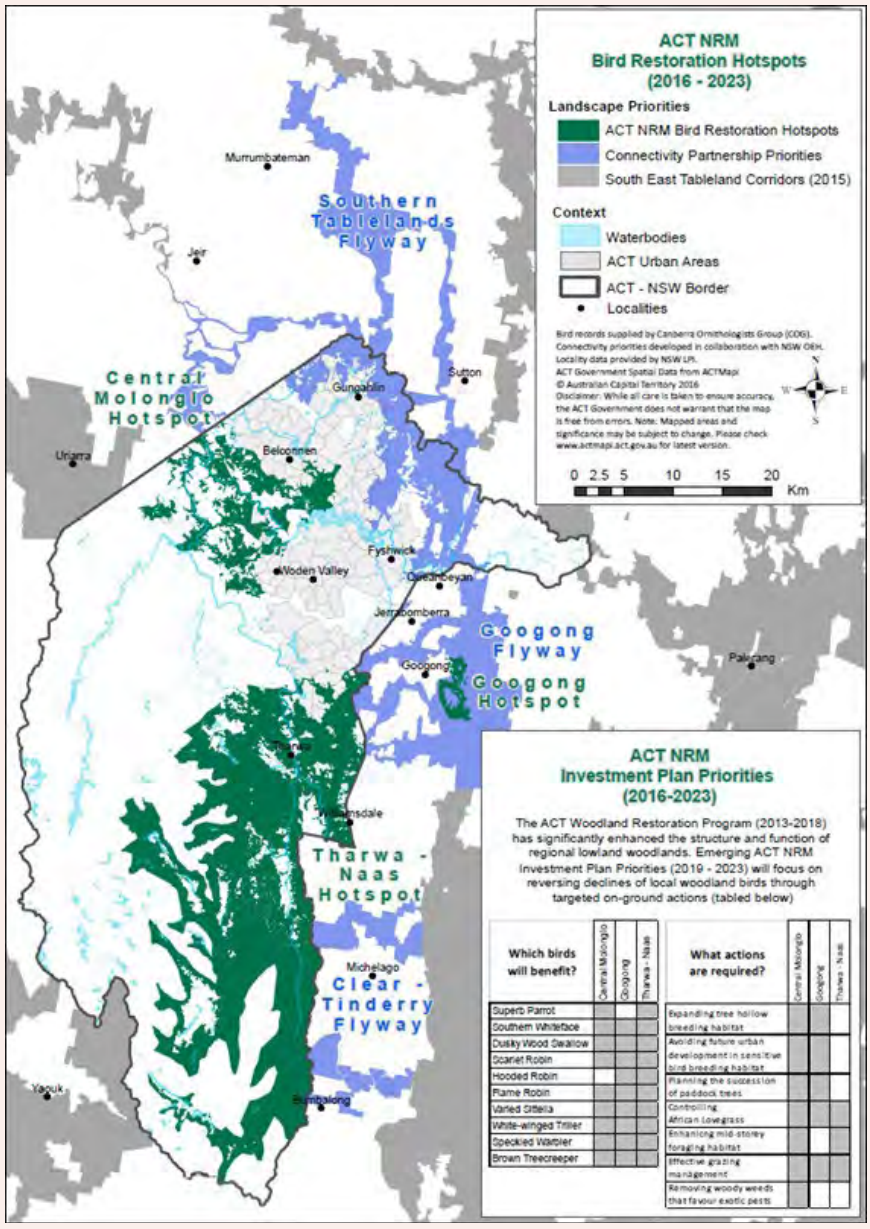


Figure 4 ACT NRM investment priorities 2016-2023

High Priority Threatened Grassland Fauna

EPBC Listed Species	Priority Actions	Relevant regional strategy
Natural Temperate Grassland Ecological Community	The priority management actions are specific to the grassland community and any threatened grassland species present at a site. Where threatened species are present actions should manage habitat to maintain its suitability for the species, including implementing an appropriate grazing and fire regime (recognising current imperfect knowledge). Priority management actions in Natural Temperate Grassland are: → Management of herbage mass and structure to maximise site quality and biodiversity. → Establishment and implementation of ecologically appropriate disturbance regimes. → Management of priority weeds, particularly at sites with threatened species present. → Control of priority pest animals. → Restoration of priority grassland sites either within larger high quality areas or adjacent to these sites to increase connectivity	See 2017 ACT Native Grassland Conservation Strategy
Canberra Grassland Earless Dragon *Tympanocryptis pinguicolla*	→ Manage vegetation and threats at sites with existing populations to maintain habitat as per 2017 ACT Native Grassland Conservation Strategy. → Undertake grassland restoration to improve habitat and connectivity of populations.	See Grassland Earless Dragon Action Plan
Striped Legless Lizard *Delma impar*	→ As above	See Striped Legless Lizard Action Plan
Golden Sun Moth *Synemon plana*	→ As above	See Golden Sun Moth Action Plan
Pink-tailed Worm-lizard *Aprasia parapulchella*	→ As above → Undertake or facilitate research on habitat requirements, techniques to manage habitat, and aspects of the species' ecology directly relevant to its conservation.	See Pink-tailed Worm-lizard Action Plan

CASE STUDY 3
Canberra Grassland Earless Dragon

The Canberra Grassland Earless Dragon (GED) is an endangered species that now only persists in the ACT and nearby Monaro Plains in NSW. Populations are unstable and those in the ACT are not secure, experiencing severe declines in many reserves, notably during severe droughts including the millennium drought. To support the recovery of this species, ACT NRM will seek to:

(a). Support captive breeding and reintroduction of GED into ACT reserves

(b). Support targeted habitat restoration interventions

Priorities Areas – Known populations of GED are indicated in the Map. Captive Breeding facilities were established at Tidbinbilla Nature Reserve in 2021. In its first ten months, the Tidbinbilla breeding facility bred 30 critically endangered Grassland Earless Dragons. Depending on the success of the captive breeding program, a future priority is to undertake or facilitate research into the efficacy of re-introducing captive bred individuals to new sites to establish breeding populations. Sites for possible reintroductions will be dependent upon the genetics of the individuals to be translocated (either from a captive colony, or between wild populations).

Desired Outcomes – Breeding success is established and wild populations are maintained by habitat management and/or re-established/enhanced by translocation of captive-bred individuals.

Building on existing investment – GED populations are closely monitored and significant habitat restoration is occurring in environmental offset areas and reserves.

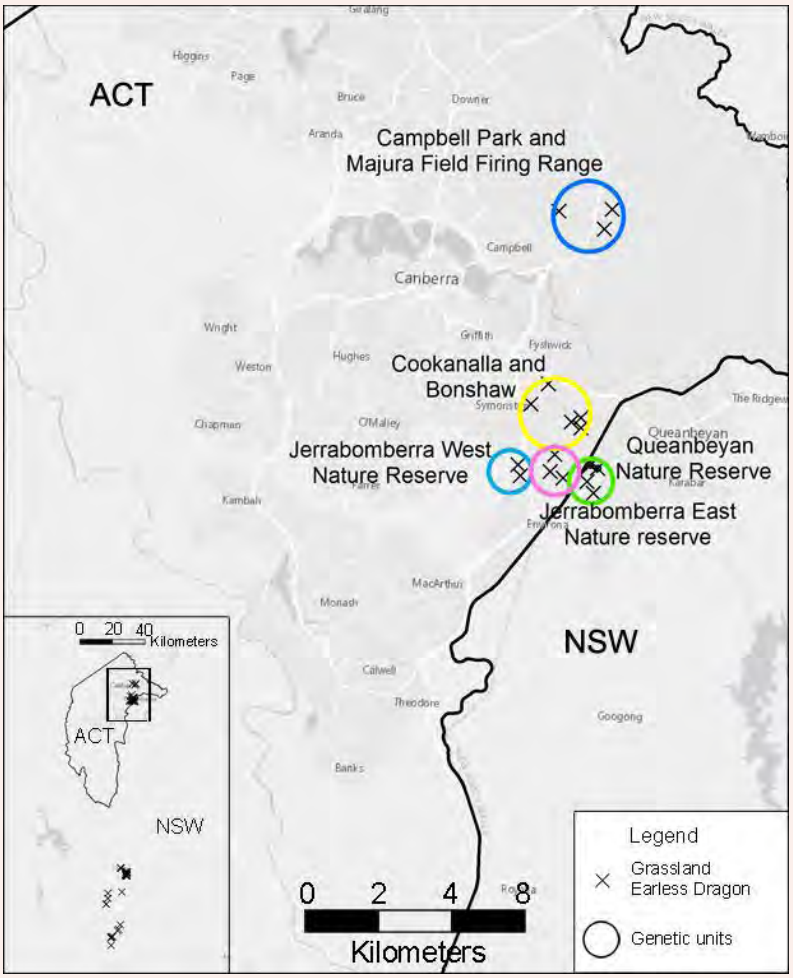


Figure 5 Map showing known Canberra Earless Dragon populations

CASE STUDY 4

Safe haven for Quolls and Bettongs in the ACT

This RLP-funded project caried out of the last 5 years with support from ACT NRM enabled the reintroduction of threatened Eastern Quolls and Eastern Bettongs into the expanded Mulligans Flat Sanctuary. This will ensure the survival of populations of Quolls and Bettongs on the Australian mainland, to increase their populations by 100 % and 50 % respectively by 2023. A network of wildlife cameras, reviewed by community volunteers, monitor the presence of pest animals and Eastern Quoll prey availability. On-ground fauna surveys have augmented the camera network data, contributing to species abundance data and intervention success. All have assisted with pest control programs have led to the eradication of pest animals from the new Sanctuary. This occurred in early 2022 after the final fox was eradicated. Additional control and monitoring, targeting foxes and cats surrounding the new Sanctuary in preparation for reintroductions.

ACT NRM through the Aboriginal Natural Resource Management Facilitator in partnership with the Mulligans Flat Volunteer program, ran events that fostered indigenous culture, including Eastern Quoll, Eastern Bettong and Box-Gum Woodland knowledge and awareness. After delays caused by the final pest eradications, reintroduction are on track for the final year of the project and will lead to enhanced ecological function of the Box-Gum Woodland Threatened Ecological Community within the new Sanctuary. It will also assist to achieve RLP outcomes for the Eastern Quoll, Box-Gum Woodland and the implementation of the ACT NRM plan.

3.3. **OUTCOME 3:** By 2023, invasive species management has reduced threats to the natural heritage Outstanding Universal Value of World Heritage properties through the implementation of priority actions.

There are currently no World Heritage listed sites within the ACT NRM Region

3.4. **OUTCOME 4:** By 2023, the implementation of priority action is leading to an improvement in the condition of EPBC Act listed Threatened Ecological Communities.

There are three Threatened Ecological Communities listed under the EPBC Act in the ACT NRM region.

Community	Priority NRM Actions	Relevant Regional Strategies
High Country Bogs and Associated Fens	→ Rehabilitate damaged areas of the Sphagnum bogs and fens ecological community (e.g. from fire, historic grazing, infrastructure damage, areas containing erosion tunnels, flow line incisions and bog collapse). → Protect water quality in all streams by minimising the impact of erosion caused by management infrastructure and use (such as fire trails, road works and creek crossings). → Develop that invasive fauna management programs developed for Namadgi National Park address the management of feral pigs, feral horses and other pest animals within the Ginini Flats Wetland Complex and adapt them for any new pest animal species identified in the existing and future monitoring programs. In the ACT the largest example of this particular EC, the Ginini Flats Wetland Complex, is also ACT's only RAMSAR site. See P 49- 50 of ACT NRM plan and summary of priority actions for Ginini Flats Wetland Complex Ramsar Site in Outcome 1: By 2023, there is a restoration of, and reduction in threats to, the ecological character of Ramsar sites, through the implementation of priority actions.	See 2017 Ginini Flats Wetland Complex RAMSAR Site Management Plan 2018 ACT Aquatic and Riparian Conservation Strategy
Natural Temperate Grassland	→ Manage Natural Temperate Grassland to maintain ecological condition, including implementing an appropriate grazing/ slashing/burning regime. → Implement site-specific management actions to maintain required habitat structure for threatened species. → Identify priority grassland sites for restoration based on quality and potential for adding ecological value to the high quality areas. → Undertake or facilitate research on appropriate methods for managing and restoring the community and its habitat (slashing/ grazing/ burning etc.), vegetation biomass, lifecycle, germination, recruitment and genetics. See p.51-55 ACT NRM plan and summary of Outcome 4.	See 2017 ACT Native Grassland Conservation Strategy
White box-Yellow Box-Red Gum Grassy Woodland and derived native grassland	→ Maintain the ecological values of Endangered WB-YB-BRG Grassy Woodland to promote ecosystem function and prevent biodiversity loss by implement appropriate grazing and fire management regimes to maintain optimal habitat for threatened species. → Control invasive plants and animals to maintain or improve ecological values of the ecological community → Retain mature trees by protecting them fire, agricultural and urban and infrastructure development. → Promote appropriate levels of overstorey development in Endangered YB-BRG Woodlands → Develop spatially and temporally explicit revegetation goals (for Endangered YB-BRG Woodland) and undertake restoration projects in priority locations → Undertake monitoring and support research projects that improve our understanding of how to successfully restore Endangered YB-BRG understorey See P 49- 50 of ACT NRM plan and summary of Outcome 4	See 2019 ACT Native Woodland Conservation Strategy

Alpine sphagnum bogs and associated fens

High Country Bogs and Associated Fens was added to the endangered category of the ACT Threatened Ecological Communities List on 8 February 2019. This is consistent with national and other jurisdictional listings. Nature Conservation (High Country Bogs and Associated Fens) Conservation Advice 2019

The majority of bogs and fens in the ACT occur within Namadgi National Park. Bogs and fens are significant because they provide critical refuge and habitat for endemic and threatened animal species, including the Critically Endangered Northern Corroboree Frog (*Pseudophryne pengilleyi*), as well as the Broad-toothed Rat (*Mastacomys fuscus mordicus*) and Verreaux's Alpine Tree Frog (*Litoria verreauxii alpina*) which are protected under the EPBC Act. Bogs and fens also play an important role in protecting water quality within the ACT's water catchment.

Prioritisation of areas (focal management hotspots) to manage bogs and fens in a changing climate is based on:

- **Analysis of data**: treated and untreated weed data collected through surveys; pest occurrence including animals such as deer, pigs and horses; as well as alpine and bog location and elevation data analysis. Weed occurrence and treatment data was used to distinguish areas that were potential under threat by weed invasion. Pest occurrence was used to determine areas that could be of high risk to degradation due to pests, in particular deer. The location and elevation of bogs and fens was used as an indicator of a site's vulnerability to climate change. The higher altitude sites are far more susceptible to the impacts of climate change than those at lower elevations.
- **Expert consultation**: ACT Parks and Conservation Services and ACT Conservation Research. The combined consideration of these consultations resulted in the prioritisation of potential monitoring and management sites.

Prioritisation

High value assets were considered to be those bogs which were in good condition, and in areas which are likely to be undisturbed due to their difficult to access location. The high value assets were determined to be the high altitude sphagnum bogs. This was decided through expert consultation and analysis of bog and fen data. These sites were identified for climate change ecological monitoring, vertebrate pest control, weed control, and visitor management. Sites for deer monitoring and weed control will be selected based on an asset protection basis. Bogs with the highest ecological values are the highest priority.

Two priority categories were identified:

- **Priority 1** - high altitude sphagnum bogs. Potential climate change monitoring sites were broken down into three categories: 1400-1600m elevation, 1600-1700m elevation and 1700-1900m elevation. This determined three potential monitoring sites at 1400-1600m elevation, two potential monitoring sites at 1600-1700m elevation and one potential monitoring site at 1700-1900m elevation. Deer monitoring and control sites are yet to be defined.
- **Priority 2** – remaining alpine bogs and fens.

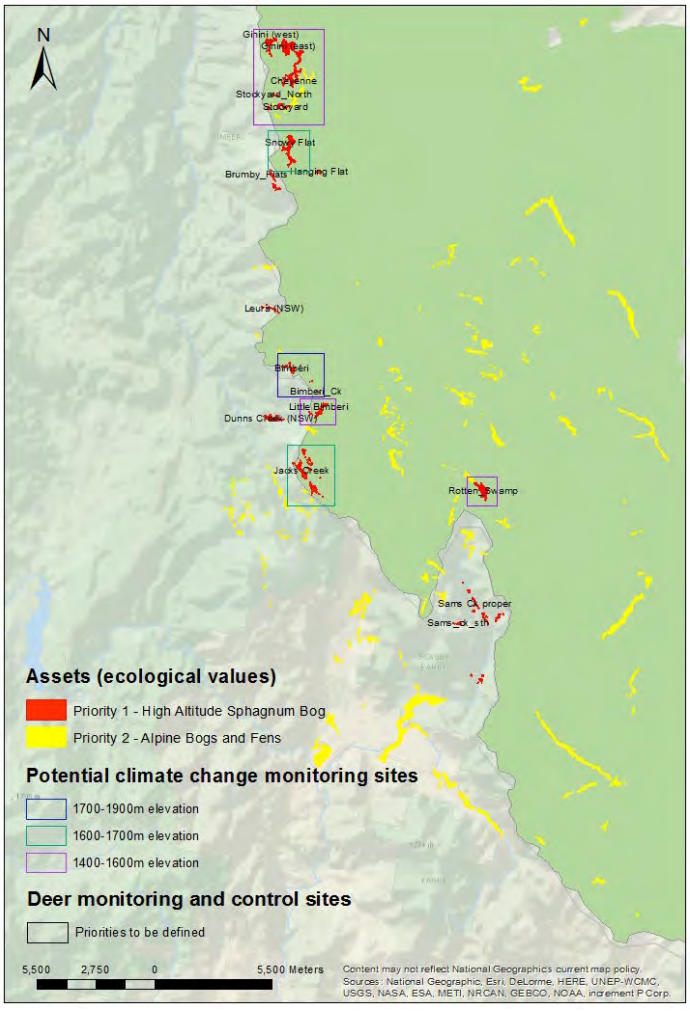


Figure 6 Map showing ACT Alpine bogs and fens

Natural Temperate Grassland Ecological Community

Natural Temperate Grasslands (NTG) are one of the most threatened Australian ecosystems (ACT Native Grassland Strategy 2017) and are listed as 'Critically Endangered' both in the ACT and nationally. The ACT contains significant remnants of the remaining extent of Natural Temperate Grassland in the region. As such, our native grasslands are a priority for protection and management.

The ACT has retained approximately 5% of original extent (1000 ha of original 20,000 ha Approximately 40 locations have been identified in the ACT, but most are very small, with only four sites having an area greater than 100 ha (Figure 1). These consist of Category 1 Natural Temperate Grasslands: lesser quality grasslands that have a high recovery potential. Currently, they are dominated by native grasslands and areas of exotic grasses. NTG in the ACT exist across multiple tenures such as Reserves, open spaces, pastoral land and land owned by other institutions (Government Defence land, Airport, CSIRO, church land and so on). ACT Parks and Conservation Service currently manage 970 ha of these high value sites specifically for the conservation of NTG, or, for several nationally threatened and regionally important NTG dependent species. These include:

- Canberra Grassland Earless Dragon;
- Golden Sun Moth;
- Striped Legless Lizard;
- Perunga Grasshopper;
- Button Wrinklewort;
- Ginninderra Peppercress;
- Small Purple Pea

Native grasslands are distinctive in that they require active management (Williams and Marshall 2015) to conserve them. Without active management these grasslands will continue to degrade. Approximately 34 sites with significant NTG conservation values have been identified outside of the formal reserve system in the ACT. These collectively add up to an area of 1000 ha (400 ha meeting NTG criteria, 600 ha of native pasture). This includes patches within the urban open space system (managed by the ACT Government's Transport Canberra and City Services – TCCS) on Commonwealth Land (managed by the National Capital Authority), other Commonwealth Land (managed by the Department of Defence and the CSIRO) and on private land (managed by ACT rural Lessees). Recognition of the ecological values and associated management effort varies considerably across these sites and tenures, and in many cases the conservation values are inadequately managed.

These areas are threatened by a number of factors including invasion by exotic species, incompatible grazing, mowing and fire regimes, fragmentation or simple neglect. NTG require active management through grazing, fire or slashing of biomass to maintain their ecological health. Most of these remnants require urgent attention, particularly those sites with lesser quality native pasture, and those sites that may provide habitat for listed threatened species (as yet unsurveyed).

NTG is a key priority for investment by ACT NRM focussing on a need for improved management of off-reserve sites. Investments will use a suite of management techniques to develop a framework methodology and undertake planning which will underpin future on ground actions targeted at improving the condition of NTG in off-Reserve areas and stabilising or improving the condition of NTG dependent nationally listed species.

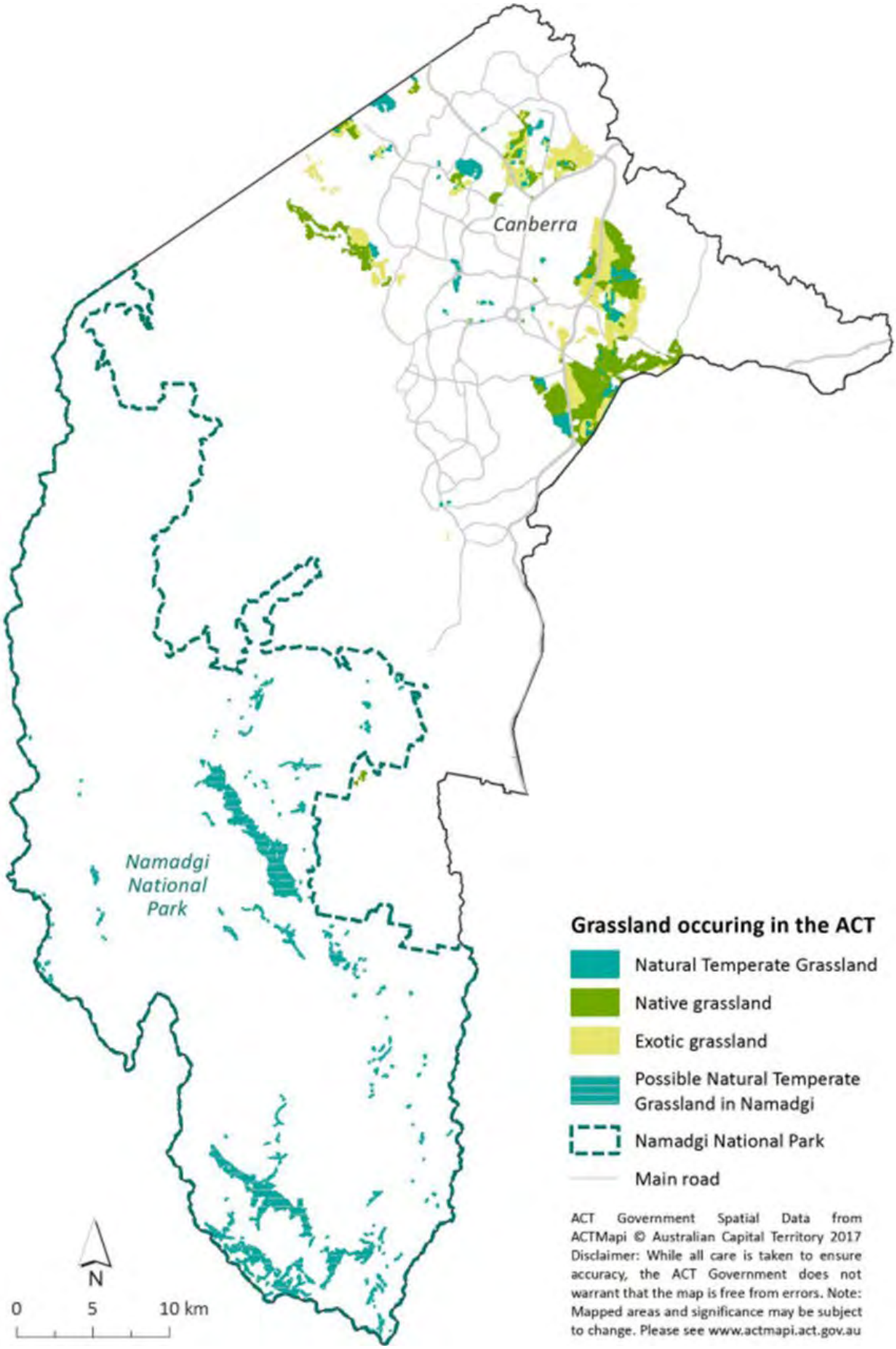


Figure 7 Distribution of Natural Temperate Grassland and other areas of grassland in poorer ecological condition in the ACT which have potential to be restored.

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

White-Box-Yellow Box-Blakely's Red Gum Grassy Woodland (Box Gum Woodland) is a critically endangered ecological community under the EPBC Act. This classification includes the ACT's Yellow Box–Red Gum Grassy Woodland, which is also listed under the *ACT Nature Conservation Act 2014*. Box Gum Woodlands are identified as an investment priority for the ACT Management Unit in various Commonwealth and ACT Government documents such as the Commonwealth National Recovery Plan, the ACT Lowland Woodland Conservation Strategy, and the ACT Regional NRM Investment Plan.

As some of the biggest, best connected, most botanically diverse examples of their type, ACT Box-Gum Woodlands are nationally significant. Lowland woodlands across temperate Australia have been extensively cleared and less than five percent of the original national extent of this community remains. In contrast to the rest of Australia, the ACT has retained over a third of its original extent and Box Gum Woodlands form the primary habitat mosaic across the ACT on both public and private land (Figure 2). The woodlands of the ACT are amongst the most functional remaining patches of their habitat type in Australia primarily due to their intact structure incorporating a diverse ground layer, mid-story shrubs and old-growth hollow bearing trees. A range of threatened and declining woodland species are dependent upon these, such as the nationally threatened Superb Parrot and the regionally important Brown Treecreeper, Scarlet Robin, and populations of several threatened plants species including the Tarengo Leek Orchid, Button Wrinklewort and the Small Purple Pea.

While the ACT has had some success in conserving Box Gum Woodlands, they remain under threat. Past clearing of lowland valley floors has left small, fragmented patches of woodland. These isolated patches are highly vulnerable to threats such as weed and pest animal invasion, and inappropriate fire and grazing regimes. Isolated and small patches of Yellow Box and Red Gum trees in the ACT's rural landscapes are declining at a rapid rate, due to natural ageing and death, dieback, and low rates of regeneration. These factors are identified as key threatening processes in the 'National Recovery Plan for White Box-Yellow Box-Blakely's Red Gum Grassy Woodland'. For example, a review of scientific literature by Reid and Landsberg (2000) found that paddock trees would be totally lost from rural landscapes in south-east Australia within the next 40 – 180 years unless practice change occurs. However, if practice change is undertaken to increase recruitment and protect existing trees, modelling by Manning et al. (2013) has shown this process of loss can be halted.

To date, relatively less investment has focused on managing and enhancing woodlands in rural areas than on public land, or on improving connectivity and complementary management across tenures. This is a matter of concern given that both rural lands and Reserves in the ACT contain Box Gum Woodlands in good condition. Recent studies have highlighted the importance of large paddock trees for the breeding success of the Superb Parrot in the ACT (Rayner et al. 2016), and woodland birds in general (Le Roux et al. 2018), with paddock tree loss identified as a significant threat to Box Gum Woodlands in the National Recovery Plan (DECCW 2010) and the ACT Woodland Strategy (ACT Government 2004). This has been the focus for ACT NRM over the last five years via the RLP - Protecting and connecting endangered woodlands in the ACT project.

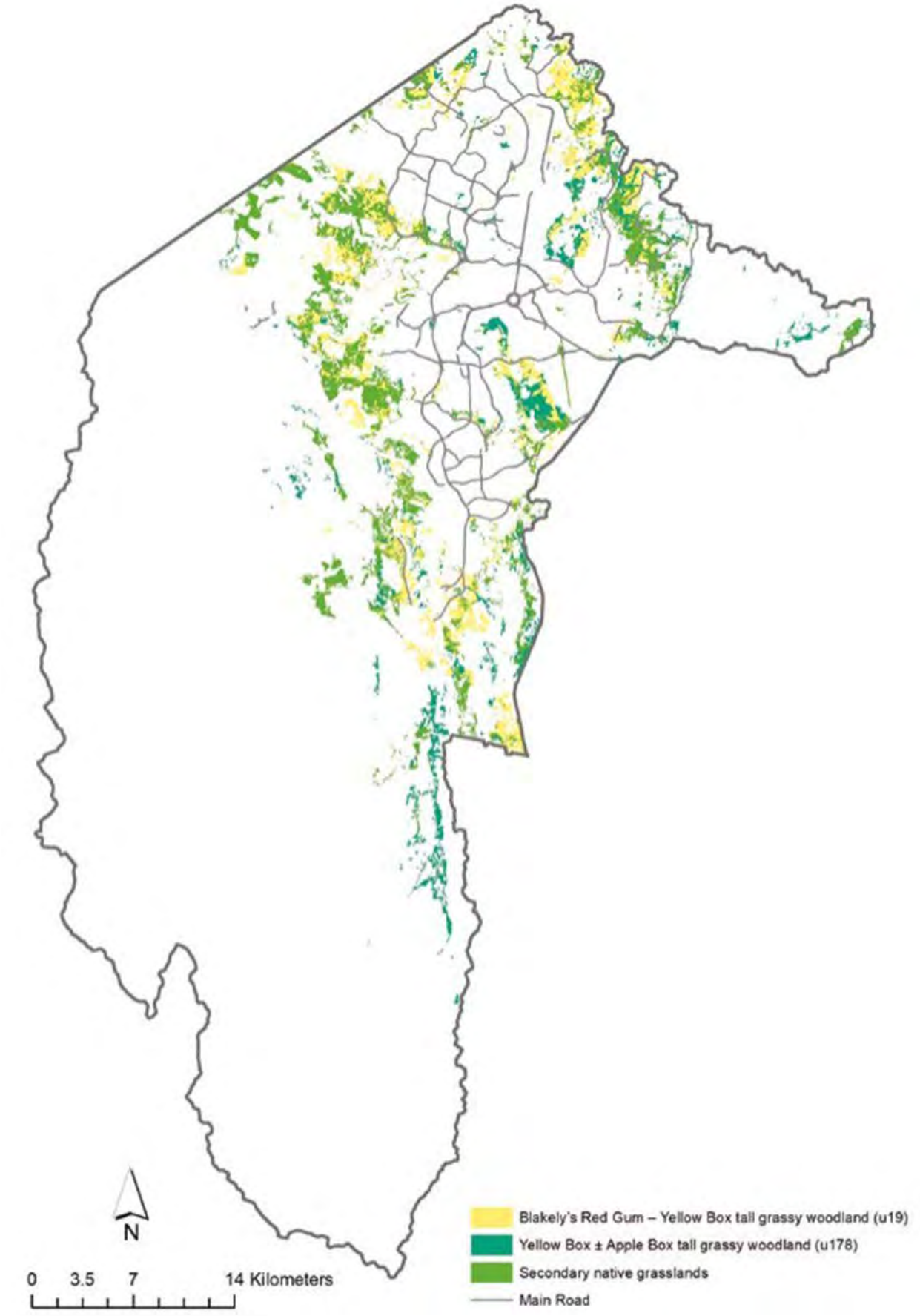


Figure 8 Potential distribution of the White Box-Yellow Box-Blakely's Red Gum Woodland and derived native grassland ecological community.

CASE STUDY 5

Protecting and connecting endangered woodlands in the ACT

This RLP Funded project will benefit the Threatened Ecological Community White Box-Yellow Box-Blakely's Red Gum Grassy Woodland across the ACT. Investment will focus on enhancement and connection of Box-Gum Woodland sites through activities including restoration, threat management (pests and weeds) and increasing awareness and adoption of better land management practices by the community. The project also benefits threatened and declining woodland bird species that are dependent on Box-Gum Woodland for foraging habitat and nesting sites such as the Superb Parrot, Brown Treecreeper and Scarlet Robin and the threatened plants Button Wrinklewort and Small Purple Pea. Ongoing protection of Box-Gum Woodland across the ACT will improve the ability to adapt to future climate change threats and contribute to broader national landscape scale conservation efforts of this critically endangered Threatened Ecological Community.

Analysis in the ACT indicated that ACT NRM investment needs to address the following issues:

- **Connectivity** – Box Gum Woodlands in the ACT are generally clustered into several patches across public and private land. There has been little investment in improving cross-tenure connectivity or addressing mutual threats, such as invasive weeds, in a coordinated manner. Analysis has identified priority landscapes and sites that can best address connectivity gaps on rural lands and enhance connectivity between private lands and high value ecological reserves. Activities in these priority areas will enhance habitat and connectivity for threatened and declining birds and strategically target areas of low recruitment, high rates of dieback, and 'gaps' in the landscape that have become treeless.
- **Isolated paddock tree loss** – Approximately 26,169 ha of grassy woodland, including 1965 ha (23% of all total in the ACT) of listed EPBC Box Gum Woodland remnants, are at serious risk of paddock tree loss. ACT NRM will strategically locate activities to address paddock tree loss. Activities will assist landholders to adopt better land management practices such as protecting existing mature (and dead) paddock trees and new plantings. The project will utilise the outcomes of ACT Government-funded species and provenance trials to ensure that appropriate species that are more resilient to climate change and other stressors, will be planted back into the landscape. A significant action required to support successful plantings will be to increase land manager awareness and adoption of land management practices that will improve tree recruitment and Box-Gum Woodlands.

This strategy builds upon the bioregional and off-reserve conservation approaches outlined in the ACT Nature Conservation Strategy 2013-23 and uses new scientific understanding and partnerships to prioritise and implement on-ground works locally and cross-border. Improving connectivity between patches of native habitat allows small populations of species to function as larger and more resilient populations. Maintaining ecosystem function such as energy flows, nutrient cycles, hydrological cycles, and food webs will allow landscapes to better adjust to changing climatic conditions. Actions under this strategy connect native vegetation at various scales, buffer existing high quality habitat patches, link terrestrial and riverine systems, and conserve altitudinal gradients to allow species to shift their ranges in response to a changing climate.

CASE STUDY 6

Bushfire ecosystem recovery – Bogs and Fens Recovery Monitoring

To assist natural regenerative processes, improve our knowledge of how fire affects the environment and species, and inform management and restoration efforts, the ACT Government is working in collaboration with the Australian Government, field experts and key community partners on targeted ecosystem post fire recovery projects.

Almost all of the Endangered High Country Bogs within the ACT were burnt in the Orroral Valley bushfire of 2020. To help these sensitive ecosystems recover, the ACT Government has conducted extensive recovery works over spring and summer along with an ongoing monitoring program.

Recovery efforts include the use of two main techniques: leaky weirs to reduce erosion, maintain peat wetness and promote vegetation growth and shade cloths to increase survival of Sphagnum moss. By monitoring key factors such as water table height, soil moisture and vegetation regrowth in treated and untreated areas over time, we will be able to determine how successful these techniques are and how they might be improved in the future. (more information available here)

3.5. **OUTCOME 5:** By 2023, there will be an increased awareness and adoption of land resource management practices that protect the condition of soil, vegetation and biodiversity on-farm.

The ACT NRM offers a range of opportunities and programs that support rural landholders to protect the condition of soil, vegetation and biodiversity on farms which are funded under the RLP National Landcare Program. The key RLP project that addresses Outcome 5 is Better Land Management.

CASE STUDY 7

Better land management practices – building evidence for practice change: social research on soil acidity management practices

Soil acidification – an NLP Priority

Soil acidification is a significant constraint on high rainfall grazing and cropping systems in south-eastern Australia including the ACT. ACT NRM's key RLP project aimed at achieving improved on-farm soil pH, soil carbon and groundcover is Better Land Management, 2018-2023. Soil acidity is recognised by the National Landcare Program as a significant risk to crop and pasture systems in southern/eastern Australia hence the priority it has been given in the RLP 2018-2023.

Summary of Better Land Management

Under Year 1 of Better Land Management, ACT NRM sought to understand the factors that influence on-farm knowledge and decision-making around soil pH, soil carbon and groundcover management through a survey of farmers, undertaken by Dr Jackie Schirmer from the University of Canberra; and analysis of historic and recent baseline soil testing on a number of ACT farms. Extension and communication activities undertaken in Year 1 promoted best practice soil management. Years 2-5 of the project is focussed on a practice change program, delivered through at least 15 best practice soil management trials/demonstrations on at least 15 ACT farms. These sites are subject to appropriate treatments (mostly lime) with appropriate monitoring and evaluation which includes soil testing, biomass monitoring and other methods, prior to treatment and then post-treatment to understand the impact of liming on soil properties – in particular soil pH, Aluminium toxicity, Cation Exchange Capacity and Total Soil Carbon The results from this work are being communicated through field days and other communication activities. This work has been delivered in collaboration with South East Local Land Services and also in a strong partnership with NSW Department of Primary. The desired outcome from this project is to reverse the soil acidification trajectory on ACT farms by demonstrating, using data coming out of the project, that liming is in an important part of farm management aimed at improving soil health, pasture health, farm productivity ground cover and soil carbon. A secondary outcome is to emphasise the importance of regular farm soil testing on both crops and permanent pastures to monitor and manage soil health – consistent with the National Soil Strategy.

Location and condition of natural resources, including the Investment Priorities; and threats to, or impacts on, natural resources

ACT NRM's current understanding of the status of ACT soils has been derived from numerous sources – this information has underpinned design and development of the Better Land Management Project and prioritisation of on-ground actions and community engagement. These sources include:

- The report: **Priorities for improving soil condition across Australia's agricultural landscapes** (McKenzie et al., 2017). This report provides an overview of trends in soil condition across Australia's

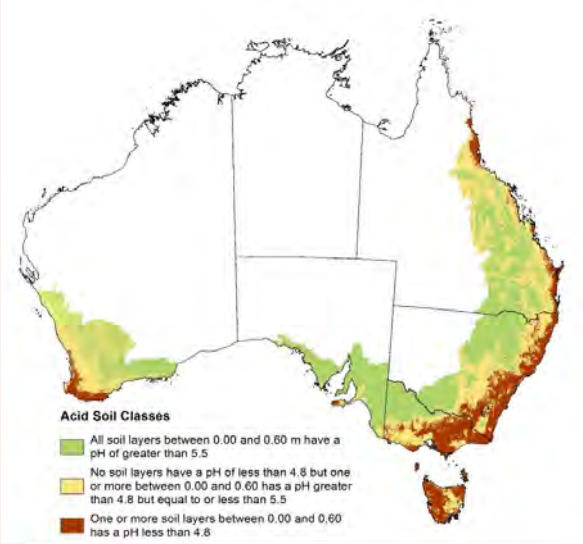
agricultural landscapes. It was prepared to assist the Australian Government design the next phase of the National Landcare Program (NLP 2) by some of Australia's leading soil scientists. The report identified soil acidification, unsustainable rates of soil erosion, loss of soil organic carbon and nutrient imbalances (deficiencies and excesses) as the key threats to soil function: "If left unchecked, these problems will constrain Australia's ability to take advantage of agricultural opportunities created by a growing population and demand for exports. The threats have the potential to impose significant costs because ecosystem services provided by soils will be impaired."

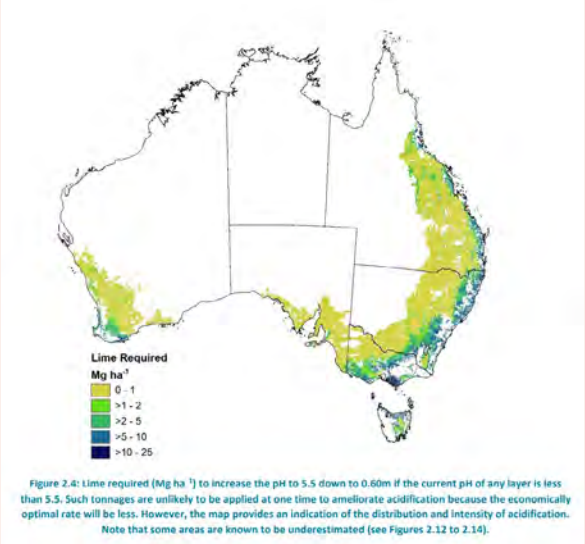
It was also noted in the Executive Summary to this report that "the extent and severity of soil acidification is much greater than previous assessments have indicated. The intensification of cropping, and in particular the increase in nitrogen fertiliser usage and product removal, combined with inadequate liming, are causing significant acidification across large areas that were previously considered to be unaffected."

The maps provided in the report identified:

- the extent and severity of soil acidity across Australia including the ACT – the ACT has severe acidification on rural lands.
- the lime required to address soil acidity across Australia including the ACT – high levels of lime are requires to address the issue in the ACT
- national farm soil testing rates including the ACT – the rates are in the lowest 20% in the ACT
- acidification across Australia – locally significant acidification likely to affect production and farm business in the ACT

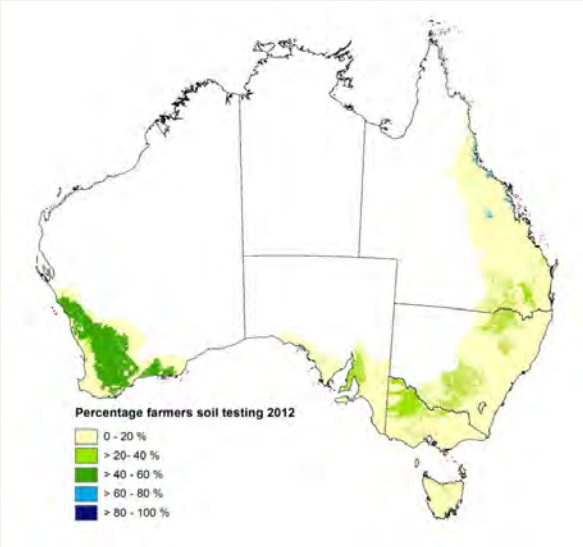
These maps have helped underpin the development and execution of Better Land Management. The full report can be found here: https://publications.csiro.au/rpr/download?pid=csiro:EP177962&dsid=DS3





Status of acidification across Australia

Note: ACT rural lands are showing "one or more soil layers between 0.00 (the soil surface) and 0.6cm below the soil surface has pH less than 4.8."



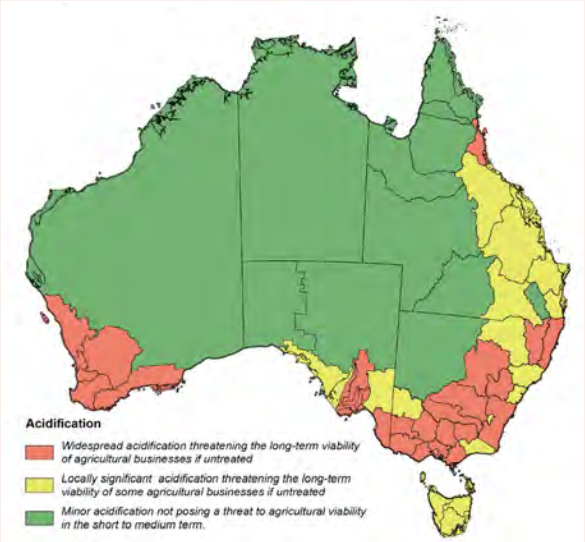


Figure 9 Priorities for improving soil condition across Australia's agricultural landscapes
McKenzie et al. (2017)

As noted ACT NRM through its initial year of funding under Better Land Management, partnered with South East Local Land Services to engage experienced NRM social researcher, Dr Jacqi Schirmer, from the University of Canberra to undertake a survey of ACT and NSW farmers to understand the social dimensions of agricultural practice change, with particular reference to soil acidity, soil carbon and groundcover management.

→ Significant data on the state of ACT farming soils was collected under the ACT Clover nodules project, 2017 – whereby 17 ACT farmers participated in a pilot soil and legume testing program (funded under NLP 1), to understand how soil conditions, including soil acidification, constrain legume health and production. Results from the project, undertaken by EPSDD and the NSW Department of Primary

Industries indicate that nearly 40% of soils in the 35 paddocks tested across ACT farming land were strongly acidic (had pH less than 4.8 in calcium chloride), and that the average soil pH across the 35 paddocks was 4.8 (strongly acidic). Management surveys undertaken as part of this project, indicate landholders rely on pasture legumes (clovers) as nitrogen fixers in their pastures, often the only source of introduced soil nutrients on their paddocks. In addition they have a low understanding of how soil acidification reduces legume nodulation effectiveness, and therefore nitrogen fixation in these pastures; with few landholders applying lime to their most acidic paddocks to increase soil pH and reduce soil acidification. For more information on the project. *McIntosh S, Hackney B, Orgill SE, McInnes A, Keen B, van Dugteren A (2018) Pasture hero or nitrogen thief? Survey results indicate poor legume nodulation in acidic soils. In 'Proceedings National Soils Conference 2018', 18–23 November 2018, Canberra. (Eds N Hulugalle, T Biswas, R Greene, P Bacon) pp. 91–92 (Soil Science Australia)*

- The results of the Healthy Soils Healthy Landscapes project, 2005-2008, undertaken in NSW/ACT by NSW Department of Primary Industries in partnership with the ACT Government, which found that the ACT's 45 participating farms had soil pH below 4.5, or between 4.5 and 5, measured in Calcium Chloride. Soil pH of less than 4.8 is considered strongly acidic. ACT NRM followed up these results from 2008 by developing a soil testing program in 2018 to try and determine the pH of farms that participated in the Healthy Soils Healthy Landscapes project, 2005-2008. Unfortunately many of the farms has changed hands and few of the farmers could recall where soil samples were collected in 2008 – but a round of soil testing was done on approximately 17 farms in 2018– which found that soil pH was low and soil acidity an ongoing issue for participating farms.
- The ACT Soil Landscape mapping and Hydrogeological Landscape mapping and reports ACT Soil Landscapes provides detailed information on soil condition and vulnerabilities in the ACT and was developed for the ACT by the NSW Government. This information guides the development of an ongoing program for monitoring soil condition and advising on best practice management for different soil landscapes and land uses. The soil landscape mapping helped ensure that all significant agricultural landscapes were included/considered in the development of the Better Land Management and confirmed that ACT soils are highly acidic.
- ACT NRM's project Better Land Management is consistent with the National Soil Strategy 2021. The National Soil Strategy is Australia's first national policy on soil. It sets out how Australia will value, manage and improve its soil for the next 20 years. It was released in May 2021. The Strategy prioritises soil health, empowers soil innovation and stewards, and strengthens soil knowledge and capability. The National Soil Strategy also suggests that soils are going to be given a greater priority going forward in terms of national, state and territory policies and programs giving greater weight to the NLP-funded outcomes under Better Land Management and a greater platform for promoting the project outcomes.

Prioritisation methods for determining the most cost-effective management actions, including decision support and spatial mapping tools;

As noted above, there is significant, repeated evidence that most ACT farming lands are generally highly exposed and impacted by low soil pH/high soil acidity. This is supported by surveys and by national meta-analyses. To date three soil testing projects undertaken by ACT NRM on ACT farms has found that across more than 40 farms in 2017, 2018 and 2020-2022 (Better Land Management), the only farms that did not exhibit acidic soils were those farms that regularly spread lime.

Prioritisation of participating farms:

Given how widespread soil acidification is in the ACT, ACT NRM did not prioritise a type of farm, a soil pH level, farm enterprise or soil type for participation in the trials and demonstrations. ACT NRM instead ran an Expression of Interest seeking participation of ACT farmers and farms in Better Land Management. ACT

NRM also spoke about the project at regular meetings of the ACT Rural Landholders Association. This expression of interest sought farmers who had a paddock that:

- is highly likely to have acidic soils (5 or less pH units in in calcium chloride)
- Hasn't been limed for at least 10-15 years (if ever)
- Is comprised of improved, semi-improved or highly modified native pastures or crops (paddocks in which pastures are degrading and in poor health were also included)
- Is around 8-12ha in size
- Be willing to host a farm walk or field
- Be willing for ACT NRM to come onto their farms up to four times to do soil testing and vegetation monitoring and to apply treatments between 2020 and 2023.

In addition, we were seeking farmers who were willing to share de-identified data coming out of their farm soil testing results with the NSW Government's SALIS database - the Soil and Land Information System and our research partners at NSW Department of Primary Industries; and willing to allow the de-identified data to be used in websites/other communication platforms to contribute to sharing the results coming out of the project. A few farmers were not interested in liming but interested in a soil carbon projects; or understanding the current status of their soils – we included these farms in the project – but in the case of the carbon farming project – the La Nina weather systems has made it impossible to follow-through on that project.

ACT NRM received 20 EOI's from farmers, and through a process of consideration of the paddocks each farmer was offering were able to include more than 17 farmers in the project.

Prioritisation of project methodology

ACT NRM sought advice from NSW Department of Primary Industries on project methodology – drawing on the expertise of the following researchers:

- Dr Sue Orgill, Leader Soil R&D South, Soil and Water R&D Unit, Agricultural Resources Branch, NSW Department of Primary Industries I DPI Agriculture
- Dr Jason Condon, NSW Department of Primary Industries and Associate Professor in Soil Science Charles Sturt University

ACT NRM also spoke to participating farmers about paddock history, what they have noticed about the paddock before and after treatment and more.

Hence the project methodology and the detail on how different sub-elements of the project were designed and implemented were developed based on expert elicitation from our NSW DPI partners and advisors and from participating farmers, based on the most effective way to demonstrate the impact of soil acidity on pastures and crops and the most effective way to demonstrate the value of applying lime to address soil acidity on ACT farms. ACT NRM also drew on the extensive literature on soil acidification; and the Soil Landscape maps of the ACT to ensure the most common Soil Landscapes were represented in the trials and demonstrations.

Methodologies for assessing the effectiveness of management actions;

The methodologies for assessing effectiveness of management actions, as with that used to determine the most cost-effective management actions, is again derived from the expert advice coming from NSW Department of Primary Industry and will include:

- → analysis of all the data coming out of the project to determine the impact of various treatments on soils and vegetation on farms
- → Communication of the results of the project to ACT and region farming communities
- → a survey of participating landholders on the project and its impact, design, value etc.
- → Farm walks or field days to share results coming out of the project

Vegetation and biodiversity on farms

Australia's Native Vegetation Framework was released by the Council of Australian Governments in 2012 and guides native vegetation management across the Australian landscape. The framework recognises that native vegetation is crucial for the health of Australia's environment, that it supports our economy and productivity as well as our biodiversity and that it is embedded within Australia's cultural identity.

The ACT Nature Conservation Strategy 2013–23 outlines a vision for nature conservation in the ACT over the next decade for 'biodiversity rich, resilient landscapes stretching from the inner city to the mountains, where well-functioning ecosystems can meet the needs of people and the environment'.

ACT Vegetation Map 2018

The ACT Vegetation Map classifies native and derived vegetation across the ACT at 1:10,000 scale into 64 plant communities. Vegetation communities are geographical units with similar association of plant species. The product also includes canopy cover and height variables based on 2015 ACT LiDAR data. Vegetation maps are important tools for characterising the landscape, informing policy and providing information for land and habitat management plans, including to help identify threats and risks to biodiversity and help prioritise protection of important ecological values in our landscape. This product will enable evidence-based decision-making at a broad regional, local and property planning scale in the ACT. It will also formulate a new baseline for future change detection in the landscape.

Native vegetation and biodiversity on farms

Within the ACT Isolated and small patches of trees in rural landscapes are declining at a rapid rate, due to natural ageing and death, dieback, and low rates of regeneration. Research has concluded that most paddock trees could be lost from South East Australia within the next century.

Many ACT farms have areas of remnant Yellow Box-Red Gum Grassy Woodlands or Lowland Temperate Native Grasslands. Increasingly, with more security of tenure, ACT rural landholders are valuing and protecting these important environmental assets in day-to-day land management, or through specific conservation activities, such as fencing and stock exclusion.

Through NLP funded projects such as the Protecting and connecting endangered woodlands in the ACT (see Case Study 5) and with support from projects such as Future Drought Fund and the Regional Agricultural Landcare Facilitator, the ACT NRM promote the protection of remnant vegetation and planting of biodiverse native species to improve biodiversity on-farms and enhance agricultural productivity.

The ACT also has a requirement all land managers in the ACT to have a Land Management Agreement (LMA) in place as part of leasehold arrangements to help manage their land in a way that protects the natural values.

CASE STUDY 8

The ACT Regional Agricultural Landcare Facilitator (RALF)

The ACT Regional Agricultural Landcare Facilitator (RALF) role is highly valued for connecting people and information: to support farmers, primary industry groups, landcare groups, NRM bodies and local/regional Indigenous communities to deliver sustainable agricultural and biodiversity outcomes for the ACT and surrounding region.

The RALF:

- facilitates partnerships that support a collaborative approach to identifying, analysing and resolving sustainable agriculture issues, by engaging seasonally and when required with the ACT Rural Landholders Association the peak body and spokesperson for ACT primary producers.
- Assists in the delivery of sustainable agriculture and biodiversity projects that increase the awareness and adoption of land management practices that improve and protect the condition of soil, biodiversity and vegetation consistent with the Australian Government National Landcare Program (NLP) standards. These include providing support for three large NLP projects:
- Better Land Management – a project that has involved the establishment and monitoring of 15 trial and demonstration sites to test approaches to improving soil pH, increasing soil carbon and improving ground cover. This project involves significant community engagement and knowledge transfer coming out of the project which the RALF plays a significant role in.
- Resilient farms - supporting ACT farmers to adapt to significant changes in climate and market information through conferences, workshops, training and a series of webinars introducing tools/ technology which support sustainable, adaptive farming; information sessions on the latest science on climate change adaptation in agricultural; and farmer peer to peer learning through the establishment of a facilitated ACT Grazing Group that meet seasonally to share knowledge and experience on improved stock and soil health management whilst remaining profitable and have been on a bus tour to meet regenerative farmers in the region.
- Protecting and Connecting Endangered Woodlands in the ACT - on public and rural leasehold land throughout the ACT. Through several community planting and propagation events the RALF has been able to build awareness of Box Gum Woodlands in the ACT amongst the urban community who otherwise might not have known about the endangered community or been able to participate in the protection and connection.

Other activities undertaken by the ACT RALF which build the networks, knowledge and skills of the RALF and assist in developing innovative approaches and strategic directions for sustainable agriculture include:

- RALF participation in local, state and territory 'Community of Practice' (CoP's) networks to better understand complex issues, improve networks and capabilities, ensure that information flows to and from the sector to the experts, agencies and departments that helps to develop solutions for national priorities. Eg Monthly ACT/NSW RALF teleconference meetings, monthly NRM Regions Australia Carbon Farming and NSW South East Landcare Network.
- Regular engagement with the Australian Government RALF team through quarterly CoP meetings to ensure two-way communication, participation in annual RALF conference and through the preparation and submission of the RALF annual plans and reports.

In addition the ACT RALF engages and assists community groups, landowners, and industry groups to develop new projects and pursue funding opportunities that deliver sustainability and biodiversity outcomes. Examples include the Future Drought Fund, Protection, and Revegetation of the Naas River for

Drought Resilience, Murray–Darling Basin Healthy Rivers program – small grants, ACT Government Weed and Pest Animal Control Grants.

The RALF is pivotal in engaging across and between stakeholder groups, to facilitate partnerships, build capacity, knowledge and skills and connect stakeholder groups to best practice bring in agricultural industries experts and provide training opportunities such as a cross border soil and ground cover program with Local Land Services; and Resource Consultancy Service – holistic business education face to face and online training and ad-hoc opportunistic field days, stakeholder workshops and facilitated training session that support agriculture related Core Services and Project Service's needs.

3.6. Outcome 6: By 2023, there is an increase in the capacity of agriculture systems to adapt to significant changes in climate and market demands for information on provenance and sustainable production.

Key Australian Government strategies, plans and programs focussed on climate adaptation and innovation in agriculture around provenance and sustainable production

The Australian Government has identified its approach to improving climate resilience, innovation and adaptation in the agriculture sector through NLP 2 and through a number of strategies and plans, including the National Climate Resilience and Adaptation Strategy, National Agricultural Innovation Agenda the Agriculture Biodiversity Stewardship Package and the Future Drought Fund.

Climate Adaptation

Adaptation is the process by which vulnerability to climate hazards is minimised. Responses depend on the type and severity of the hazard and the capacity of the community adapt, and can range from resilience responses (changes or coping strategies to maintain business as usual) to transitional responses (incremental system changes) to transformational responses (fundamental system/enterprise change).

CASE STUDY 9

Resilient Farms: Supporting Adaptation to Climate and Market Variability

ACT NRM's key RLP project that aims to address RLP Outcome 6 is: Resilient Farms: Supporting Adaptation to Climate and Market Variability.

Resilient Farms: Supporting Adaptation to Climate and Market Variability (henceforth called Resilient Farms) has aimed to support ACT rural landholders to adapt their farming operations to both already observed and projected climate change impacts in order to minimise risks; and where possible market variability. In addition, ACT NRM's Resilient Farms Project has aimed to introduce ACT farmers to technologies, tools, market-based instruments and other approaches that support innovation, efficiency and strong environmental outcomes to promote sustainable, climate resilient farming in the ACT.

Resilience, transitional and transformational adaptation responses are being explored and promoted (not necessarily using the language of "resilience, transitional and transformational" changes) to assist ACT rural landholders to make well-informed decisions, reflecting the diverse interests, capacities, resources and commitment amongst ACT rural landholders.

Resilience strategies include promoting management approaches that maintain ground cover, improve land management, identify trigger points for change and support actions which conserve fodder, secure water, provide shade, for example. Transitional and transformative strategies include activities which try to manage market risk (such as engagement in market assurance programs, income equalisation programs, sustainability frameworks and environmental management systems) or complete shifts in enterprise and how land is managed.

There is no on-ground investment under the Resilient Farms Project. This project has been delivered primarily through workshops, conferences, training days, field days, farm walks, bus trips to other areas and other capacity building activities aimed at building the skills, knowledge, confidence and capacity of ACT farmers to seek out and apply:

- the latest science on climate change adaptation in agriculture.
- locally relevant weather/climate information.
- sustainability frameworks, market assurance programs or similar programs.
- tools/technology which support sustainable, adaptive farming.
- key agriculture research, industry, marketing and extension organisations and their research and information products.

In addition, under this project the ACT Regional Agricultural Landcare Facilitator has led the development of the ACT Grazing Group – a peer-based group of interested ACT rural landholders who are being supported to come together with the RALF to share knowledge and experiences. The Group recently went on a field trip to Crookwell to visit regenerative farms and learn about how the Upper Lachlan Grazing Group works and how it supported group members through the drought. The ACT RALF has promoted the group to all ACT rural landholders and a core of 10-15 landholders regularly attend meetings and joined the RALF on the recent bus trip. The group helps to determine group activities and priorities.

The location and condition of the natural resources

As noted previously, the ACT and much of Australia have experienced the worst drought encountered since temperature and rainfall records commenced. The biggest source of information on the threats to and impacts on natural resources caused by climate change was the living laboratory provided by the climate conditions in the ACT between 2017-2022, what our farmers have observed, how they have responded and how they are considering responding the future and the support they need.

Clearly the fires and post-fire erosion and sedimentation of creeks and rivers was the most visible impacts on natural resources. While a stock take of climate impacts has not been taken on farms – much of the NRM training under the Resilient Farms project offered to landholders has focussed on developing skills around pasture and farm management going into and coming out of drought using pasture management tools such as the Tidbinbilla Soil Moisture Probe and pasture monitoring tools such as those developed by MAIA, RCS, Local Land Services and other organisations.

Prioritisation of activities undertaken under Resilient Farms – Baseline knowledge and knowledge needs

- **Survey of rural landholders**: ACT NRM conducted a survey of ACT rural landholders in 2020 – aiming to elucidate their knowledge of climate change, their experience/observations of climate change as it applies specifically to their enterprise, their knowledge gaps, knowledge needs and how they prefer information to be provided. 40 landholders (at least 25% of ACT landholders) responded to the survey. This has helped inform development of the project.
- **Climate adaptation forum**: ACT NRM ran a climate adaptation forum in November 2020 which IPCCC Lead author Professor Mark Howden spelled out climate change impacts and adaptation options for agriculture across our region; seven farmers from across the region spoke on how they managed the last drought and how they are planning to manage future droughts; and representatives from carbon farming groups and the Emissions Reduction Fund spoke on carbon farming options.

The combination of the survey and the presentations from the forum have helped inform the development of the program, along with key documents that have been published over the life of the program including:

- Climate Change and Land published in August 2019 https://www.ipcc.ch/srccl/
- The IPCC Sixth Assessment Report Climate Change 2022: Impacts, Adaptation and Vulnerability
- https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/
- Climate smart agriculture toolkit - Farmers for Climate Action
- Australian Bureau of Agricultural and Resource Economics and Sciences
- Seasonal Conditions and Drought - NSW Department of Primary Industries
- Climate Change Research Strategy - NSW Department of Primary Industries

Threats to and impacts on natural resources

As previously noted, the surve, the forum and the literature previously noted, as well as the living laboratory provided by the climate conditions in the ACT between 2017-2022 – drought, fires and floods – all elucidated the key threats and impacts on natural resources on ACT farms due to climate change are extensive and include:

- Soil erosion due to drought, fires and post-fire erosion
- sedimentation of creeks and rivers was the most visible impacts on natural resources.
- Weeds and pest animals
- Loss of soil nutrients and deterioration of soil health (acidity, soil carbon, cation exchange capacity, phosphorus and nitrogen, Aluminium and more).

While a stock take of climate impacts has not been taken on private land – much of the NRM training under the Resilient Farms project offered to landholders has focussed on developing skills around pasture and farm management going into and coming out of drought.

Prioritisation methods/processes the Service Provider is using to determine the most cost-effective management actions, including decision support and spatial mapping tools

The Resilient Farms project is focussed on all rural lands in the ACT – and is not aimed at undertaking on-ground works – hence prioritising sites for trials, demonstrations or treatments to address climate change impacts is not an element in this project.

Rather this project has delivered primarily capacity building activities to interested landholders in the ACT farming community through workshops, conferences, training days, field days, farm walks, bus trips to other areas and other capacity building activities aimed at building the skills, knowledge, confidence and capacity of ACT farmers to adapt to climate change; and use market-based instruments and other tools and technologies to farm sustainably.

Prioritises cost-effective interventions to address threats for the Investment Priorities of focus.

There is a huge proliferation of training programs, trainers, tools available and on offer to farmers. ACT NRM has not tried to pick winners, rather has, across its suite of capacity building programs (RALF, Resilient Farms and the Future Drought Fund) have tried to bring "the best of the bunch" from a diversity of providers, partners and stakeholders that have a useful and well tested body of knowledge, are experienced, well respected, diverse and can demonstrate impact and farmer practice change, including: ANU, Local Land Services, NSW Department of Primary Industries, RCSMAIA, The Savoury Institute, Earth Canvas, Numerous cutting edge Farmers – including the Watson Family, Colin Sies, RDA ACT, NSW Farmers, CSIRO, BOM, Meat and Livestock Australia, Soils for Life, National Museum of Australia, Landcare ACT , The ACT Rural Landholders Association, ACT Catchment groups, Land to Market

Evidence and expertise to guide and support decision making

As noted – science, evidence guide our prioritisation of capacity building programs targeting practice change in ACT rural landholders along with the concerns, interests, information needs of ACT rural landholders

Decision support tools and processes to support prioritisation and determine cost effectiveness of delivery methods and management actions

The key method for determining the effectiveness of the Resilient Farms project will be a survey of ACT rural landholders at the end of the program to determine impact and whether the program has changed/ influenced farm management and whether farmers are adapting to climate change.

CASE STUDY 10
ACT Tidbinbilla Soil Moisture Probe

ACT NRM has installed a permanent soil moisture probe in the Tidbinbilla Valley, ACTone of more more than 30 farm-based probes across the Southern Tablelands, Monaro, South West slopes and the South Coast administered by the South East Local Land Services, Tablelands Farming Systems and Monaro Farming Systems.

The Tidbinbilla Soil Moisture Probe records accurate rainfall to the nearest 0.2mm, soil temperature and soil moisture to a depth of 1 metre. Data generated by the probe is a relative measure of soil moisture. All this data is available free on the web along with modelled pasture growth and availability projections three months out – giving landholders important information on planning for feed gaps, feed deficiencies and droughts.

Each probe provides information that is accessible to all farmers to assist them to make stock and pasture decisions in their district, even if rainfall or soils across a district are variable.

During the 2017-2020 drought the probe showed consistently very low soil moisture, low pasture growth projections three months out and very low rainfall.

4. Identify and prioritise natural resource management actions

Looking forward, the new NRM Plan, Caring for Dhawura Ngunnawal: A natural resource plan for the ACT 2022-2042, identifies and prioritises natural resource management actions across the focus areas through extensive consultation with the primary stakeholders in natural resource management in the ACT and Region.

The timing to implement each action will be dependent upon agreed priorities, the complexity of the action and availability of resources and will be determined by collaborative agreement between government and community.

4.1. Priority Targets

The natural resource management priority targets are summarised below, with a full list available in the NRM Plan under each of the associated "Landscape" chapters alongside the suggested actions.

Cultural Landscapes

The Ngunnawal people are the custodians of our cultural landscape, with their cultural roots and identity intrinsically connected to the landscape. The role of Ngunnawal people and the knowledge that has been passed across the generations is critical for the sustainable management and restoration of our natural ecosystems. Traditional burning was an important landscape management tool that our ecosystems are uniquely evolved to depend on, showcasing intertwined relationship of traditional custodians with our ecology. Traditional burning that re-establishes a complex diverse overlapping mosaic of age structures and fuel loads can protect landscapes and human-made assets from wildfires.

Priorities:

- → Increase awareness of Ngunnawal culture through regular training, education programs, use of Ngunnawal language.
- → Increase involvement of Ngunnawal people in land management activities.
- → Increase Ngunnawal employment, engagement and training opportunities.

Community Connection to Nature

The ACT community enjoys its identity as a Bush Capital and gives back to nature. Environmental volunteering makes a significant impact to natural resource management, estimated at contributing $40-50 million per annum in labour or approximately one fifth of the total ACT Government's environmental expenditure. Volunteering and advocacy is supported and encouraged through a number of highly capable non-government groups, including the Canberra Ornithologists Group, Friends of Grasslands, National Parks Association, Conservation Council ACT Region and Greening Australia.

Priorities:

- → Increase opportunities for nature-based recreation.
- → Increase opportunities for people to connect with nature for wellbeing.
- → Increase opportunities for volunteering for the environment.

Rural Landscapes

The rural landscape of the ACT is a defining feature of living and visiting the region, with farms accounting for 15% of the ACT land area. Productive and sustainable agriculture in close proximity to urban areas provides valuable biodiversity connections and ecosystem services. Farming enterprises are typically family based, with beef, lamb, wool and horse agistment and equestrian activities common. Other enterprises include free range eggs, chickens, alpacas and llamas, fruit and vegetations, wine, olives and truffles.

Priorities:

- → Improve policy and tenure arrangements to maximise sustainable management of land into the future.
- → Improve management of biosecurity issues (weeds and pest plants).
- → Improve rural lands fire management.
- → Improve resilience to climate change.
- → Improve Water Security.
- → Improve soil health and increased production.
- → Protect and enhance native vegetation.
- → Improved management of dumping of building waste.

Urban Landscapes

The more densely populated human-made environments of the ACT are home to more than 430,000 people. The green spaces of urban forest, grassland and aquatic ecosystems within the urban landscape provide for recreation, wellbeing and ecosystem services such as cooling and biodiversity connections. Population growth is a major challenge for the ongoing integration of urban landscapes as part of sustainable and healthy natural ecosystems.

Priorities:

- → Increase the area of protected urban open space and the land and infrastructure that connects them.
- → Establish a well-managed well-connected biodiverse series of corridors across the ACT's urban area.
- → Increase public awareness of, and participation in, environmental management.

Natural Landscapes

Natural landscapes in the ACT are diverse, ranging from alpine areas with steep forested hills to sparse open woodlands and treeless grasslands in lowland areas and aquatic ecosystems. These landscapes are critical wildlife connections, requiring cross jurisdiction management to maintain large scale biodiversity connectivity. All these landscapes are faced with loss of biodiversity, climate change pressures and inappropriate fire regimes.

Priorities:

- → Long-term water security and efficient use of water particularly during drought.
- → Improve the resilience of natural landscapes to climate change and other threats
- → Improved knowledge to enable effective management of natural landscapes
- → Engage community and strengthen stakeholder and research collaborations for the conservation of natural landscapes
- → Conserve rare ecosystems and communities including high country bogs and fens, woodlands and native grasslands
- → No net loss of the ecological and cultural values of woodlands and to maintain or improve the proportion of each woodland community located within the ACT's formal reserve system.
- → Undertake monitoring and research that supports improved natural ecosystem management.

Ecosystem Function and Services

Climate change is a challenge to our ecosystems' ability to provide functions and services and also heightens our need for ecosystems to filter and clean air and water, provide cooling and maintain sustainability of food production. The living infrastructure of street trees, ovals, wetlands, creeks, nature reserves, parks, private yards, green roofs and balconies, and living walls can assist with urban heat and flash flooding. Increasing tree canopy cover and surface permeability, along with upgraded stormwater management are priorities for Canberra's Living Infrastructure Plan and the Healthy Waterways Program.

Priorities:

- → Achieve 30% tree canopy cover by 2045 or a tree canopy equivalent
- → 30% permeable surfaces in Canberra's urban footprint by 2045
- → Integrate ecosystem services into planning.
- → Improve liveability for Canberra residents through nature.

5. Implementation of Natural Resource Management Plan with comprehensive Community participation

Canberra is known as the Bush Capital of Australia. As such, nature is at the forefront of Canberra's lifestyle, wellbeing, industry, and tourism. This is recognised in the ACT Wellbeing Framework (2020)

Residents of the ACT, value a strong connection to nature; with environmental volunteering being particularly important. This leads to community placing a strong value on ecosystem condition, catchment health, biodiversity, status of threatened species and communities, and reducing threats to the natural environment.

Landcare and other environmental volunteering contribute unparalleled knowledge of the surrounding environment and local species, physical labour (planting, weeding, removing debris), caring for injured wildlife and monitoring and evaluation through citizen science. They administer and manage environmental groups and run activities that include education and awareness-raising about local environmental issues, which encourages positive practices. Community and government partnerships are well-developed, resulting in positive on-ground outcomes.

There is also a strong value on supporting ACT's rural landholders to manage the land in a sustainable and responsible way that adapts to changing conditions and is supportive of the environment.

Canberrans value their natural resources and are vital in the implementation of the ACT Natural Resource Management plan. There are many opportunities to actively seek community participation in projects which will value add to associated outputs and outcomes. This includes in areas such as governance and decision making, assistance in delivery and participation in on ground activities such as tree plantings.

For all project designed to assist with the implementation of the plan and reach RLP outcomes, expert elicitation will begin the process us. Current research will be used to inform practice, this will be sourced from both internal and external sources including from community partners in both the Australian National University and University of Canberra. This process can also be kicked off with community razing concerns through various governance bodies (see below).

Formal project design commences with engagement various project partners. This can include ACT Government land managers as well as community partners such as Landcare or NGO's. For the **Protecting and connecting endangered woodlands in the ACT** RLP project, both Greening Australia and the Molonglo Conservation Group (Landcare Organisation), were key in assisting with project design. ACT NRM would also seek consult with other relevant stakeholders including other government/nongovernment stakeholders (EPA, Soils for Life etc), and other community stakeholders. Cross border stakeholders will also be consulted where appropriate. ACT NRM governance structures will also be able to provide feedback on project designs which dos include relevant community stakeholders. While ACT NRM guides this process it seeks to be as collaborative and engage community where possible to ensure the best possible outcomes in the delivery of the ACT NRM plan and associated RLP outcomes.

For project deliver, ACT NRM will seek to include community delivery partners and community volunteer activities when:

- → Achieving RLP outcomes can be assured,
- → It fits within project scope,
- → Investment allows.

Monitoring and evaluation of projects which is done through similar methods with stakeholders from across the community being involved where possible. Molonglo Conservation group when running activities as part of Protecting and connecting endangered woodlands in the ACT with the community, help to evaluate awareness within the community to endangered woodlands and their importance. This was through various approaches, including the use of a colouring book. This data will be used to help evaluate effectiveness of this project in assisting to meet RLP outcomes as well as assisting to deliver the ACT NRM plan.

Specific themes, priorities and actions related to community participation in the implementation of the NRM plan are listed below.

Theme	Actions & Priorities
Improved NRM governance and accountability.	ACT NRM has the Natural Resource Management Advisory Committee (NRMAC). The NRMAC is an independent representative advisory body of key community stakeholders including Landcare ACT and the ACT Rural Landholders association. The NRMAC will contribute, test, and enrich ideas, and act as a sounding-board in providing advice and feedback NRM issues and projects. It will help to deliver RLP and ACT NRM plan outcomes. The NRMAC builds upon expert elicitation in the design phase of any RLP project. Currently this is done through relationships with existing stakeholders. The prime example of this is with Greening Australia and the This will ensure that community can participate and help drive strategic project design that efficiently assists with the delivery of the NRM plan. It will also help drive a strong review and evaluation process to ensure delivery has met RLP outcomes as well as community expectations.
Decisions utilise the best available science.	ACT ensures robust science, evidence and evaluation underpins NRM decision making and guides the adaptive management of Country. ACT NRM has an internal Ecologist who provides advice around current research and best NRM practices. ACT NRM also has access to the Conservation Research (CR) branch of EPSDD. CR Ecologist provide an avenue to current research within ACT and across the region. An example of this in action is the Reducing the impacts of Sambar Deer in the ACT's Ramsar site - the Ginini Flats Wetlands RLP project. Here the best available science was gathered which led to practice change relating to NRM pest programs. We also have valued community partners from universities including ANU and UC who assist in this area.
Improve NRM data management and accessibility.	All activities and decisions consider monitoring the effectiveness and logistics of data capture, processing, and storage (including considerations to supplying standardised monitoring methods and data collection tools where applicable). Build a robust NRM database of activities and decisions to underpin governance. Include science-related projects in the EPSDD Environment Research Directory, which aims to foster discoverability, enable consultation and discussion, build linkages, share knowledge, and research outcomes. Enhance community access to government environmental data.

Theme	Actions & Priorities
Greater participation of community in decision making relating to NRM.	ACT NRM has a productive relationship with its community stakeholders. Over the last 5 years positive relationships have been built with community organisations such as Landcare ACT, which has led to positive collaboration opportunities (see case study below). ACT NRM has forums that the community can participate in to related to NRM: → Biodiversity Conservation Forum: This forum is designed to create a strong community of practice to bring together expertise from within the local conservation community. It provides an opportunity for government and community groups to work together on current and emerging issues relating to the conservation of biodiversity, environmental planning, and policy in the ACT. The forum considers topics including climate adaptation, landscape, and ecosystem management, threatened species management, urban biodiversity, and invasive species. Topics raised at the forum can be utilised to develop projects that assist with the delivery of the ACT NRM plan. → Natural Resource Management Advisory Committee: This committee will contribute, test, and enrich implementation ideas around the ACT NRM plan, and act as a sounding-board in providing advice and feedback on projects. The committee will be made up of community representative stakeholder groups involved in NRM delivery within the ACT. Both groups provide a robust avenue for community to participate in decision making related to NRM.
Improved integration and cross-sector collaboration on NRM across government.	Being a cross tenured organisation ACT NRM seeks collaboration across ACT Government jurisdictions to achieve RLP outcomes and the implementation of the NRM plan. Through strategic investment ACT NRM has been able to enhance collaborations including: → Working with Transport Canberra and City services to assist with management of threatened EECS through the Protecting and connecting endangered woodlands in the ACT RLP project. → Helping to operationalise more effective and efficient invasive pest control programs with ACT Parks and conservation service as part of the Reducing the impacts of Sambar Deer in the ACT's Ramsar site - the Ginini Flats Wetlands Complex RLP project. → Working with ACT Rural Services to educate and upskill landholders as part of the Resilient Farms: Supporting Adaptation to Climate and Market Variability RLP project. ACT NRM where possible will seek strategic cross tenured collaborations to improve RLP outcomes and help implement the ACT NRM plan across government.
Establish cross-border NRM liaison with the NSW regional bodies.	ACT NRM is working to establish a cross border NRM committee with other NRM bodies that share a border with the ACT. Also, will be included are representatives from relevant NSW Government departments. The establishment of this committee forms part of the ACT/NSW Government MOU on cross border relations. This committee will assist involved stakeholders to collaborate and tackle NRM issues that are cross border in nature in a collaborative way.
Stronger environmental regulators.	ACT NRM projects provide greater emphasis on and support for environmental regulation to ensure the important laws and regulations designed to protect the environment are complied with. ACT NRM will have and will continue to collaborate with regulators across government to address environmental issues that are of community concerns that impact the achievement of RLP outcomes. As part of the Protecting and connecting endangered woodlands in the ACT RLP project, ACT NRM has routinely worked with PCS as the regulator for the ACT Nature Conservation ACT, to ensure regulations are met, followed and strengthened in the delivery of the projects.

Theme	Actions & Priorities
Increased participation in delivery of projects and their associated RLP outcomes.	ACT NRM has a strong relationship with community partners who aid in the delivery of RLP projects and their associated outcomes. Strong existing partnerships already exist with both ACT Landcare and its associated members, as well as community NGO's such as Greening Australia. These organisations have assisted in the important delivery of outputs and outcomes within NLP 2 projects. A great example of this partnership has been the **Protecting and connecting endangered woodlands in the ACT** project. This project has been improving the condition of **White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland** within the ACT. Our community partners have provided vital assistance in delivering outputs in both community engagement and environmental restoration that have aided the success of the project. So far over 370ha of restoration of this threatened ecosystem has occurred through community partnerships on this project. ACT NRM always looks to further develop community partnerships and community capacity where possible to help implement the NRM plan and relevant RLP outcomes.
Increase opportunities for community volunteer participation in projects.	Community participation has been core facet of the implementation of the ACT NRM plan. Community participation greatly adds to outcomes across RLP projects. Ways community participation have value added to implementation of the plan included: → Raising awareness of RLP outcomes and their importance. → Assisting with community wellbeing, as described in the ACT Wellbeing Framework (2020). → Assist in the direct delivery of outputs (i.e., tree planting). → Assist to empower community stewardship of greenspaces and provide for their long-term care, → Value adds to any project through the contribution of volunteer labour ACT NRM has sought to include, empower, and enhance volunteer activities where possible. These have both been collaborations with Landcare in the ACT and independent. Several current NLP2 projects that assist with the implementation of the NRM plan, align with this. → Protecting and connecting endangered woodlands in the ACT provided opportunities for volunteers to participate in activities such as tree planting, information workshops and field trips aimed at improving the conditions of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland within the ACT. → Haven for Quolls and Bettongs in the ACT has provided opportunities for community volunteers to participate in education activities aimed and raising the awareness of efforts to improve the trajectory of threatened species at Mulligan Flat woodland sanctuary. → Resilient Farms: Supporting Adaptation to Climate and Market Variability has provided opportunities for local landholders to participate in activities to adapt to significant changes in climate and market demands for information on provenance and sustainable production. ACT NRM will continue to provide these opportunities where they strategically align with the implementation of the NRM plan. Strategic partnerships with organisations such as Landcare will aid in the delivery of these opportunities.

CASE STUDY 11
Landcare for Singles

Over the last 5 years of the current NLP2 program, ACT NRM has run The Landcare for Singles event with partners such as Landcare and Greening Australia. This has been supported through the Protecting and connecting endangered woodlands in the ACT RLP project. Since 2012 (through multiple NLP programs) it has engaged with over 700 community volunteers. They have helped to restore and generate awareness of the critically endangered White Box-Yellow Box-Blakely's Red Gum Grassy Woodland ecological community, once very common in our region and across south-eastern Australia but now very fragmented and vulnerable on private and public land.

Unfortunately, due to drought, fire risk and the COVID pandemic the scheduled events for 2018 and 2020 were not able to be held, the Canberra community clearing missed the annual event as there were over 400 registrations for the 2021 Landcare Singles! Event partners particularly Greening Australia and Landcare ACT are an important component as they assist in providing follow up opportunities for participants to engage in a variety or natural resource management volunteer activities across the ACT throughout the year beyond the one-day Speed Planting event.

Landcare for Singles volunteer planting events promise a win-win scenario for everyone involved, as an attendee even if they don't meet that special someone, they can still feel good about doing something positive for their local environment.

The events have aligned and contributed to RLP outcome 4 but have also acted as an exemplar of collaboration between community organisations and allowed a greater community participation in delivering RLP outcomes.

CASE STUDY 12
ACT NRM Plan Community Consultations

In preparation for the development of the ACT Natural Resource Management Plan, ACT NRM contracted Landcare ACT to lead 4 community consultations with its members around the issues of concern and areas they think the plan should cover. The concept was that if community led the conversation around the plan, then its membership would engage with the process in a more efficient and effective way. As an important community stakeholder and partner it also helped further build the relationship with Landcare ACT and ACT NRM. This will help enable further successful collaborations in the future to jointly reach RLP outcomes.

During early 2021 Landcare held the 4 consultations with over 50 community members

The key messages from the consultation sessions related to:

- Plan structure, terminology, and communication
- Strategic themes and focus areas; and
- Guiding principles.

While the work with Landcare ACT was only a part of the consultation process as part of the ACT NRM plan development, it did serve a vital part. It not only allowed key community stakeholders to make themselves heard but also that they were key parts of the process. This helps to build positive relationships helping with the implementation of the ACT NRM plan and achievement of RLP outcomes.

6. Identify Indigenous peoples' land and sea management aspirations for the relevant Management Unit, including how they relate to 5-year Outcomes, and strategies to prioritise and implement them

Ngunnawal people are recognised as being responsible for caring for Country and speaking for Country, and balance the physical, social and spiritual connection to nature as central to the health and wellbeing of all Canberrans.

ACT NRM seeks to improve processes by taking into consideration the aspirations, needs and values of Aboriginal people. This is core to ACT NRM's commitment to increase opportunities for Aboriginal people to involve them in natural resource management programs and projects. Innovation and mutual respect have helped drive development in cross-Government programs that aim to engage the Aboriginal and Torres Strait Islander community holistically, generating the best outcomes moving forward.

6.1. Priority areas

Six priority focus areas have been identified:

- Engaging Aboriginal and Torres Strait Islander youth and preparing them for advisory and leadership roles
- Developing cultural heritage programs to assist with Aboriginal and Torres Strait Islander people healing and rehabilitation
- Supporting the development of cultural tourism
- Conserving Country and applying Aboriginal land management
- Helping protect Traditional Custodians cultural land and water rights
- Supporting employment programs working on Country

Theme	Target	Actions identified during stakeholder consultation
Cultural awareness, training and education	Increase awareness of Ngunnawal culture through regular training, education programs, use of Ngunnawal language.	→ Provide cultural awareness training for landholders in the ACT. → Support Ngunnawal-led education programs—resources for teachers and community groups to help to inform people about Ngunnawal culture. → Promote Ngunnawal language; re-name places, animals and plants; incorporate Ngunnawal language into education.
Land management	Increase involvement of Ngunnawal people in land management activities.	→ Support collaboration between Aboriginal people, government employees and broader stakeholders in relation to land management activities and decision making. → Share responsibilities for land and water with the Ngunnawal community—emphasise co-management or partnership with traditional custodians. → Establish systems to ensure Ngunnawal people are involved in land management governance and decision making at all levels. → Promote cultural fire management, including more on-ground trials of different fire regimes. → Develop a Cultural Heritage Plan including a Use of Cultural Resources Plan.
Cultural empowerment	Increase Ngunnawal employment, engagement and training opportunities.	→ Increase employment opportunities for Ngunnawal people to work in the ACT Government. → Instigate a River Ranger program to work alongside Ngunnawal Traditional Custodians to track river health. → Support the United Ngunnawal Elders Council to lead 'teach and share' knowledge with Ngunnawal youth to develop their understanding of Ngunnawal cultural protocols, lore and governance. → Support a 12–17-year-old Ngunnawal Youth on Country leadership group and the Kickstart My Career through Culture Program to attract Ngunnawal youth participation. → Engage and support Ngunnawal youth and Aboriginal and Torres Strait Islander youth to participate in NRM events, activities, forums etc. in a culturally appropriate capacity. → Provide safe places to implement 'on-Country' cultural learning opportunities with Ngunnawal and wider Aboriginal and Torres Strait Islander youth to learn more about Ngunnawal country, people and culture.

To achieve outcomes under these priority areas, ACT NRM employs an Aboriginal NRM Facilitator to assist engagement and consultation, and build capacity within the community to deliver projects on the ground.

The Aboriginal NRM program works to support ACT Parks and Conservation Service and ACT Heritage to protect culturally significant areas in conjunction with Traditional Custodians.

CASE STUDY 13

Native Plant Use Forum – 'Care for country and it will care for you'

The first Native Plant Use Forum was hosted in 2019 by the Environment, Planning and Sustainable Development Directorate (EPSDD) and ACT NRM supported by the ACT Aboriginal NRM facilitator and other Aboriginal staff members to share knowledge, empower communities and develop new opportunities into the future.

A two day event that brought over 100 participants to hear from leading Aboriginal and Torres Strait Islander people working with and promoting native plant use in cooking, medicine, cultural activities and more.

Day one was held at Exhibition Park in Canberra (EPIC), where presentations and workshops from industry leaders engaged participants in actively learning about native plant uses.

Day 2 comprised of a field day at Tidbinbilla, where participants were given the opportunity to experience a cultural weaving workshop, a wetlands walk and demonstrations of traditional artefacts.

The forum provided an opportunity to share, strengthen and learn about past, present and future native plant use.

It was a highly successful and engaging event that encouraged participants to partake in hands-on activities in an inclusive, respectful environment.

7. Incorporate traditional ecological knowledge, where appropriate, in accordance with agreed protocols and with prior approval of the Indigenous custodians of the knowledge

The Ngunnawal people are original inhabitants of the Canberra region and its earliest land managers. Ngunnawal people occupying the diverse landscape of the ACT region possessed great knowledge of the environment, skilful custodianship and close cooperation with their own family members and other groups. This knowledge lives on through the Traditional Custodians who remain culturally connected to Country.

The involvement of traditional owners and acknowledgement and respect for Ngunnawal knowledge and the integration of cultural practices is important for the ongoing management of Ngunnawal country.

Integrating Aboriginal NRM into all aspects of the plan has been informed through consultation and feedback from the Aboriginal and Torres Strait Islander community and with the Dharuwa Ngunnawal Caring for Country Committee (DNCCC).guided by the overarching principles of the EPSDD Innovate Reconciliation Action Plan 2019–21 which outlines principles for fostering relationships, promoting knowledge, respecting cultural practices, creating opportunities through employment and business development and creating partnerships with traditional custodians. ACT NRM and the ACT government is committed to collaboration with Aboriginal people and stakeholders in relation to land management activities and decision making.

Having clear, two-way communication channels for involving Traditional Custodians as well as Aboriginal staff is considered important for the successful participation of Aboriginal and Torres Strait Islander people in activities. The Aboriginal NRM Facilitator funded under RLP is responsible for navigating communication between the many distinct Traditional Custodian governance structures and family groups for an inclusive approach to engagement. These groups include the Representative Aboriginal Organisations, United Ngunnawal Elders Council, the Namadgi Rock Art Working Group and the newly formed EPSDD Traditional Custodian Caring for Country Committee. The role also works collaboratively with the ACT Parks and Conservation Service's Senior Healthy Country Ranger, the Aboriginal fire project officer, the Woodlands and Wetlands Trust Indigenous Project officer, the Aboriginal Heritage Liaison Officer, as well as other Aboriginal and Torres Strait Islander Staff who form the Murumbung yurung Murra Network.

The role will facilitate allowing Aboriginal people who have direct responsibility to practice culture in a practical way which facilitates intergenerational transfer of knowledge systems, protection of cultural rights and responsibilities as well as maintaining a connection to country. Training Aboriginal people in ecological methods, including monitoring is a complementary initiative that aims to bring together ecological and cultural aspects of projects.

CASE STUDY 14

King Brown – Ngunnawal Led Bushfire Recovery

Supported by the Commonwealth Government response to the 2020 Black Summer bushfires, this project is focusing on traditional custodian led bushfire recovery related to the 2019/20 Orroral Valley bushfires. It aims to contribute to RLP outcome 4, as well as the implementation of the ACT NRM plan. The project started with co-design with the local Traditional Custodians, the Ngunnawal. This has led to project activities being designed around capacity building for Ngunnawal Community to partake in land management activities. The project also seeks to further the Ngunnawal aspiration to manage healthy Country within the ACT and build a collaborative partnership with the ACT Government. The ACT Government with its bushfire recovery efforts is focused on 'building back better' from the 2019/2020 fires. This project would further those aims helping to grow a productive relationship with the Ngunnawal community that would assist landscape recovery work in threatened ecological communities and improve community and landscape resilience. It is named after Carl Brown, a Ngunnawal elder who was instrumental in early cultural fire management within the ACT.

The project has kicked off with two field days on country. These field days gave Ngunnawal community members opportunity to spend time with senior ACT Government managers and discuss issues and aspirations regarding the management of healthy country. Issues raised at these days will focus on-ground works and form the core of workshops related to land management topics and community capacity building. These activities will contribute to the implementation of the ACT NRM plan and help build positive relationships with the Ngunnawal Community. These relationships will ultimately be used to inform current and future bushfire recovery efforts.

8. Identify the monitoring and reporting processes in place and how they are utilised to measure the achievements and the effectiveness of the Natural Resource Management Plan(s)

Measuring and communicating the achievements and the effectiveness of management actions in achieving stated goals is a key component of a natural resource management plan. In order to assess the impact, appropriateness, effectiveness, efficiency and legacy of policies and programs, Monitoring, Evaluation, Reporting and Improvement (MERI) processes should be integrated into planning.

Before commencing the draft of the new NRM plan a review was undertaken of the previous ACT NRM Plan, Bush Capital Legacy 2009. The plan which set 16 broad targets, these targets have been reviewed with the progress towards the target ranked good progress (green), some progress (orange), and poor progress (red) and are summarised in Appendix 1 – Review of NRM Achievements Since 2009.

In addition, for each of the Five-year Outcomes under RLP in this Addendum, relevant monitoring programs and information is provided, along with a list of potential indicators for monitoring resources, as a system or species in line with the RLP Program Logic.

8.1. Monitoring, evaluating and reporting New ACT NRM plan

The new NRM Plan **Caring for Dhawura Ngunnawal; a natural resource plan for the ACT 2022-2042** identifies priorities, targets and actions which are monitored and reviewed through an adaptive management 'learning by doing' approach that aims to generate knowledge, and enable learning from the outcomes of management approaches.

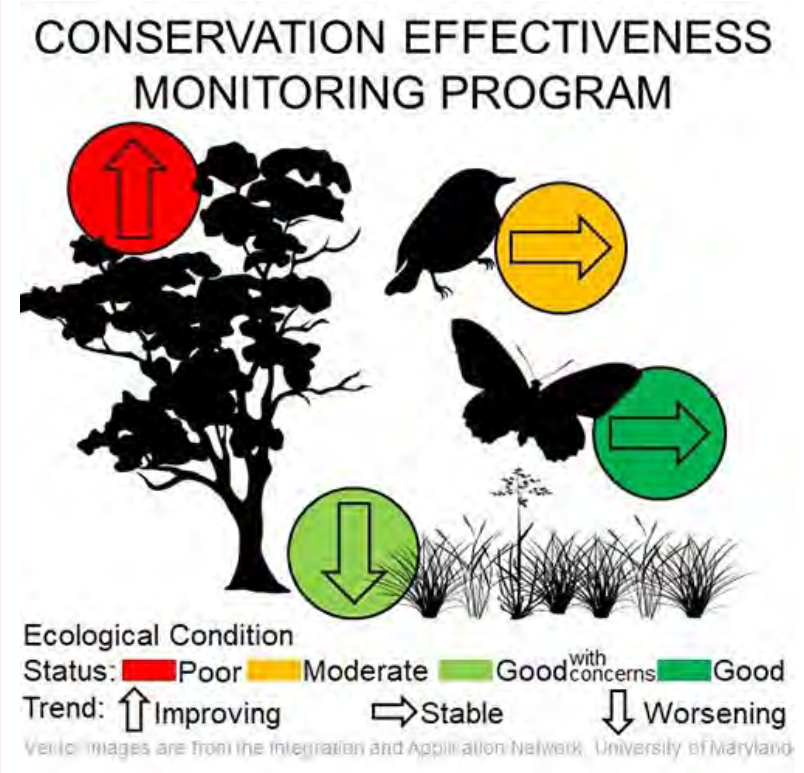
The stages of a typical adaptive management cycle involve recognition of the desired achievement (Goal), a plan on how this goal may be achieved (Plan), actions to carry out the plan (Do), a review or assessment on whether the actions have achieved their goals (Evaluate), communication of this review to other stakeholders (Report) and then a decision to either adjust the management actions (make a new Plan), or even adjust primary goals if necessary. ACT NRM will collect supporting data and information from a range of partners to inform the evaluation and adaptation of the plan through annual reporting on progress towards stated goals and by undertaking a review of the NRM Plan at 5 yearly intervals. Ongoing engagement through regular forums will also ensure the community continues to be empowered to update priorities and take action to deliver on specific targets within the adaptive management framework.

The ACT Government's Conservation Effectiveness Monitoring Program or CEMP for short– is a key element in generating the knowledge to enable adaptive and evidence-based management. The CEMP aims to provide a data-rich decision support tool to inform strategic planning and assist management in conserving ecological values within the ACT.

CASE STUDY 15

Conservation Effectiveness Monitoring Program (CEMP)

The CEMP is an overarching ecosystem condition monitoring framework for the ACT. The program identifies and brings together multiple datasets from both internal and external groups to the ACT Government to make new, large-scale assessments about ecosystem condition and management effectiveness, but also to ensure that monitoring across the ACT is coordinated, systematic, and robust and can detect changes in all ecosystem types in the ACT, detect changes in ecosystem condition and evaluate the effectiveness of management actions.



The overarching goals of the CEMP program are to:

- Detect early warning signs of change to ecosystem condition.
- Evaluate the effectiveness of management actions in achieving conservation outcomes.
- Provide evidence to support land management decisions.
- Identify and prioritise knowledge gaps for future research.
- Encourage ACT Government staff, community groups and research institutions to contribute towards biodiversity monitoring and research in the ACT.
- The CEMP brings together the impressive datasets collected by passionate groups across the ACT, analysing and providing feedback to land managers about the condition of different ecosystems and informing management priorities.
- The team collates data about each ecosystem collected from internal groups such as Parks and Conservation Service (PCS), Natural Resource Management (NRM), Conservation Research and Offsets, and from external collaborators such as the Australian National University (ANU), the University of Canberra (UC), Canberra Ornithologists Group (COG), FrogWatch and VegWatch.
- The data is organised, analysed and used to inform useful ecosystem condition indicators and metrics. The condition of these important components are summarised using a traffic light system with varying degrees of certainty and trends.
- This data is also used to assess how effective management actions, such as weeding, are for decreasing weeds and producing positive outcomes such as improvements in the condition of the ecosystem.

ACT Government