CONSERVATION COUNCIL ACT REGION

Friends of Grasslands

Briefing: Building a Biodiversity Network Across the ACT

December 2022

Overview

As the 'bush capital', Canberra is fortunate to host a mosaic of natural areas in and around the city. Many of these natural areas are protected under the ACT's extensive reserve system. But this system does not adequately protect all the Territory's natural values, leaving many unprotected and at risk of mismanagement.

Notably, the reserve system is biased against low lying ecosystems and small areas of natural vegetation. Indeed, 67% of the ACT's Natural Temperate Grassland remnants occur outside the reserve system despite their status as critically endangered.[1] Similarly, many threatened woodland remnants also occur outside of the reserve system, including 80% of Box-Gum Woodland.[2] Many small but significant areas outside the reserve system occur along roadsides, in urban open space, in green corridors between houses, or in rural or urban leases. While they may be small in size, these sites can have environmental significance as they support threatened ecosystems, provide habitat for native species, and/or facilitate connectivity across the landscape. However, areas with conservation value that occur on tenures outside of the reserve system are not primarily maintained for their natural values, which can put those values at risk.

To facilitate adequate protection of natural resources, a strategic system that facilitates best practice conservation on and off reserves is required, to ensure that all remaining threatened species and communities in the ACT are properly managed and protected in perpetuity. This paper outlines how '*A Biodiversity Network*' can act to support the protection and enhancement

[1] ACT Government, *ACT Native Grassland Conservation Strategy and Action Plans,* p21.
[2] Calculations from ACT Government, *Canberra Nature Park Reserve Management Plan,* 2021.

of natural values in the ACT. A Biodiversity Network would be designed to protect remnants of natural value that are not reserved, whereby these remnants, together with those in reserve, will be unified into a single management and (or) legal framework for protection and implementation of ecological management.

While nature reserves and national parks are important in that they provide a high level of protection against damage and loss, conservation (protection and management) can be achieved across other land tenures, without compromising the land uses that may exist in those places.

The aims of the Biodiversity Network are to formalise conservation and management of biodiversity outcomes on multiple types of public and leased land by identifying them as Conservation Areas, through a combination of protection, restoration and reconnection compatible with other land management objectives. A Biodiversity Network would achieve this by:

- Providing legislative protection to Matters of National Environmental Significance (MNES) and ACT threatened species and ecosystems that are not held in reserve;[3]
- Protecting other natural attributes so that they do not become threatened;
- Supporting representation of all ACT ecosystems in our conservation areas to achieve a comprehensive, adequate and representative (CAR) outcome;
- Increasing landscape habitat, biodiversity and connectivity;
- Implementing consistent and best practice ecological management coordinated across land tenures; and
- Better engaging, cooperating with and supporting land managers, community, special interest groups and associated management and research professions.

In addition, downstream benefits include climate resilience, increased human health and wellbeing, greater opportunities for fostering identity and connection to the natural landscape, improved natural functionality of the environment, and a basis for planning to prevent continuous loss of biodiversity.

The proposed new Territory Plan for the ACT, in the context of the 2022 Planning Review, is a substantial opportunity to identify Conservation Areas on unleased and leased urban and non-urban land, and ensure they are exempt from development; this would not preclude them from being used for other compatible land uses. Incorporating the Biodiversity Network on rural and urban leases can achieve major conservation gains for protection of woodlands, grasslands, and other MNES through cooperative management agreements facilitated by enhanced support including the provision of resources and advice. The establishment of the Biodiversity Network to protect Conservation Areas across all tenures will ensure a certainty of management and protection over the long term.

[3] Environment Protection and Biodiversity Conservation Act 1999 (Cth), Part 3 Div 1.

Table of Contents

Part 1: Problem Framing

The ACT Government's commitment to biodiversity protection

The ACT Government has an obligation under Federal environment laws to protect its "matters of national environmental significance" (MNES),[4] regardless of whether they occur inside or outside of the reserve system. The ACT Government, per its own laws, is also obliged to protect, conserve, enhance, restore and improve biodiversity in the ACT.[5] This is particularly relevant to the ACT's two most threatened ecological communities: Natural Grasslands and Box-Gum Woodlands. In the context of this paper, biodiversity refers to habitats that are native to the ACT and that contribute to the resilience and function of these systems. The protection goals for ACT Native Grasslands state an intention to "conserve all remaining areas of native grassland in the ACT that are in moderate to high ecological condition".[6] There is no distinction between native grasslands on or off reserve. Similarly, the ACT Native Woodland Conservation Strategy includes lowland and subalpine native woodland communities in all conditions across all tenures and land uses, and notes the importance of an ecosystem management approach regardless of land tenure.[7]

There has been a recent renewed focus on supporting biodiversity outcomes across the urban landscape. The ACT Legislative Assembly's 'Nature in Our City Inquiry' highlighted the issues and opportunities to better manage the interface between the urban and non-urban environments. A total of 58 recommendations were made; centrally, it was determined that the ACT Government should re-commit to the concept of the city within a landscape context by developing a comprehensive strategy and implementing a wide array of supporting policies.[8]

The release of the Urban Forest Strategy set a new direction for the urban forest program to "take an ecological approach and support biodiversity".[9] With the recent commitment of $14 million into urban trees, it is crucial that this investment is utilised to facilitate key biodiversity outcomes alongside those outlined in the Urban Forest Strategy. For example, by ensuring that the planting of trees across all tenures will be done with the consideration of conservation, the most effective native species can be used to support connectivity and species habitat.

Against this backdrop, it is clear that stronger action to protect the Territory's unique biodiversity is due. This action must be based on ecological understandings of how the landscapes work, and how human beings can live sustainably. The proposal for a Biodiversity Network has been designed with these commitments in mind to ensure that it fulfills the ACT's regulatory and legal commitments.

---

[4] Ibid.
[5] Nature Conservation Act 2019 (ACT); ACT Government, *Parliamentary and Governing Agreement of the 10th Legislative Assembly*, 2020.
[6] ACT Government, ACT *Native Grassland Conservation Strategy and Action Plans 2017*, p 11.
[7] ACT Government, ACT Native *Woodland Strategy and Action Plan,* 2019, p 8; 21.
[8] Inquiry into Nature in Our City, Final Report, 2020.
[9] ACT Government, *Urban Forest Strategy*, 2021.

Biodiversity protection is failing across tenures

Despite the ACT Government's extensive commitment to biodiversity conservation, the current regulatory scheme is incompatible with the way that nature occurs as a mosaic across the landscape. As such, sites of natural significance occur in reserves as well as on public and leased land.

There are limited requirements for conservation to be considered as a primary objective in land use areas outside the reserve system, making them prone to ecological mismanagement. Existing land use areas are incompatible with the protection of natural values in four primary ways:

1. The reserve system does not protect all conservation areas of importance;
2. Areas of conservation value outside reserves are being lost through expansion of the city and associated infrastructure;
3. Natural resources outside reserves are not consistently managed for conservation values;
4. Areas of biodiversity are fragmented across the ACT.

These are considered in greater detail below.

The reserve system does not protect all conservation areas of importance

Under the current regulation system, only Public Land is capable of being declared as a reserve,[10] whereas land with high quality natural values occurs across all tenures in the ACT. The reserve system in the ACT has historically protected bushland above 700 m and therefore failed to protect ecological communities and associated species whose habitat is within lower-lying parts of the ACT. These include lowland natural grasslands, a range of grassy woodland associations, and lowland wetlands.

Table 1 is an extract from the Canberra Nature Park (CNP) Reserve Management Plan,[11] and demonstrates the lack of reservation of key lowland vegetation communities. The table shows that only 20% of the combined total of all existing areas of the lowland woodland community are in CNP reserves and only 26% of Natural Temperate Grasslands are in CNP reserves. Moreover, of the 36 mapped lowland native grassland sites on Territory land containing critically endangered Natural Temperate Grassland and/or associated threatened species, only 11 are in nature reserves and a further two are proposed for reservation. Of the remaining grassland sites, 23 remnants (64%) occur outside the reserve system, with six of these being on leased land. A further 12 native grassland sites, on Commonwealth land, are managed by various Commonwealth agencies and lack reservation.[12] Additionally, over 40% of the critically endangered Yellow Box – Blakely's Red Gum Grassy Woodland (Box Gum Grassy Woodland) occurs on rural land.[13]

---

[10] Nature Conservation Act 2019 (ACT), s169, 170.
[11] Calculations from ACT Government, *Canberra Nature Park Reserve Management Plan,* 2021.
[12] Calculations based on ACT Government, ACT *Native Grassland Conservation Strategy and Action Plans 2017*.
[13] n 2. Table 1, *ACT Native Woodland Strategy and Action Plan 2019*, p. 19

Table 1: Reserve status of key lowland vegetation communities[14]					
	ACT total (ha)	**Reserved or managed by PCCS (ha)**	**In reserve (ha)**	**% of total hectares reserved or managed by PCCS**	**% of total hectares reserved**
Yellow Box–Blakely's Red Gum Grassy Woodland	21,975	6,490	4,366	30%	**20%**
Drooping She-oak Lowland Woodland to Open Forest	670	478	236	71%	**35%**
Red Box–Tall Grass–Shrub Woodland to Open Forest	1,779	368	270	21%	**15%**
Snow Gum Grassy Woodland	90	21	21	23%	**23%**
Total (woodlands above)	**24,514**	**7,357**	**4,893**	**30%**	**20%**
Natural Temperate Grassland	**1,158**	**871**	**305**	**75%**	**26%**

Areas of conservation value outside reserves are being destroyed

One of the biggest threats to our natural environment in the ACT is the loss of habitat due to urban expansion. The undulating Natural Temperate Grasslands and Yellow Box-Blakely's Red Gum Woodlands that previously existed across this landscape have taken a significant hit as the city's urban form has been extended. Added to this, we are already witnessing the impacts of global climate change – higher temperatures, more extreme rainfall events, storms and

[14] ACT Government, *Canberra Nature Park Reserve Management Plan,* 2021.

bushfires. Now more than ever we need to lift the profile of the environment we live in and rely on for our welfare.

An expanding urban footprint reduces biodiversity, through destruction of habitat, fragmentation, introduction of plant and animal pests and the inability of many native fauna species to survive against predatory or competitive native and introduced fauna or human impacts such as lighting, noise and traffic. Additionally, carbon emissions are increased by the higher private vehicle use resulting from uneconomic or poorly planned public transport infrastructure.

Central to the retention of much of the biodiversity outside the reserve system is the retention of mature native trees, as identified in the Action Plan to Prevent the Loss of Mature Native Trees 2022. Indicative of the loss of habitat, are data on the loss of mature native trees: the majority of mature tree loss in Canberra from 2015 - 2020 occurred at greenfield sites: Coombs (22%), Denman Prospect (12.5%), Throsby (35%), Taylor (31%), Wright (42%) and Whitlam (23%).[15]

To counter the impacts of greenfield development, the 2018 ACT Planning Strategy identifies the objective of ensuring 70% of new housing is within the existing urban footprint. The rate of infill urban development has continued to increase since 2013 and by 2017-18 infill made up 77% of the ACT's urban development. Current greenfield development sites are predicted to be developed by 2031 at which point the city footprint should not be extended and no further greenfield should be pursued. The significant trajectory of loss of grassy woodlands and native grasslands must be curtailed and the remainder conserved.

While supporting the policy of infill rather than greenfield development, significant further pressure on existing conservation areas within the urban footprint is likely as a result of development, disturbance or over-use. To ensure such areas are maintained for their conservation values, these remnants and corridors need to be identified up front and protected.

Urban greenspace will help to build resilience against the impacts of climate change, enhance connectivity across the urban landscape, and deliver quality-of-life benefits to the community. Green space, trees and shrubs offer physical and mental well being benefits for our community. Importantly they also cool the urban environment, slow urban water flows and provide vital refuge for wildlife and pollinators across the urban landscape.

Natural resources outside reserves are not consistently managed for conservation values

In the face of the dual extinction and climate crises, natural remnants are increasingly important, whether or not they happen to fall within a reserve. Natural remnants provide habitat for threatened and rare species, store carbon,[16] increase soil, air, and water quality,[17] support

[15] ACT Government, A*ction Plan to Prevent the Loss of Mature Native Trees* 2022.
[16] Lindenmayer and Vardon, *Ecosystem accounts in box gum grassy woodlands,* 2021.
[17] Smith et al, *The role of ecosystems and their management in regulating climate, and soil, water and air quality,* 2012.

pollination,[18] control diseases,[19] and increase the liveability of the city.[20] Considering this, best practice ecological management needs to be consistently applied to all areas in the ACT with high natural values; not only areas that contain threatened species and communities, but also areas of other communities and species native to the ACT, to prevent them from becoming threatened.

Management applying the adaptive management approach for the retention and restoration of conservation values should - and can - occur both on and off reserve. There are considerable benefits to applying consistent ecological management, as it can link and coordinate efforts by land managers and volunteers, for improved conservation outcomes and more efficient use of resources.

The 2019 Territory Plan identifies that conservation is a secondary or lower objective on land uses other than reservation, meaning conservation values do not need to be managed as a priority other than on reserved land. While conservation management may be coincidentally integrated into the care of these tenures, the outcome is that there is no consistency across the ACT or logistical support for best practice management to be applied to all land of conservation value. Three major impediments to achieving more compatible ecological management across all tenures are:

- Private and Government land managers and on-ground staff may have little experience, knowledge or support to apply ecologically based management;
- Management advice provided for ecological outcomes is inconsistent or non-existent; and/or;
- Management for conservation outcomes is frequently viewed as incompatible with the primary land uses (for example, where less frequent mowing in spring would encourage regeneration of native herbaceous species on a site that is usually mown more frequently for recreational purposes).

As a result, many areas are subject to inappropriate or inconsistent management, leaving them vulnerable to damage, loss or disturbance, as demonstrated in Case Study 1: Kuringa Woodland. A review undertaken by the ACT Commissioner for Sustainability and the Environment in 2009 identified that land management actions in many lowland native grassland sites were not being undertaken and more than 50% of the grasslands were in or approaching critical condition.[21] Even within the reserve system, the Commissioner for Sustainability and the Environment found that a better management framework was required to improve the condition and resilience of nature reserves.[22]

To adequately protect all biodiversity appropriate and consistent management of natural values must be undertaken across all land, regardless of tenure. Arrangements have been established to implement conservation management in some areas without compromising existing land uses. Case Study 2, Hall Cemetery, describes what is being done to retain a population of an endangered orchid within a working cemetery. Kinlyside Nature Reserve in Hall

[18] Vanbergen *Threats to an ecosystem service: pressures on pollinators,* 2013.
[19] Zimmer, *Deforestation is leading to more infectious diseases in humans*, 2019
[20] Jacobs et al. *Livability: Natural environment, 2014*
[21] Cooper, 2009, *Report on ACT Lowland Native Grassland Investigation*, Office of the Commissioner for Sustainability and the Environment.
[22] Cooper, 2011. *Report on Canberra Nature Park (nature reserves)*, recommendations 2, 3.

is managed under a leasehold agreement to achieve conservation outcomes. Other areas are managed similarly with leases over parts of the CNP[23]. Furthermore, opportunities exist through the Planning Review to identify off-reserve conservation land uses that can ensure consistent conservation management is applied across tenure. Existing programs can be used to improve and enhance ecological conditions of areas (the Connecting Nature Connecting People program, for example).

Applied research, trials and monitoring to measure, quantitatively and comparatively, changes in condition of the natural features and populations of both desirable and undesirable species[24] are required to guide 'best practice' management. Considerable data already exists on long-term monitoring programs run including Government initiatives and community monitoring programs including Canberra Ornithologist Group programs, Frogwatch, Waterwatch and Vegwatch. At regular intervals metadata needs to be analysed to identify patterns in condition and information about management treatments.

Biodiversity is impacted by fragmentation and edge effects

Fragmentation has been identified as a key threat to the recovery of the critically endangered Natural Temperate Grassland and Box-Gum Grassy Woodland ecological communities.[25]

Connectivity recognises that biodiversity is more resilient to disturbances and adapts better when it forms part of a continuous landscape.[26] Fragmentation through clearing, cropping, damage and disturbance, urbanisation and establishment of infrastructure results in isolation of patches of native vegetation. Modified landscape surrounding these patches act as impediments to species movements, reduce available habitat, enhance the spread of pest plants and animals and modify the climate. Fragmentation also leads to increased edge effects, augmenting exotic plant and animal infestations, noise and light pollution, and increasing bushfire risk. To mitigate these issues, remnants outside the reserve system can form important links that support corridors for biodiversity to move across the landscape and/or increase the areas already within the reserve system. For example, mature native trees that occur as scattered elements within the urban area, and in higher densities along roadsides and within the rural fabric, as well as within currently conserved areas, provide a significant support base for connectivity. In many cases important biodiversity corridors are degraded or not managed to retain or enhance ecological values. Inherent within this, therefore, is that ecological management of these areas is required to better support biodiversity values.

---

[23] ACT Government, *Canberra Nature Park Reserve Management Plan,* 2021.
[24] Sharp, V*egwatch Monitoring Program: Practice and Findings 2011 to 2018*: *Report to the Molonglo Catchment Group*, 2020.
[25] ACT Government, *ACT Native Grassland Conservation Strategy and Action Plans 2017;* ACT Government, *Canberra Nature Park Reserve Management Plan,* 2021.
[26] Smith, Smith, *Urban edge effects in the Blue Mountains, New South Wales: implications for design of buffers to protect significant habitats*, 2010.

Part 2: A model for a Biodiversity Network in the ACT

Protection through an IUCN lens

The purpose of the Biodiversity Network is to formalise management for biodiversity outcomes on multiple types of public and leased land, through a combination of protection, restoration and reconnection compatible with other land management objectives, applying the principles of the International Union for the Conservation of Nature's (IUCN's) Protected Area Network. Any area in the ACT with high quality natural values – whether unleashed or leased – should be designated as part of the Biodiversity Network. The focus should be on a) identifying and protecting biodiversity, and then b) consideration of options for development of areas that do not compromise the biodiversity elements.

Protected areas are the principal mechanism for biodiversity conservation on Earth and serve as the most important units for in-situ conservation internationally. Protected area categories identified by the IUCN are applied to regions or zones of land or sea which are given certain levels of protection for conservation of biodiversity and socio-environmental values. In these areas a hierarchy of human intervention (other than conservation-based management) and exploitation of resources is defined.

Reserves within CNP and other areas are mainly identified as IUCN Category IV: Habitat/ species management area with a primary management objective to maintain, conserve and restore species and habitats.[27] Tidbinbilla and parts of Namadgi National Park are designated as an IUCN Category II reserve. Other parts of Namadgi National Park are designated as IUCN Categories Ib and IV.[28]

In 2019 the IUCN defined a new category, 'other effective area-based conservation measures' (OECMs). The relevance of this category to a Biodiversity Network in the ACT is as follows: "OECMs may be managed for many different objectives but they must deliver effective conservation. They may be managed with conservation as a primary or secondary objective or long-term conservation may simply be the ancillary result of management activities".[29]

Other jurisdictions in Australia and internationally have applied IUCN categories to protect areas outside reserves. This allows and promotes best practice conservation management and protection of all significant natural resources while maintaining compatible land uses.

A Biodiversity Network would provide a layer of protection that falls across a jurisdiction for the purpose of protecting natural values, consistent with the IUCN category OECM that identifies conservation as the primary objective, has proper regard to natural and cultural values and provides for additional uses.

---

[27] ACT Government, *Canberra Nature Park Reserve Management Plan*, 2021.
[28] ACT Government, *Nature Conservation (Reserves—IUCN Categories) Assignment,* 2021
[29] IUCN, *Recognising and reporting on other area-based effective conservation measures. Protected Area Technical Report Series No. 3*, 2019.

The key outcomes of putting a Biodiversity Network in place across areas of moderate-high conservation value or areas important for connectivity, whilst retaining compatible land uses, are:

A. Protection in perpetuity of key biodiversity areas linked across the landscape;
B. Implementation of consistent and best practice ecological management;
C. Conserving important ecosystems, habitats and wildlife corridors;
D. Supporting the recovery of threatened species;
E. Maintaining ecosystem functions and securing ecosystem services;
F. Enhancing resilience against threats; and
G. Retaining and connecting remnants of fragmented ecosystems within developed landscapes.[30]

The implementation of a Biodiversity Network provides the opportunity to identify Conservation Areas (OECMs) outside the reserve system, and together with existing and future nature reserves, manage them as a landscape mosaic, rather than as isolated remnants of different ecological communities, receiving inconsistent protection and management.

A Biodiversity Network should contain assessment criteria relevant to retention of conservation values that are appropriate for multiple land uses. These criteria would give clarity to regulative legislation by mandating the requirement for upholding protection and maintenance of these areas from destructive and degrading land-use change and exploitation. The criteria would facilitate the implementation of Action Plans for threatened species and ecological communities across all tenures.

The Biodiversity Network delivers on the ACT Government's recognition of the importance of providing "a healthy natural environment" that includes benefits to biodiversity directly, and also the considerable benefits to human living conditions.[31]

[30] Smith, Smith, *Urban edge effects in the Blue Mountains, New South Wales: implications for design of buffers to protect significant habitats*, 2010.
[31] ACT Government, *Canberra Nature Park Reserve Management Plan,* 2021.

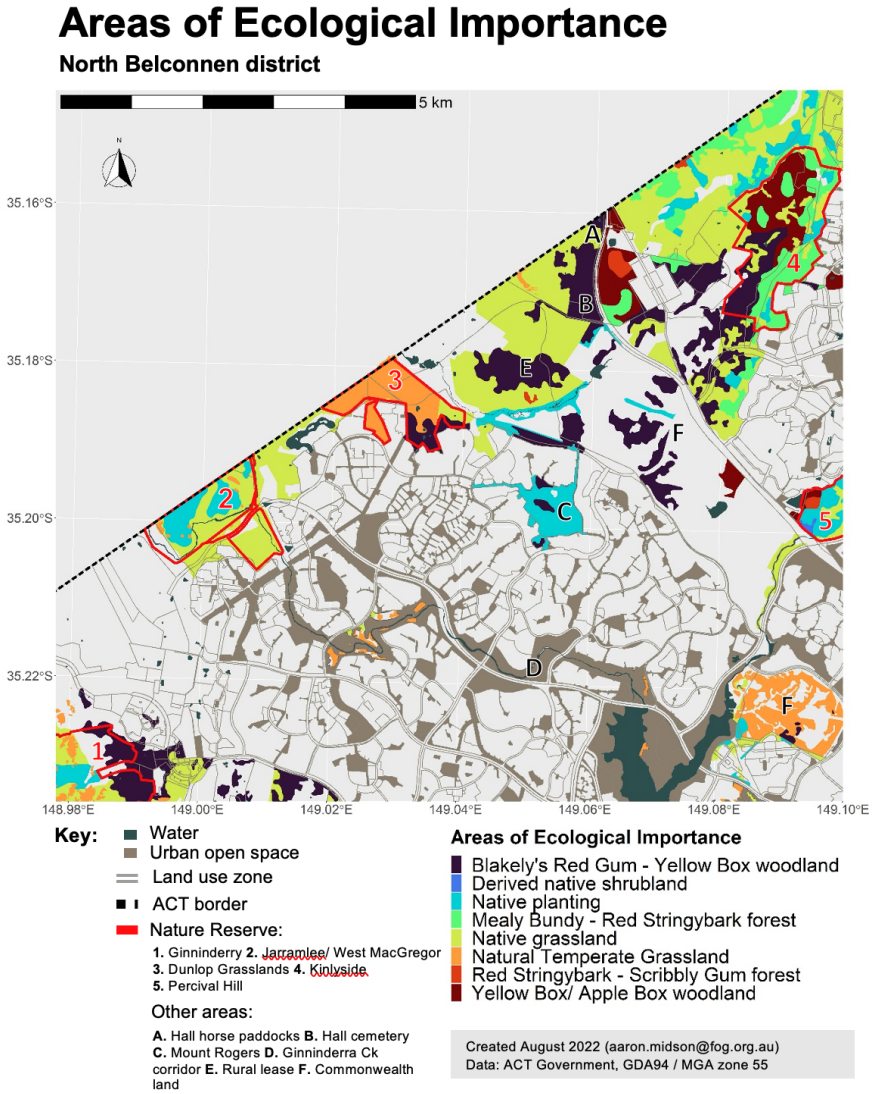
Implementation

It is proposed a stakeholder group be established to help guide and support the implementation of the Biodiversity Network. Stakeholders should include ACT Government agency representatives, Commonwealth agencies, research organisations, First Nations representatives, rural lessees, and community group representatives.

The stakeholder group would assist with defining the principles and criteria for implementing the Biodiversity Network. Some matters for consideration are outlined below.

Identify Conservation Areas

A variety of options for applying Conservation Areas may be considered, depending on the particular land use and condition of areas. A map of the northwestern edge of the Belconnen district demonstrates existing links across the landscape and provides the basis for the creation of Conservation Areas across multiple land uses (See map below).



Conservation Areas can be identified using the considerable survey data and mapping that already exists, using, for example, The ACT Government's "ACT Habitat and Connectivity Map".[32] Additional small remnants exist that may not be mapped; considerable knowledge about many of these lies within the local community.

In many sites existing land uses may remain, and be utilised for purposes such as production, recreation or fire access, as long as they do not compromise biodiversity values. Opportunities should be given to regenerate degraded areas to improve conservation values outside existing remnants, focussing on areas that improve connectivity across the landscape. Conservation Areas should be accessible on public maps for example through the use of interactive interfaces such as QR codes.

A proposed framework is outlined below.

A. Unleased land, including public land

1. Create new nature reserves: possible examples include Mt Rogers, currently urban open space, and Mugga Mugga Grassland, managed by ACT Historical Places.
2. Incorporate remnants into existing adjacent nature reserves: an example includes the Grassland within Glenloch Interchange which could be incorporated into Aranda Bushland Nature Reserve.
3. Create Conservation Areas:
    a. Existing remnants with biodiversity values, such as native woodland or grassland habitat. These typically occur within Urban Open Space (UOS) land use zones. The Conservation Areas may include all of an existing UOS area, or only part. Examples include the native grassland already identified within Bass Gardens in Griffith, remnants of grassy woodland and grassland within Umbagong Park in Florey and several horse paddocks and travelling stock reserves, such as those adjacent to Hall village.
    b. Small and isolated remnants to improve connectivity. Examples include Tennant Street Grassland in Fyshwick and groups of trees with or without native ground flora in open space between houses.
    c. Gaps in connectivity between remnants should be identified and corridors established. Existing corridors linking remnants with a variety of vegetation that enhance movement of fauna and opportunities for plant pollination include roadsides, waterways or walkways within suburbs. Examples include walkways between Mt Rogers and small woodland remnants, or larger remnants within urban open space such as the Ginninderra Creek corridor through Belconnen (see map above), and threatened woodland and other native vegetation along Tidbinbilla Road easement.

In all cases, conservation values and condition could be improved by the reintroduction of native biota and habitat features.

B. Leased urban and rural land

Application of a Biodiversity Network on leased land requires the collaboration of lessees and the ACT Government, recognising that lessees already have legal agreements for use of land. On rural leases, Land Management Agreements were established to promote appropriate

[32] ACT Government, yet to be published.

sustainable agricultural management practices. There is a risk that some lessees may view restrictions to their use of areas as an economic impediment. No such arrangement exists for leased urban land, and little if any assistance is provided to urban lessees to look after the natural values. Such sites range from small remnants of grassland at St Marks in Barton to large areas of land such as at the University of Canberra.

Voluntary agreements acknowledge the role of rural and urban lessees in protecting biodiversity. In other jurisdictions in Australia voluntary covenants provide a means to apply conservation restrictions via a mutual agreement between Government and private landholders. Collaborative conservation agreements between lessees and government in the ACT may be a mechanism to provide protection and appropriate management on both rural and urban leased land, similar to that applied in NSW under the covenant system.

A collaborative agreement should include provisions of financial and logistic support to facilitate implementation of conservation management, while enabling other land uses to continue.

Protect remnants through appropriate legislation

Remnants identified as part of a Biodiversity Network should be designated through legislation as Conservation Areas, utilising the Nature Conservation Act and the Territory Plan. The current reviews of the Planning Bill, the District Strategies and the Territory Plan provide the opportunity for incorporation of an additional zone or 'Conservation Area' alongside the existing categories, Pb (National Park) and Pc (Nature Reserve) or a change in definition to the category, Pd (Special Purpose Reserve), to include Conservation Areas.

Legislative changes need to be effective in providing long-term protection, and to ensure there are no inconsistencies between the requirements of Conservation Areas, and the requirements of other planning controls.

The key element to achieve this is a clearly established set of principles and criteria for assessing areas to potentially be included in the Biodiversity Network.

Develop and implement best practice management for ecological outcomes

Management of the Conservation Areas within the Biodiversity Network should be resourced adequately so that it can achieve long-term conservation outcomes. Opportunities should be taken to enhance biodiversity through existing conservation and regeneration programs. ACT Government directorates or agencies that have ecological knowledge to apply best practice management should engage in knowledge sharing with all areas of Government and provide assistance to lessees.

Actions identified in the Canberra Nature Park Reserve Management Plan provide a template that can be applied to Conservation Areas as appropriate. These include:[33]

- The development of site-based implementation plans and on-ground works plans;
- The implementation of monitoring to measure outcomes;

[33] ACT Government, *Canberra Nature Park Reserve Management Plan*, 2021.

- Resource allocation to achieve these identified actions

Priority should be given to fund on-ground works (government funding and NRM grants) that achieve the conservation outcomes identified in the plans. These plans should be developed as a cooperative process with all stakeholders, including relevant community representatives such as ParkCare groups.

Recently implemented programs including Connecting Nature Connecting People provide opportunities to strategically implement management and improve condition of individual remnants within the ecological landscape.

Appoint a liaison and support team

A liaison team should be appointed to aid in the coordination of the Biodiversity Network and to promote knowledge sharing. The liaison team should consist of staff with skills in conservation management to work with lessees and all relevant government directorates.

A significant proportion of land containing threatened ecological communities and species also occur on Commonwealth managed lands in the ACT. While the Biodiversity Network cannot be imposed on Commonwealth land, opportunities should be taken by the support team to work with Commonwealth land managers to achieve similar outcomes in areas that contain MNES.

Undertake public awareness

Public education will be important to ensure community and lessees are supportive of the scheme, to ensure there is recognition that multiple land uses can be compatible and that limitations on use of the land will be negligible or compensated. Public education could be achieved through, for example:

- Public signage
- Advertising on buses
- Teacher resources and curriculum linked lesson plans
- Schools, community groups, preschools encouraged and supported to visit natural areas in close proximity
- Information about accessibility to selected Conservation Areas improved
- Nature walk and talk programs

Benefits for biodiversity outcomes

Better protection of all native fauna, flora and ecological communities

A *Biodiversity Network* would enable protection of flora and fauna and communities that, while not designated threatened, may not be well represented in the reserve system or may contain important habitat for particular biodiversity elements. Furthermore, protecting these key areas will assist in ensuring that species and communities do not become threatened.

Improved protection and enhanced ecological management of mature native trees

A *Biodiversity Network* would assist in the protection of remnants and corridors in which mature native trees occur. Many mature trees retain cultural values, including scar trees, ring trees or mark key cultural areas. Isolated trees, while they provide some benefits, when managed as links across the landscape provide important benefits to biodiversity. Mature native trees provide for the landscape in many ways, for example, by:

- Providing nesting habitat and materials.
- Creating “islands” or “stepping stones” across the landscape to facilitate connectivity.
- Contributing to soil conservation and stability, water quality, air quality, nutrient cycling and carbon sequestration.
- Promoting pest management by providing habitat for insectivores such as bats and birds.
- Providing foraging and shelter sites for ground-dwelling animals.
- Supporting heritage and cultural values.
- Supporting numerous and diverse invertebrate populations.
- Contributing to socio-economic wellbeing by improving mental health for residents in cities, providing shade, mitigating ‘heat island effect’, and increasing residential property prices.

Improved connectivity

A *Biodiversity Network* would support the protection of corridors of native vegetation that provide connectivity between remnant patches and reserves. The current studies being undertaken within the Environment, Planning and Sustainable Development Directorate (EPSDD) to identify key areas where native vegetation can provide potential movement corridors for flora and fauna between remnants can play an important role in providing for the *Biodiversity Network* to improve the function and diversity of important remnants.

Implementation of a Biodiversity Network to include conservation corridors (recognising that many potential Conservation Areas already link larger remnants) would ensure such areas continue to provide opportunities for the movement of fauna, including invertebrates, and facilitate pollination of plants as well as physical movement of seed across the landscape. Many of these areas already occur, such as planted or endemic native trees along roadsides or along water bodies or along bike paths. A Biodiversity Network would provide these Conservation

Areas with a level of protection and management to retain or improve biodiversity values, whilst retaining primary land uses.

Other areas contain important assets such as the built wetlands, that provide habitat for a range of species including amphibians, reptiles and birds. These wetlands are an example of how existing areas can be integrated into the Biodiversity Network, without any land use changes. The Murrumbidgee and Molonglo Rivers and associated tributaries are key corridors for movement of fauna, including pollinators. Many older suburbs contain mature trees and shrubs that promote movement of fauna.

Improved ecological function

Vegetated areas cool the region, enhance water retention, and support fauna. Improving the condition of remnants, identifying and managing connectivity corridors for ecological outcomes will enhance ecological function. The urban wetlands provide important functional roles in the retention and cleaning of water entering the creeks and rivers.[34]

Improved climate resilience

Preservation of biodiversity across the landscape provides opportunities for improving climate resilience. A public awareness campaign undertaken as part of the implementation of a Biodiversity Network would provide opportunities for government and community to reduce the built environment's influence on climate change, and inform actions such as planting heat- and drought-resilient species into the ACT and region, reducing hard surfaces and consideration of improved building styles, as well as promoting the planting of appropriate species to enhance habitat as well as mitigate against climate change effects.

Application of consistent best practice adaptive management across all tenures

Opportunities to improve and better coordinate management across land tenure and land use are likely to facilitate:

- more effective plant and animal pest control across the landscape,
- more sustainable grazing practices such as short-phased rotational grazing,
- improved coordination of fire mitigation between lessees and government agencies,
- enhanced climate resilience as best practice is applied more widely,
- improved herbage mass management with outcomes of better bushfire protection,
- improved levels of natural plant regeneration,
- improved habitat connectivity and resilience, and
- potential to reduce costs of management.

Ecosystem knowledge should inform protection, enhancement and management. Areas mapped as needing protection for their conservation values should have specific management plans that address improvement of biodiversity, management of cultural values, managing threats including pest control, incompatible land uses and incorporate strategic (as opposed to reactive) wildfire management.

[34] Somayeh Alikhani et al, *Urban Wetlands: A review on Ecological and Cultural Values*, 2021.

Other benefits

Incorporation of First Nations partnerships and knowledge

Many areas of conservation value contain areas of existing and archaeological cultural importance. A Biodiversity Network that better conserves the landscape can enhance opportunities to incorporate indigenous cultural values, and to improve cultural respect for the land. Opportunities should be undertaken to involve First Nations people in planning and management, to ensure no activities result inadvertently to damage to cultural heritage sites or artifacts and to promote culturally applicable management options.

This approach recognises the cultural obligation to Care for Country, which should be recognised by the entire community.

Incorporation of rural and urban lessee and community partnerships, knowledge and support

Farmers are increasingly supporting regenerative farming practices, conserving their native vegetation, soils and water resources. As has been demonstrated,[35] such practices have multiple benefits, improving productivity, reducing costs of pest control and enhancing biodiversity for functional purposes. Much could be done to provide opportunities for the agricultural sector to contribute knowledge to each other and to the broader community.

Similarly, the community is a significant resource in terms of knowledge, experience and understanding of processes on a fine and broader scale, which should be encouraged. However, as recent studies have shown volunteers undertake a considerable proportion of on-ground conservation work, and although volunteering has inherent values with many positive outcomes for both the people involved and community, there are many instances where volunteers feel undervalued, their efforts are undermined by damage to the sites they work in through lack of consultation or planning, or are burnt out.[36]

Economic savings and opportunities

There are many examples of one land management action creating numerous additional management problems, generally as a result of lack of understanding by the executor, poor planning and lack of consultation. In many cases these actions cause unnecessary site disturbance, and increase the spread of invasive pest plants, thus increasing expenditure required for restitution. Such examples include the spread of weed seed by mowers not taking responsibility for mowing according to existing guidelines, actions undertaken for fire mitigation that destroy habitat or poorly thought out implementation of programs such as planting of trees in and adjacent to natural grasslands, that then have to be removed, wasting resources and leaving behind disturbed ground. Application of programs and management guided by defined criteria will save money and result in best practice outcomes (the consistent application of best practice restoration ‘recipes’, for example).

[35] Massy, C., 2017. *Call of the Reed Warbler. A new agriculture A new earth*. UQP Press, Queensland.
[36] Commissioner for Sustainability and the Environment, *State of The Environment Report*, 2019.

Enhanced human health and wellbeing

Human well-being is linked to the natural environment in myriad ways. A growing body of empirical evidence is revealing the value of nature experience for mental health. A Biodiversity Network would ensure Canberrans have ready access to nature into the future, supporting physical and mental health outcomes and facilitating people's connections with nature and provide opportunities for meaningful stewardship of their local biodiversity.

Proximity to nature is well understood to have wellbeing and mental health benefits for people (see Case Study 4, Kuringa Woodland Landcare). Many in Canberra live in close proximity to green spaces; nature reserves, urban parks and urban greenery across the landscape. However, growing population and increased urban densification, intersecting with a changing climate, will require the prioritisation of nature across the urban landscape, to support emotional and physical wellbeing.

Formally incorporating local biodiversity into urban planning to support the physical and mental health of Canberrans could result in a reduction in costs associated with mental health for both local residents and the Canberran community as whole.

Nature across the city will also support the community as temperatures rise due to global climate change. Exposure to heat is exacerbated in urban environments through the urban heat island effect with serious effects on mental health.

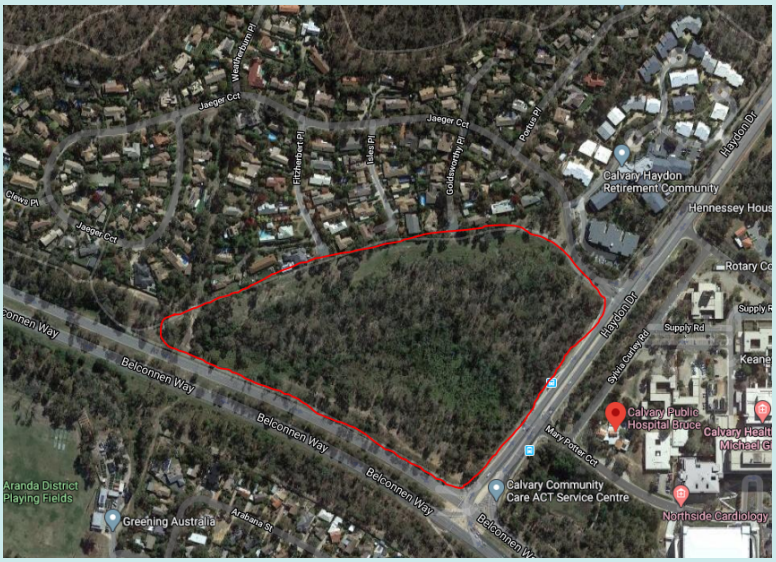
A Biodiversity Network would allow the ACT Government to better meet community expectations in regard to the values they place on the natural environment. Most Canberrans value their proximity to the region's natural areas; many belong to Landcare Groups to support biodiversity. The hours that are contributed by the community through volunteering to improve environmental outcomes is substantial; every year volunteering contributes $1.5 billion to the ACT economy[37]. These hours are not only spent in areas that are currently protected through reserve status, but also include areas outside reserves. Yet community feedback regarding poor management of natural resources outside reserves is not uncommon and can include in many cases damage caused by government employees and contractors, as well as community.

Legislatively enshrining a Biodiversity Network would acknowledge the contribution of Landcare and Park Care groups, and support their work by protecting in perpetuity the areas that they expend considerable effort on. The engagement of community groups is likely to grow if there is a perception that the areas in which they volunteer and recreate are better protected. With a higher level of engagement from the community also comes additional community assistance in citizen science projects as well as community education.

[37] Australian Bureau of Statistics (2015) *General Social Survey: Summary Results, Australia, 2014*, available online at http://www.abs.gov.au/ausstats/abs@.nsf/mf/4159.0.

Part 3: Case studies

Case Study 1: Flea Bog Flat, Belconnen ACT



Flea Bog Flat (Block 4, Section 21 Bruce) is located in the Belconnen Region of the ACT. It is in close proximity to protected areas of Gossan Hill, Bruce Ridge, Aranda Bushlands, and Black Mountain Nature Reserves. Currently it is maintained as urban open space under the Territory Plan. The woodland provides a corridor between Gossan Hill Nature Reserve and Bruce Ridge and also connectivity within Calvary Hospital.

Flea Bog Flat contains areas of Yellow Box–Blakely's Red Gum Grassy Woodland, an endangered ecological community. It also has areas of ephemeral wetland that provide an important water source for local flora and fauna, an increasingly precious feature in the face of climate change. Despite these assets, as the area is urban open space, it is not managed for the protection of these values. This has led to notable environmental degradation in terms of weed infestations.

Much of the burden for maintaining and protecting this area is undertaken by volunteers, however, their capacity is limited. The ecological importance of Flea Bog Flat and its proximity to several nature reserves requires targeted management strategies to maintain and improve woodland and riparian conditions and reduce invasive weed species. In turn, reduction of invasive species will mitigate against further spread into the adjacent reserves. This can be done while maintaining the area as urban open space, provided that conservation is considered as a key objective of the site's ongoing management.

Case Study 2: Hall Cemetery

Hall Cemetery was dedicated in 1883, and the first recorded burial was in 1907. The Cemetery was the first location in which the endangered Tarengo Leek Orchid, *Prasophyllum petilum* was identified. It also contains a remnant Box-Gum Woodland with a Kangaroo Grass dominated understorey, linked to similar woodland in neighbouring rural blocks. New burials are limited to people who hold burial rights to plots in the cemetery, and none are allowed in the areas containing populations of the orchid. The community group Friends of Grasslands helps to maintain the ecological values of the woodland surrounding the cemetery. EPSDD undertakes regular monitoring of the orchid, and the sub-populations are mapped. An ecological management plan guides the protocols of site management and burials (Hall Cemetery - Canberra Memorial Parks (act.gov.au)).

Mowing is not undertaken in the spring and early summer. Rules have been developed for implementing appropriate management, including plantings on graves are restricted to 'allowable plants list', which are all endemic understorey species; dogs must be kept on leash; tradespersons must register their location prior to work. Items that do not comply with the regulations, or which are considered hazardous may be removed without notice.

Case Study 3: Bluetts Block-Piney Ridge

The area commonly known as "Bluetts Block-Piney Ridge" (extending across Stromlo Block 402/403 and Denman Prospect Block 12, Section 1) is home to over 100 different species of plants and supports over 130 species of birds, including the Black Mountain Leopard Orchid, and vulnerable Superb Parrot, a species facing increasing loss of habitat. The area is likely to support rare marsupial populations of Dunnart and Antechinus.

The area provides important landscape connectivity from the Murrumbidgee River Corridor to Black Mountain. Without connectivity, many animal species cannot find food or shelter, or space to breed, leaving them vulnerable.

Despite this, the site is not protected for its conservation values, and is at risk of the impacts of adjacent development.

Case Study 4. Kuringa Woodland

"You can just about feel your blood pressure drop whenever you go there, people who meet each other there almost always greet each other with a smile and a wave, people who probably wouldn't otherwise interact with each other, especially during the last 2 pandemic years. You feel more like a community member and less like just a local resident thanks to this area. This helps mitigate some of the adverse mental health risks associated with the pandemic. For the locals in the associated Landcare group, it's an opportunity to be involved, to learn about and value the ecology, to make a difference and protect something valuable. It's worth protecting and with good management can be regenerated back towards its original condition, and remain a community and environmental asset indefinitely." *Local Landcare Organiser*

The fire hazard reduction in early 2020 emphasises just how vulnerable the area is to well intentioned but harmful interventions: saplings and seedlings were cleared and consequent wood chip piles were left for months. After removal of the chips the ground layer primarily consisted of herbaceous weeds, including new incursions.

Conclusions

In conclusion, the aims of the Biodiversity Network are to formalise conservation and management of biodiversity outcomes across tenure on multiple types of public and leased land by identifying them as Conservation Areas, through a combination of protection, restoration and reconnection compatible with other land management objectives. A Biodiversity Network would achieve this by:

- Providing legislative protection to Matters of National Environmental Significance (MNES) and ACT threatened species and ecosystems that are not held in reserve;
- Protecting other natural attributes so that they do not become threatened;
- Increasing landscape habitat, biodiversity and connectivity;
- Implementing consistent and best practice ecological management coordinated across land tenures; and
- Better engaging, cooperating with and supporting land managers, community, special interest groups and associated management and research professions.

Opportunities to achieve these aims can be encapsulated within the framework of a National Park City, acknowledging, implementing and celebrating the expansion of the Bush Capital concept into a landscape based protected biodiversity network across all tenures in partnership with government land managers, other land holders, lessees and communities.

About Friends of Grasslands

Friends of Grasslands (FoG) is a community group dedicated to the conservation of natural temperate grassy ecosystems in south-eastern Australia. FoG advocates, educates and advises on matters to do with the conservation of grassy ecosystems, and carries out surveys and other on-ground work. Its members include professional scientists, landowners, land managers and interested members of the public.

About Conservation Council ACT Region

The Conservation Council ACT Region is the peak non-government environment organisation for the Canberra region. Since 1981, we have spoken up for a healthy environment and a sustainable future for our region. We harness the collective energy, expertise and experience of our more than 40 member groups to promote sound policy and action on the environment.

We campaign for a safe climate, to protect biodiversity in our urban and natural areas, to protect and enhance our waterways, reduce waste, and promote sustainable transport and planning for our city. Working in the ACT and region to influence governments and build widespread support within the community and business, we put forward evidence-based solutions and innovative ideas for how we can live sustainably.

At a time when we need to reimagine a better future, we understand that the changes we need will only happen with the collective support of our community.

This paper was prepared in collaboration with members of the Conservation Council's Biodiversity Working Group.

Further information:

Sarah Sharp, Friends of Grasslands, sarah.sharp@fog.org.au

Peta Bulling, Nature and Waterways Campaigner, peta.bulling@conservationcouncil.org.au

Elle Lawless, Executive Director, director@conservationcouncil.org.au