

# National Environmental Science Program (NESP)

Resilient Landscapes Hub annual  
progress report 1 January to  
31 December 2023



## Resilient Landscapes Hub Annual Progress Report 2023


<b>Version</b>	<b>Date of issue</b>	<b>Author</b>	<b>Comments</b>
1	5 April 2024	Michael Douglas	Draft
2	5 April 2024	Michael Douglas	Final

# Certification of annual progress report

## Hub Leader certification

As Hub Leader, I certify that I have taken adequate steps to reasonably assure that:


- each required report component is attached
- the contents of each component of the report are complete and accurate in all material respects
- funds have been used for the purpose for which they were provided and all funding conditions have been met, Recipient and Other Contributions have been received, and appropriate oversight has been maintained of hub projects, their progress, performance and budgets during the reporting period
- all relevant risks to project delivery have been notified to the Department of Climate Change, Energy, the Environment and Water (the department) in this and previous reports and that appropriate steps are being taken to manage those risks
- the hub and its sub-contractors have current workers compensation and public liability insurances, as required under the Funding Agreement
- any carryover of project funds has been allocated as required under the Funding Agreement, to projects or hub Activities in the next reporting period/research plan.

Signature   
Name: Professor Michael Douglas  
Position: Hub Leader  
Date: 5 April 2024

## Hub Steering Committee Chair certification

As Steering Committee Chair, I certify that any issues of concern or matters raised during hub steering committee meetings where the draft progress report was discussed have been adequately resolved, amended or incorporated into the final report submitted to the department.

This annual progress report was endorsed by the hub steering committee on 4 April 2024.

Signature   
Name: Ian Cresswell  
Position: Hub Steering Committee Chair  
Date: 5 April 2024

# Contents

<b>Certification of annual progress report</b> .....	<b>i</b>
Hub Leader certification .....	i
Hub Steering Committee Chair certification .....	i
<b>Acknowledgement of Country</b> .....	<b>1</b>
<b>Letter from the Hub Leader(s)</b> .....	<b>1</b>
<b>Management</b> .....	<b>4</b>
<b>Research</b> .....	<b>6</b>
Progress towards research delivery .....	7
Research projects .....	14
Cross-cutting initiatives .....	14
Emerging priorities .....	17
<b>Performance against milestones</b> .....	<b>17</b>
Performance against funding agreement milestones .....	17
Performance against the research plan milestones .....	17
<b>Measuring success</b> .....	<b>17</b>
Hub outcomes and outputs.....	17
NESP impact stories .....	23
<b>Collaboration and partnerships</b> .....	<b>23</b>
Meetings and Engagement.....	23
Governance .....	23
Department .....	24
States and territories .....	24
Hub research providers and research users .....	24
Knowledge brokering .....	24
Communication .....	25
Website and social media statistics for 2023 .....	26
Indigenous partnerships .....	27
Data management .....	28
<b>Hub-level risk management</b> .....	<b>28</b>
<b>Financial information</b> .....	<b>29</b>
Annual financial reporting .....	29
<b>Attachments</b> .....	<b>29</b>

# Acknowledgement of Country

We acknowledge the Traditional Owners of Country throughout Australia and their continuing connection to and stewardship of land, sea and community.

We pay our respects to them and their cultures and to their Ancestors, Elders and future leaders.

Our Indigenous research partnerships are a valued and respected component of National Environmental Science Program research.

## Letter from the Hub Leader(s)

I am pleased to present the *2023 Annual progress report* for the Resilient Landscapes Hub of the Australian Government's National Environmental Science Program (NESP).

Resilient landscapes are those able to recover from disturbance, whether that is fire, flood, drought, invasive and feral species, clearing or climate change. The Resilient Landscapes Hub has a unique opportunity to make a positive impact on the management of Australian terrestrial and freshwater ecosystems and improve their resilience. The hub has worked closely with policy-makers and decision-makers within the Department of Climate Change, Energy, the Environment and Water (the department) to ascertain their research needs and subsequently co-develop projects to meet those needs. Given recent developments of policy initiatives such as the [Threatened species action plan 2022–2032](#), it is critical that the hub is collaborating with department staff to design user-driven research to inform policy and practice.

In addition to the department, we have reached out to other research users including Natural Resource Management (NRM) Regions Australia, National Landcare Network (NLN), Australian Land Conservation Alliance (ALCA), Indigenous land managers, and state and territory governments. These consultations will continue into 2024 as we finalise our research portfolio around aligning shared priorities.

We have close working relationships with the other 3 NESP hubs (Climate Systems Hub, Marine and Coastal Hub, Sustainable Communities and Waste Hub) and meet with their hub leaders regularly. We recognise the importance of the cross-cutting initiatives and how they intersect with the initiative hosted by our hub – the 'Threatened and migratory species and threatened ecological communities' initiative. For example, many of these species and communities may be affected by climate change and many occur in marine and coastal ecosystems and protected places, so they are relevant to the work of the other hubs.

Our Hub Steering Committee (HSC) met 4 times during 2023, supported by the Research Executive Committee (REC) that provides project development and management guidance. We also extended our partnership agreements with our research-provider partners from 11 to 15 organisations.

Our hub [website](#) contains information on all the people involved with the hub, our projects and updates on news from the hub. The hub's social media channels are engaging with research users and the broader community. Our website also provides an overview of research activity from Research Plan 2023 (RP2023 tranche 1 and 2)).

The first step in our co-design process is to consult with research users to identify priority knowledge gaps and research needs. A comprehensive co-design process is essential to ensure our applied research meets the needs of, and hence will have the highest impact for, our research users. Given

the large number of research projects to be developed in 2023 (i.e. 22 research projects in total), we split the development and approvals of research plans into two tranches to allow adequate time for co-design with research users and for project proposals to receive considered and rich feedback from our governance committees (i.e. Hub Steering Committee, Research Executive Committee, and Indigenous Advisory Panel). Tranche 1 research projects were approved on 21 December 2022, and tranche 2 projects were approved on 3 October 2023. Hence, only the tranche 1 projects for 2023 are reported in this Annual Progress Report. RP2023 (tranche 2) and RP2024 are focused on high-priority projects that meet the needs of the department and other stakeholders with aligned priorities. Consultation meetings with research users continued through 2023, and we are currently finalising projects for RP2024 which will be completed within one tranche (i.e. 11 research projects for 2024),

RP2023 includes research projects to support major new investments by the department. For example, one research project will develop tools for the management of grassy weeds which will complement and support the Australian Government's \$10 million commitment for the management of gamba grass in the NT. The government also made a \$200 million commitment to the Urban Rivers and Catchments Program, which our hub will support through a project on urban river restoration. This is one of 4 projects in RP2023 focused on the conservation of freshwater biodiversity, including prioritising and evaluating management actions for threatened fish species in Victoria, Queensland and Western Australia.

Further ensuring that Indigenous knowledge and ways of working are incorporated into every stage of our research, the hub celebrated the inaugural meeting of our Indigenous Advisory Panel in 2023. The panel of Indigenous advisors from across Australia has an enormous wealth and diversity of knowledge. Alongside the Hub Steering Committee, the Indigenous Advisory Panel is an integral part of the hub's research development, approvals, implementation and evaluation processes.

Recognising the government's commitment to doubling the Indigenous ranger program, RP2023 included the development of a platform that will support Indigenous rangers to monitor and manage Country as well as an expansion of our research partnership with the Indigenous Desert Alliance (IDA) focused on threatened species in desert landscapes. RP2023 also includes 2 projects aimed at supporting Australia's recent commitments to the goal of protecting 30% of our land and oceans by 2030, with research on identifying important areas for protection and as well as improved methods for monitoring and managing the resilience of existing protected areas.

Our current research project activities include:

- [Solutions science for resilient landscapes](#)
- [Strengthening resilience to threatening processes and extreme events](#)
- [Restoring and recovering landscape resilience](#)
- [Socioeconomic insights for resilient landscapes](#)
- [Monitoring resilient landscapes](#)
- [Indigenous knowledge and managing the Indigenous estate](#)
- [Cross-cutting initiative research](#)
- [Addressing Kakadu's strategic research needs](#)
- [Best-practice management for feral cats and red foxes](#)
- [National overview of monitoring frameworks and tools for Ramsar sites](#)
- [Protecting threatened species in safe havens](#)
- [Queensland threatened lizard survey](#)
- [Using integrated data analysis to assess regional transferability](#)
- [Water planning in north Queensland](#)
- [Supporting the strategic management of invasive grasses](#)

- [Planning for catchment resilience and threatened-species recovery from extreme events in Queensland's Moonaboola \(Mary River\)](#)
- [Enhancing the resilience of urban rivers: informing the regional restoration of the Djarlgaroo Beeliar \(Canning River, Perth\)](#)
- [Guiding the strategic management of freshwater fish](#)
- [Ecological and Indigenous values of south-western Australian rivers](#)
- [Developing an Indigenous monitoring platform](#)
- [Research to support the management of priority desert threatened species](#)
- [Methods for mapping areas important for biodiversity](#)
- [Managing and monitoring resilience in Australia's national parks](#)
- [Developing an Indigenous ranger monitoring platform](#)
- [Trialling detection dogs as a novel method for finding threatened reptiles](#)
- [Assessing the impacts of myrtle rust on forest dynamics and function](#)
- [Informing management of feral cats and foxes in priority areas](#)
- [Best-practice fox control in Booderee National Park](#)
- [Supporting Indigenous fire management through collaborative socio-ecological partnerships \(Bunya Mountains, Queensland\)](#)
- [Experimental translocations to understand and combat declines of eastern quolls](#)
- [Developing a national Indigenous environmental research network \(NIERN\)](#)
- [Recognising culturally significant entities](#)
- [Improving environmental outcomes on conserved and managed lands](#)
- [Enhancing climate-adaptation responses in regional natural resource management planning by incorporating resilience investment](#)
- [Climate-resilient landscapes: an adaptation case study in NSW's Northern Rivers region](#)
- [Ecology and conservation of the Christmas Island giant gecko](#)
- [Ecology and conservation of the Christmas Island goshawk and hawk-owl](#)
- [Rewilding Norfolk: closing management knowledge gaps for faunal restoration on islands.](#)

Hub projects are already delivering. We brought together feral cat experts from across Australia who assessed the effectiveness of 10 cat management techniques across a range of ecoregions. This valuable information has been used to develop an integrated management decision tool for feral cat control.

More than two decades of research into the invasive weed gamba grass has been synthesised and showcased in a new website. Research through the Australian Government's National Environmental Science Program (NESP) has helped land managers better understand the scale of the gamba grass problem, the serious threat it poses to biodiversity and how research can support successful gamba grass management approaches.

2024 will be a year of significant research project activity, as well as the most significant final phase of research planning, with RP2025 priorities being considered by the REC, IAP and HSC in April 2024 and submission of Research Plan 2025 in September. The hub's projects from previous research plans have continued to deliver research outcomes and have ongoing impacts on environmental management. With this new round of projects and new team members, we can expect even bigger things to come for hub research in supporting the resilience of our natural landscapes and biodiversity.

I am pleased to provide this *2023 Annual progress report* for the Resilient Landscapes Hub.

# Management

The National Environmental Science Program (NESP) is a long-term commitment by the Australian Government. The program funds environmental and climate research. The second phase of NESP (NESP2) builds on the foundations of past work, and funds 4 research hubs from 2020–21 to 2026-27.

The Hub Leader, Michael Douglas, is based at the host institution, The University of Western Australia (UWA). The Deputy Hub Leader and Senior Indigenous Facilitator, Stephen van Leeuwen, is based at Curtin University (Curtin). The Cross-cutting Initiative Leader, Helene Marsh, is based at James Cook University (JCU).

Our Hub Steering Committee (HSC) was established in 2021 and is led by an independent Chairperson. In addition to members from the department, the HSC includes a representative from the Cross-Jurisdictional Chief Environmental Scientists (scientists from state and territory governments), as well as representatives from three key research users with a national membership (NRM Regions Australia, NLN and ALCA). The terms of reference for the HSC include:

- providing strategic direction for the activities and research conducted by the hub
- ensuring the alignment of activities and research to the interests and needs of the hub's research users
- connecting the hub's research questions, activities and outputs to relevant policy, planning and action relevant to the hub and research users
- reviewing and endorsing research plans prior to approval by the department
- reviewing and endorsing progress and financial reports prior to approval by the department
- making recommendations for addressing project-level issues, supported by user-satisfaction reporting and related key performance indicators.

Membership of the HSC is currently: Ian Cresswell (Chair), Michael Douglas (Hub Leader; UWA), Stephen van Leeuwen (Deputy Hub Leader and Senior Indigenous Facilitator; Curtin), Kate Andrews (NRM Regions Australia), Margaret Byrne (Western Australian Department of Biodiversity, Conservation and Attractions), Kerry Olsson (NLN, as a proxy for Jim Adams), Jody Gunn (ALCA), and from the department: Lisa Nitschke (Environmental Science and Nature Based Solutions Branch), Ilse Kiessling (Protected Species and Ecological Communities Branch), Fiona Fraser (Office of the Threatened Species Commissioner) and Rebecca Pirzl (Parks Australia). Helene Marsh (Cross-cutting Initiative Leader) is an observer on the committee.

The HSC met on 4 occasions during 2023 and endorsed the *2022 Annual progress report*, RP2023 (tranche 2) and RP2024. With the support of the Australian Government and the HSC, we have continued to support 4 key strategies that provide critical program guidance:

- *Indigenous partnerships strategy*
- *Communication strategy*
- *Knowledge brokering strategy*
- *Data management strategy*

In 2023, the Research Executive Committee (REC) continued its important role with the following terms of reference:

- lead and manage the research program
- monitor and review research project design and delivery
- provide advice and report to the HSC on program progress, financial management and strategic direction of the program



- facilitate collaborative arrangements among consortium members by agreeing on a set of partner operating principles
- ensure that if scientists leave the hub, arrangements are put in place so that the meeting of milestones and delivery of project outputs are not compromised
- support preparation of an annual report and progress reports to funders and program partners
- monitor the implementation of the hub's strategies (knowledge brokering, communication, Indigenous partnerships and data management)
- represent, coordinate and communicate on behalf of consortium members' interests.

Membership of the REC includes Michael Douglas (Chair), Libby Pinkard (CSIRO), Jennifer Firm (Queensland University of Technology [QUT]), Diane Jarvis (Northern Node host – JCU), Helene Marsh (JCU), Guy Ballard (University of New England [UNE]), Vanessa Adams (Southern Node host – University of Tasmania [UTas]), Samantha Setterfield (Western Node host – UWA), Stephen van Leeuwen (Curtin) and Mark Kennard (Eastern Node host – Griffith University [GU]).

The REC met regularly throughout the year, normally on a fortnightly basis.

In 2023, the [Indigenous Advisory Panel \(IAP\) was formed](#) and had its inaugural meeting on 14 September 2023. The panel has been established to ensure that an Indigenous perspective is applied throughout the hub's research development, approvals, implementation and evaluation processes. The IAP established its important role with the following terms of reference:

- Supporting the development and oversight of the Hub's Indigenous Partnerships Strategy.
- Providing advice and guidance on the development and design of new projects.
- Identifying opportunities within the scope of existing projects to promote Indigenous participation inclusion and collaboration.
- Supporting the development of an Indigenous Partnerships Handbook.
- Revising and amending the Indigenous Partnerships Strategy as required.
- Assisting with reporting against targets set out in the Indigenous Partnerships Strategy.

Membership of the IAP includes Stephen van Leeuwen (Chair, Deputy Hub Leader Resilient Landscapes Hub), Niboddhri Ward (Department of Climate Change, Energy, the Environment and Water), Scott Allen (Jaithmathang Traditional Ancestral Bloodline Original Owners First Nation Aboriginal Corporation), Phil Duncan (Centre for Applied Water Science), Marlee Hutton (Kimberley Land Council), and Lani Barnes (Commonwealth Environmental Water Office).

The Indigenous Advisory Panel met in September and October 2023 and is scheduled to meet throughout 2024 commencing in April.

We finalised agreements with our partners comprising the REC membership in 2021 and 2022, closely following the format of the Head Agreement established between the department and UWA. These agreements included JCU (including funding for the Cross-cutting Initiative Leader), GU, CSIRO, UTas, Curtin (including funding for the Senior Indigenous Facilitator), UNE, QUT, University of Newcastle, Indigenous Desert Alliance and Charles Darwin University. We have since finalised partnership Agreements with a further 5 research providers (Flinders Uni, Latrobe Uni, Uni of Qld, Uni of Southern Qld, Western Sydney Uni) bringing the total number of research partners to fifteen.

We have completed recruitment action that has built our administration, communication, data wrangling and knowledge brokering teams.

# Research

NESP hubs deliver world-class, practical, evidence-based research to inform decisions. This investment helps build adaptation capacity and resilience in our natural environment and communities.

NESP research has real impact through partnerships and collaboration between researchers and research-users, including policymakers, to deliver proven outcomes. Environmental decision-makers are key partners and are encouraged to articulate their needs to researchers; provide feedback on the quality and usefulness of the research outputs; and be engaged in the communication of how this information has informed policy.

NESP research listens to and prioritises the research needs of Indigenous land and sea managers, weaves together Indigenous and western environmental knowledge systems and celebrates Indigenous-led approaches to strengthening and sharing knowledge.

New and existing NESP research findings are available to use and accessible at Australian Government and hub websites.

The Resilient Landscapes Hub is delivering a body of research that includes short-term and long-term projects. Broadly, the research priorities of the Resilient Landscapes Hub are:

- applied research to support the management of Australia's terrestrial and freshwater habitats, including a focus on bushfire recovery, impacts of feral animals and invasive species, and accessible science to assist land managers to create and maintain resilient, sustainable and productive landscapes
- targeted biodiversity and taxonomy products to support efficient system monitoring
- environmental monitoring systems and decision-support tools
- cross-hub coordination for the cross-cutting 'Threatened and migratory species and threatened ecological communities' initiative to support policy development, program management and regulatory processes to protect Australia's environmental assets in terrestrial, Ramsar and marine environments.

Our current key research themes include:

1. [Solutions science for resilient landscapes](#)
  - research approach and planning
  - building capacity for 'solutions science'
  - evaluation and learning
2. [Strengthening resilience to threatening processes and extreme events](#)
  - environmental weeds and diseases
  - invasive animals
  - bushfire management
  - wetlands and water management
3. [Restoring and recovering landscape resilience](#)
  - landscape restoration
  - species recovery
4. [Socioeconomic insights for resilient landscapes](#)
  - evaluating the effectiveness of environmental plans, policies and actions on biodiversity outcomes
  - planning for resilient landscapes
  - implementing plans, policies and actions

5. [Monitoring resilient landscapes](#)
  - the role of new technology in monitoring
  - prioritisation and integration of monitoring activities
  - citizen science and community-based monitoring
  - management of monitoring data
  - monitoring, evaluation and standards frameworks
6. [Indigenous knowledge and managing the Indigenous estate](#)
  - research to support Indigenous Australians and their joint-management partners in managing the Indigenous estate
  - mobilising Indigenous knowledge to better understand, manage and conserve Australia's environments
7. [Cross-cutting initiatives](#)
  - Threatened and migratory species and threatened ecological communities (led by the Resilient Landscapes Hub)
  - Protected place management (led by the Marine and Coastal Hub)
  - Climate adaptation (led by the Climate Systems Hub)
  - Waste impact management (led by the Sustainable Communities and Waste Hub).

## Progress towards research delivery

As outlined in the original Head Agreement established between the department and UWA (signed 21 May 2021), activity outcomes include research that supports:

- management of Australia's terrestrial and freshwater habitats, including a focus on bushfire recovery, feral animals and invasive species impacts
- targeted biodiversity and taxonomy products to support efficient system monitoring
- environmental monitoring systems and decision-support tools.

The activity also includes delivering the cross-cutting initiative research focused on threatened and migratory species and threatened ecological communities. As stated in the Resilient Landscapes Hub research scope, the activity outcomes related to this initiative include:

- delivering tools and advice to support the conservation of habitats important for priority threatened species, threatened ecological communities and migratory species
- updating the national list of threatened ecological communities and species
- improving detection of cryptic, 'difficult' and other data-deficient species
- monitoring and supporting the management of the recovery of species and communities after extreme events.

Our research is designed around a participatory approach that is driven by research users, as outlined in Figure 1 below.

**Resilient Landscapes Hub ‘solutions science’ approach**

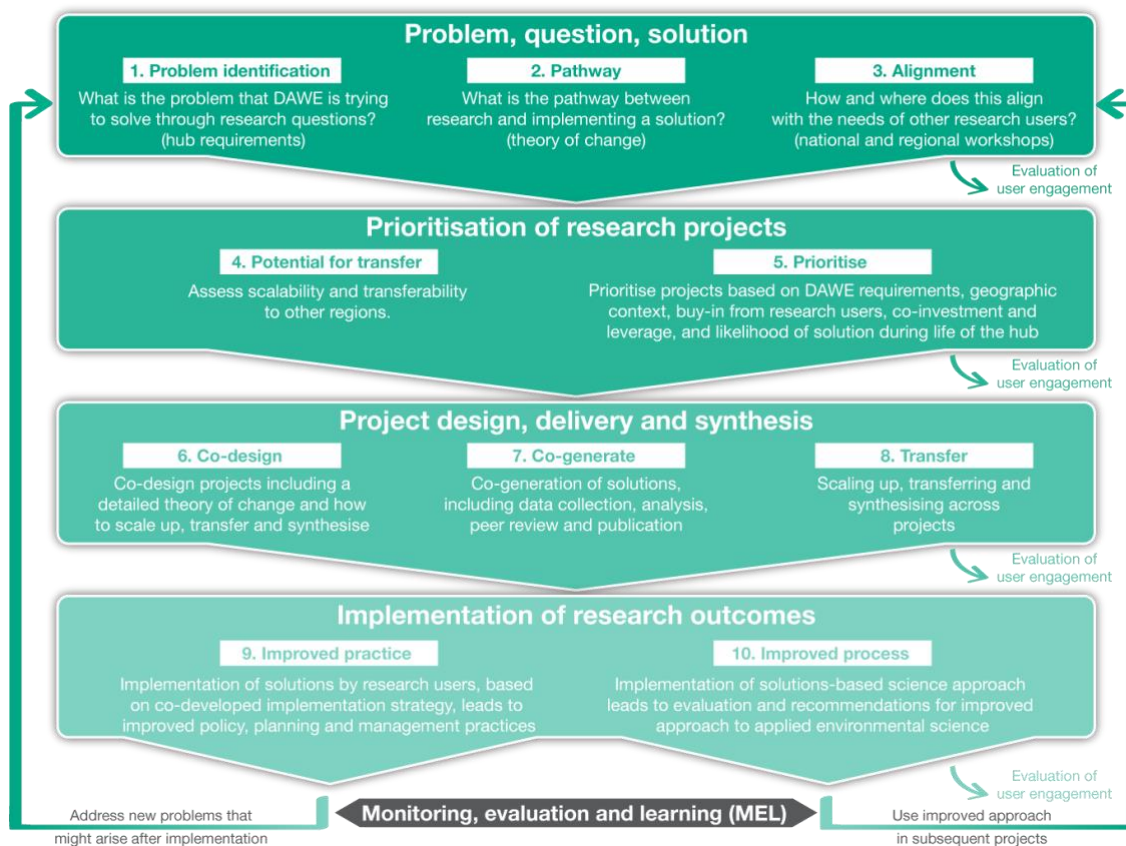


Figure 1. Research design, implementation and evaluation process.

In 2022, we held a range of consultation meetings with department staff and external research users to better identify research needs and priorities. These consultations resulted in the identification of a number of potential areas where research could make a significant contribution to solving key environmental challenges. The outcomes of these workshops were the development of 22 projects that were approved in RP2023 (tranche 1 and 2).

A summary of these projects follows:

Title	Summary
Project 3.1. Supporting the strategic management of invasive grasses.	This project aims to support the strategic management of invasive grasses in northern Australia – in particular, gamba grass, para grass and olive hymenachne – to reduce their impacts on biodiversity. This project will provide support to managers of protected areas and Indigenous ranger groups through co-development of user-friendly mapping, monitoring and decision-support tools. The project will also support more effective threat-abatement programs by identifying methods for prioritising areas for on-ground control and rehabilitation of ecosystems invaded by these weeds.

Title	Summary
<p>Project 3.2. Planning for catchment resilience and threatened species recovery from extreme events in Queensland's Moonaboola (Mary River).</p>	<p>This project aims to identify practical solutions for catchment-scale restoration and threatened-species recovery in south-east Queensland. Recent extreme weather events (causing severe droughts, heat waves, wildfire and floods), habitat degradation and invasive species are posing increasing risks to the resilience and long-term persistence of highly valued and threatened freshwater species and the integrity of critical wetland habitats in the region. The project will focus on the Mary River (Moonaboola) catchment in Queensland – a hotspot of threatened freshwater and riparian species (including the Mary River turtle, Australian lungfish, giant barred frog and water mouse) that flows into the Ramsar-listed Great Sandy Strait, adjacent to the K'gari (Fraser Island) World Heritage area. By working with local natural resource management groups, Traditional Owners, governments and other stakeholders, this project will (i) fill critical knowledge gaps on threatened species distributions and habitat requirements, ecological and cultural values, and threats, (ii) prioritise on-ground restoration actions to benefit multiple threatened species, (iii) undertake targeted implementation trials of habitat-restoration measures for key species, and (iv) design a monitoring program to evaluate restoration success. The project will deliver applied research outcomes to support ecosystem restoration after extreme events and planning for threatened-species recovery at national and state levels. The approaches developed and trialled in this project will be transferable to other catchments and threatened species.</p>
<p>Project 3.3. Enhancing the resilience of urban rivers: informing the regional restoration of the Djarlgaroo Beelie (Canning River, Perth)</p>	<p>Urban rivers sustain biodiversity and provide important amenity and connections to Country but they face complex and accelerating threats. Creating resilient urban rivers that protect biodiversity requires strategic landscape-level prioritisation, targeted on-ground actions based on evaluation of past efforts, and appropriate monitoring of future outcomes. This project seeks to achieve this using the Djarlgaroo Beelie (Canning River, Western Australia) as a case study. It will build on research from the first phase of NESP and work collaboratively with key stakeholders, including Whadjuk Noongar Traditional Owners, to help implement and evaluate the Australian Government's Urban Rivers and Catchments Program.</p>
<p>Project 3.4. Guiding the strategic management of freshwater fish.</p>	<p>This project will develop a strategic approach to identifying cost-effective management actions aimed at protecting freshwater fish biodiversity in rivers and streams across Victoria. We will develop up-to-date information describing (i) current and potential future species distributions and biodiversity patterns across the region, (ii) how those patterns are influenced by historic and emerging threats, and (iii) the costs and relative impact of different combinations of management actions that can mitigate those threats. We will work closely with river managers to develop principles and approaches to assist them in managing freshwater fish, including the protection and restoration of populations of threatened species.</p>
<p>Project 3.5. Ecological and Indigenous values of south-western Australian rivers.</p>	<p>This project aims to support water management that protects ecological and Indigenous values by undertaking targeted research on rivers in south-western Australia. Subject to further consultation, the study will assess the transferability of a hydro-socio-ecological model developed in northern Australia to systems in south-western Australia. The Donnelly River catchment has been identified as a priority system by Western Australian Government water managers and will be the initial focus area for research. Project outcomes will support water-management decisions to protect river flows for aquatic and riparian habitats that support 5 species listed in the Australian <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act). Research will also address priorities identified in the 2020 Samuel review of the EPBC Act and the Productivity Commission's 2020 National Water Reform inquiry, providing a framework for the inclusion of Indigenous knowledge and cultural values in water planning.</p>

Title	Summary
Project 3.6. Methods for identifying areas important for biodiversity.	Protected areas are frequently called the 'cornerstones' of global biodiversity conservation strategies. Covering 17% of land and 8% of sea areas, protected areas are also one of the largest land uses in the world. The Convention on Biological Diversity specifies global goals and targets for conserving biodiversity – in particular, the role of conserved and protected areas. The post-2020 global biodiversity framework is expected to, among other things, commit signatories to protecting 30% of land and sea areas by 2030, with an emphasis on conserving and protecting areas that are important for biodiversity. This project will review the methods available for identifying areas important for biodiversity to guide future national-scale efforts to delineate these areas and prioritise appropriate actions within them.
Project 3.7. Managing and monitoring resilience in Australia's national parks.	Protected areas are essential to address the species-extinction crisis and restore biodiversity and resilient landscapes. The government has committed to protecting 30% of land and sea by 2030. Alongside a more expanded and representative network, it is essential to ensure that the values of existing national parks are maintained. This requires strategic prioritisation of management activities, informed by rigorous monitoring and evaluation, targeted research on critical gaps in our knowledge about species and systems, and development and testing of new technologies and methods for monitoring and management. This project will address urgent questions for the management of Commonwealth national parks (which include World Heritage areas, Ramsar sites and priority places under the Australian Government's <i>Threatened species action plan 2022–2032</i> ) and provide tools and case studies to benefit research users in other places. It has 3 components: (i) developing an integrated monitoring program for desert flora and fauna, (ii) developing acoustic monitoring methods to support species recovery and conservation, and (iii) informing the strategic management direction of an island restoration program.
Project 3.8. Developing an Indigenous ranger monitoring program.	This project aims to provide guidance and support to Indigenous practitioners on the protocols and appropriate technologies to employ to facilitate effective and efficient monitoring and evaluation of on-Country management programs. This will be achieved by: (i) developing an Indigenous-tested toolbox of protocols and technologies appropriate for monitoring which are accompanied by guidance from Indigenous practitioners on how, why, when and where to deploy the tools, (ii) building of and honouring established Indigenous monitoring projects through making them available to new Indigenous practitioners, (iii) validating the veracity of methodologies and technologies employed by and recommended to Indigenous practitioners to ensure they are fit for purpose and culturally appropriate, and (iv) support the development of methods by data managers (e.g. Terrestrial Ecosystem Research Network) for the enduring storage, management and subsequent analyses of monitoring data where Indigenous practitioners maintain sovereignty over their data and how it is used, in keeping with the principles of FPIC (free, prior and informed consent), CARE (collective benefit, authority to control, responsibility, ethics) and FAIR (findability, accessibility, interoperability, reusability).
Project 3.9 Trialling detection dogs as a novel method for finding threatened reptiles.	This project aims to support Zoos Victoria with innovative research in their response to the rediscovery of the cryptic Victorian grassland earless dragon ( <i>Tympanocryptis pinguicolla</i> ) in grasslands west of Melbourne. Detection dogs can detect target odours in tiny concentrations and are an effective and non-invasive way to find this highly cryptic and critically endangered lizard in the wild. Applications of this research include surveys for additional populations, population monitoring, collection of individuals for a conservation breeding program, disease monitoring, ecological knowledge building, and assessment of key fitness indicators such as survival, reproduction and dispersal.
Project 3.10 Assessing the impacts of myrtle rust on forest dynamics and function.	This research project aims to support the strategic management of Australia's World Heritage forests from the impacts of the invasive disease myrtle rust, caused by the fungal pathogen <i>Austropuccinia psidii</i> . Our research efforts will focus on understanding which ecosystem attributes increase the vulnerability of forests to myrtle rust and better understand the consequences of losing certain native tree and shrub species from forests. Understanding forest dynamics and the ecological role that different Myrtaceae species play in different forest types will focus future management and restoration efforts by setting the foundations

Title	Summary
	for a myrtle rust susceptibility model aimed at guiding investment and fortifying biosecurity monitoring protocols.
Project 3.11 Informing management of feral cats and foxes in priority areas.	Land managers from Kangaroo Island (KI) in South Australia and the Fitz-Stirling (FS) region in Western Australia require assistance to improve management of feral cats (both regions) and red foxes (FS only). Both regions have experienced researchers and managers, and collaboration with hub researchers will result in analysis and interpretation of existing data to inform future management. Despite impressive local efforts to understand the ecology of invasive predators in both regions, research users have identified opportunities for hub research to build on existing knowledge to further mitigate the impacts of cats and red foxes on wildlife. Hub researchers will work with local research users to collect new data on target animals and incorporate these into practical recommendations for best-practice management (including monitoring) of feral cats and red foxes in each priority place. This project will engage with and complement other work using KI cat-management data – for example, a project funded by the Australian Research Council and led by Dr Bronwyn Hradsky from the University of Melbourne, and the feral cat management work being undertaken by KI Land for Wildlife.
Project 3.12 Best-practice fox control in Booderee National Park.	Booderee National Park’s land managers want to know how they can reduce the risk posed by red foxes so that key local conservation goals can be achieved. This project will study the ecology of red foxes, particularly their spatio-temporal behaviour, and use the data to engage local stakeholders in fox management and develop tailored management interventions for the park. Improved management and monitoring will underpin successful reintroduction and management of a priority species, the eastern quoll ( <i>Dasyurus viverrinus</i> ), as well as other locally significant species such as southern brown bandicoots and shorebirds.
Project 3.13 Supporting Indigenous fire management through collaborative socio-ecological partnerships.	This project will investigate the ecological and evolutionary outcomes of cultural burning in forests and grasslands in southern Queensland, including Bonye Biar (Bunya Mountains), and examine characteristics of collaborative partnerships that support cultural burning. This project aims to provide scientific support to the Bunya Peoples Aboriginal Corporation (BPAC) and their regional Indigenous fire practitioners’ network in their ‘“Right fire” for Country and resilience through safety-based engagement’ project by (i) documenting species and ecosystem responses to burning, including cultural burning and prescribed burning, and (ii) identifying opportunities to strengthen collaborative partnerships.
Project 3.14 Experimental translocations to understand and combat declines of eastern quolls	The eastern quoll ( <i>Dasyurus viverrinus</i> ) is a nationally endangered marsupial, and one of the Australian Government’s 110 priority species under the Threatened species action plan 2022–2032. This project aims to understand the causes of observed declines of the eastern quoll in Tasmania and develop tools to safeguard this species in their last wild stronghold. Our innovative approach will undertake a series of experimental translocations at an early stage of population decline. This will provide concurrent information on the causes of observed declines while testing the effectiveness of translocations of captive-bred animals as a management tool for the species. It will also develop evidence-based protocols for undertaking captive-bred translocations to improve the outcomes of recovery efforts for the eastern quoll, as well as promoting early intervention for other declining species. This applied knowledge will be widely applicable to the conservation of other threatened species Australia-wide and globally, as it will present data on how to proactively address species decline before populations become critically small and less likely to recover without significant intervention and investment.

Title	Summary
Project 3.15 Developing a national Indigenous environmental research network	The national Indigenous environmental research network (NIERN) is an Indigenous-led strategic initiative to establish an 'entity' that will support Indigenous leadership and participation in biodiversity conservation and environmental management across Australia. Establishment of NIERN will: • support Indigenous environmental research needs and priorities • enhance Indigenous-led decision-making in the environmental research and management sectors • ensure mutually beneficial outcomes from environmental, cultural and socioeconomic research for Indigenous groups and research providers • offer a cultural authority and integrity entity for NESP and other environmental research providers • empower Indigenous Australians to participate in national environmental scientific research, biodiversity conservation and environmental management agendas. This project will develop a pathway to an enduring and transformative entity – NIERN – that will promote Indigenous inclusion and guide the relationship between Indigenous organisations, researchers, policy-makers, and biodiversity conservation and environmental management practitioners. This project will also design, test and validate through an Indigenous participant elicitation process a pilot research priority exchange and make recommendations for mobilising investment to secure the long-term future of NIERN.
Project 3.16 Recognising culturally significant entities	The recognition of species and ecological communities of cultural significance to Indigenous Australians (culturally significant entities [CSEs]) presents a key opportunity to move towards recognising Indigenous knowledge and integrating traditional management practices into land management and conservation policy and practice. However, at present, there is no consistent national definition of a CSE, and CSEs are not considered by policy-makers in the same way that other entities, such as threatened species, are considered. This project aims to highlight the importance of collaborative and Indigenous-led management of CSEs in biodiversity conservation and enable the subsequent empowerment of Indigenous-led decision-making to inform conservation planning.
Project 3.17 Improving environmental outcomes on conserved and managed lands.	The Kunming-Montreal Global Biodiversity Framework (GBF) of the UN Convention on Biological Diversity (CBD) outlines key goals and targets that specifically acknowledge the importance of protecting, conserving and managing land and water effectively. While protected areas are well understood and studied, conserved and managed lands and their role in delivering environmental and social outcomes are not. To this end, 'other effective area-based conservation measures' (OECMs; termed 'conserved areas' in Target 3 of the GBF) will contribute alongside protected areas to meet area-based measures of 30% of land and sea by 2030. Similarly, managed areas which surround and connect protected and conserved areas are essential for meeting the broader goal that the integrity, connectivity and resilience of ecosystems are maintained and enhanced. Protected, conserved and managed areas will necessarily work in tandem to improve landscape-scale habitat quality and connectivity and, ultimately, overall persistence of biodiversity. This project will review private-land conservation programs against the draft Australian OECM framework criteria to indicate the types of programs that are likely to qualify. Based on this review, programs that are near OECM standard but that fall short on key criteria, such as actively managing for biodiversity outcomes, will be considered for place-based research. Within programs, the research will design and deploy interventions to support landholders to manage their land consistent with OECM criteria and track the outcomes of this management over time to demonstrate enduring biodiversity outcomes. The research will demonstrate if the hypothesised benefits to both biodiversity and participants of these programs (e.g. increased nature connectedness) hold true. If our findings are positive, we expect these interventions could be added to private-land conservation programs in other jurisdictions.
Project 3.18 Enhancing climate-adaptation responses in regional natural resource management planning by incorporating resilience investment.	Climate change and, in some cases, our mitigation and adaptation responses pose major risks to Australia's biodiversity and landscapes. Yet it is biodiversity that provides the resilience needed for nature, people and economies to cope, adapt and transform under a changing climate. It is a priority to enhance regional natural resource management (NRM) planning processes and capabilities to consider the risks and opportunities from large uncertain change and build investment cases to fund responses to these. By adapting and enhancing the 'enabling resilience investment' (ERI) approach in a pilot application with an



Title	Summary
	<p>NRM region in Australia, this project aims to build capabilities and coherence in biodiversity-adaptation assessment, planning and investment decision-making, and generate transferable principles and lessons that help scale these across NRM regions.</p>
<p>Project 3.19 Climate-resilient landscapes: an adaptation case study in NSW's Northern Rivers region.</p>	<p>This project aims to develop a climate change adaptation plan for focal threatened species and ecosystems of the Northern Rivers region of New South Wales. The plan will be designed to be embedded in planning and initiatives by local communities and governments. A bottom-up, community-based approach will be taken, working with local Landcare and species-monitoring groups, NSW North Coast Local Land Services (LLS) and Indigenous organisations. Our process will integrate with adaptation and resilience planning being undertaken by relevant local, state and federal government agencies. Many threatened species and several threatened ecological communities occur in the region. Significant wetlands, national parks, World Heritage areas, declared Aboriginal Areas, Indigenous Protected Areas and Indigenous Land Use Agreements are also found here. The region was home to the 'Big Scrub' subtropical rainforest, 75,000 ha of which was intensively cleared for agriculture. Less than 1% of this ecosystem remains. The project will deliver applied research outcomes for stakeholders, including data, information and tools needed to support effective and appropriate adaptation actions for addressing climate-related risks to species and ecosystems in the region. The approaches and tools developed will be transferable to other regions.</p>
<p>Project 3.20 Ecology and conservation of the Christmas Island giant gecko</p>	<p>The Christmas Island giant gecko (<i>Cyrtodactylus sadleiri</i>) is the last remaining native and endemic lizard species found in the wild on Christmas Island. Little is known about its abundance, spatial distribution, habitat use, and interactions with invasive predators (especially wolf snakes) and competitors (especially common house geckos). The results from this study will provide a baseline assessment of the species and a detailed investigation of its ecology and will inform spatial targeting of forest management and other conservation actions.</p>
<p>Project 3.21 Ecology and conservation of the Christmas Island goshawk and hawk-owl</p>	<p>Little is known about the ecology of Christmas Island's 2 endemic apex predators – the Christmas Island hawk-owl (<i>Ninox natalis</i>) and Christmas Island goshawk (<i>Accipiter fasciatus natalis</i>). This poses an important impediment to the sound conservation management of these threatened and ecologically important species. This project will combine field-based and lab-based methods to determine the status, health and critical habitat requirements of these species, and develop robust designs for monitoring population trends. Results will inform the spatial targeting of habitat management on Christmas Island, the management of invasive prey species (i.e. black rats), and direct conservation interventions for the 2 raptors (if needed).</p>
<p>Project 3.22 Rewilding Norfolk: closing management knowledge gaps for faunal restoration on islands.</p>	<p>Island ecosystems around the world have been devastated by introduced species. Norfolk Island is no exception, with multiple species having been driven extinct, including birds such as the white-chested white-eye, Norfolk Island kaka and Tasman starling. Many other species face a similar fate if action is not taken. Rodents are a primary threat to many threatened plants and animals on Norfolk Island, including the Norfolk Island green parrot, a priority species under the Australian Government's Threatened species action plan 2022– 2032. We urgently need to fill critical knowledge gaps on the management of rats to allow us to move toward island restoration ('rewilding') before the ecosystem moves into an alternative stable state. Parks Australia needs to know how current rodent management activities are altering rodent abundance on the island. Results will be used to maximise the chances of local eradication to enable broader faunal restoration to begin.</p>

## Research projects

Attachment A lists the projects funded under the Resilient Landscapes Hub and provides information on the project status, information on outputs and links to products for all projects (where available). Exceptions to the *NESP data and information guidelines* are also noted there.

## Cross-cutting initiatives

The Resilient Landscapes Hub leads the cross-cutting ‘Threatened and migratory species and threatened ecological communities’ initiative. This initiative supports policy development, program management and regulatory processes to improve the status of Australia’s threatened and migratory environmental assets in terrestrial, freshwater and marine environments by working with all NESP initiatives and hubs to add value to the outcomes of the overall program.

The Hon Tanya Plibersek, Minister for the Environment, launched Australia’s *Threatened species action plan 2022–2032* in late 2022. The plan identifies 110 priority threatened species and 20 priority places, as well as 22 targets to achieve by 2027 for species, places and habitats, insurance, First Nations, planning, research and engagement. The Resilient Landscapes Hub will address the research needs and targets identified in the action plan and work with land managers to design, implement and monitor priority on-ground activities.

All four hubs are working together in the delivery of research plans. Planning activities include scoping, prioritising and co-designing a suite of projects to be considered for inclusion in the research plans of all four hubs and the strategic research plans for the other four cross-cutting initiatives.

The hub developed a *Cross-cutting initiative strategy* in late 2021. This living document was updated in 2023 and includes a summary of the actual and proposed investments in the first five years of NESP in this initiative. The estimated budget (including NESP funding and co-contributions) totalled more than \$65 million (GST-exclusive). The strategy was submitted to the Senate Inquiry into Australia’s Faunal Extinction Crisis.

There are 26 current and completed Resilient Landscapes Hub projects in 2023 that contribute to the Cross – Cutting Initiative ‘Threatened and migratory species and threatened ecological communities’ led by the Resilient Landscapes Hub as listed in the table below. Note: some projects contribute to several cross-cutting initiatives.

### Projects contributing in part, or fully, to the cross-cutting initiative ‘Threatened and migratory species and threatened ecological communities’

---

Project 1.7 Cross-cutting initiative research: Threatened and migratory species and threatened ecological communities

---

Project 1.8 Queensland threatened lizard survey

---

Project 2.1 Assessing risks to the environment from water-resource development in northern Australia, using north Queensland as a case study

---

Project 2.3 Using integrated data analysis to assess regional transferability

---

Project 2.4 National overview of monitoring frameworks and tools for Ramsar sites

---

Project 2.5 Addressing Kakadu’s strategic research needs

---

Project 2.6 Protecting threatened species in safe havens

---

Project 2.7 Research to support the management of priority desert threatened species

---

Project 3.1 Supporting the strategic management of invasive grasses

---

**Projects contributing in part, or fully, to the cross-cutting initiative ‘Threatened and migratory species and threatened ecological communities’**

Project 3.4 Guiding the strategic management of freshwater fish
Project 3.5 Ecological and Indigenous values of south-western Australian rivers
Project 3.6 Methods for mapping areas important for biodiversity
Project 3.7 Managing and monitoring resilience in Australia’s national parks
Project 3.8 Developing an Indigenous ranger monitoring platform
Project 3.9 Trialling detection dogs as a novel method for finding threatened reptiles
Project 3.10 Assessing the impacts of myrtle rust on forest dynamics and function
Project 3.11 Informing management of feral cats and foxes in priority areas
Project 3.12 Best-practice fox control in Booderee National Park
Project 3.13 Supporting Indigenous fire management through collaborative socio-ecological partnerships
Project 3.14 Experimental translocations to understand and combat declines of eastern quolls
Project 3.16 Recognising culturally significant entities
Project 3.17 Improving environmental outcomes on conserved and managed lands
Project 3.18 Enhancing climate-adaptation responses in regional natural resource management planning by incorporating resilience investment
Project 3.20 Ecology and conservation of the Christmas Island giant gecko
Project 3.21 Ecology and conservation of the Christmas Island goshawk and hawk-ow
Project 3.22 Rewilding Norfolk: closing management knowledge gaps for faunal restoration on islands

There are 16 current and completed Resilient Landscapes Hub projects in 2023 that contribute to the Cross – Cutting Initiative ‘Protected Place Management’ led by the Marine and Coastal Hub as listed in the table below. Note: some projects contribute to several cross-cutting initiatives.

**Projects contributing in part, or fully, to the cross-cutting initiative ‘Protected Place Management’**

Project 2.3 Using integrated data analysis to assess regional transferability
Project 2.4 National overview of monitoring frameworks and tools for Ramsar sites
Project 2.5 Addressing Kakadu’s strategic research needs
Project 2.6 Protecting threatened species in safe havens
Project 2.7 Research to support the management of priority desert threatened species
Project 3.1 Supporting the strategic management of invasive grasses
Project 3.2 Planning for catchment resilience and threatened-species recovery from extreme events in the Mary River
Project 3.6 Methods for mapping areas important for biodiversity
Project 3.7 Managing and monitoring resilience in Australia's national parks
Project 3.8 Developing an Indigenous ranger monitoring platform
Project 3.9 Trialling detection dogs as a novel method for finding threatened reptiles

**Projects contributing in part, or fully, to the cross-cutting initiative 'Protected Place Management'**

Project 3.10 Assessing the impacts of myrtle rust on forest dynamics and function

Project 3.14 Experimental translocations to understand and combat declines of eastern quolls

Project 3.20 Ecology and conservation of the Christmas Island giant gecko

Project 3.21 Ecology and conservation of the Christmas Island goshawk and hawk-owl

Project 3.22 Rewilding Norfolk: closing management knowledge gaps for faunal restoration on islands

There are eight current and completed Resilient Landscapes Hub projects in 2023 that contribute to the Cross – Cutting Initiative 'Climate adaptation' led by the Climate Systems Hub as listed in the table below. Note: some projects contribute to several cross-cutting initiatives.

**Projects contributing in part, or fully, to the cross-cutting initiative 'Climate adaptation'**

Project 2.3 Using integrated data analysis to assess regional transferability

Project 2.4 National overview of monitoring frameworks and tools for Ramsar sites

Project 2.5 Addressing Kakadu's strategic research needs

Project 3.3 Enhancing the resilience of urban rivers: informing the regional restoration of the Djarlgaroo Beelie (Canning River, Perth)

Project 3.4 Guiding the strategic management of freshwater fish

Project 3.14 Experimental translocations to understand and combat declines of eastern quolls

Project 3.18 Enhancing climate-adaptation responses in regional natural resource management planning by incorporating resilience investment

Project 3.19 Climate-resilient landscapes: an adaptation case study in NSW's Northern Rivers region

There are 8 current and completed Resilient Landscapes Hub projects the Resilient Landscapes Hub leads and collaborates with other NESP hubs.

<b>Cross-hub projects</b>	<b>Other Hubs involved</b>
Project 1.6 Indigenous knowledge and managing the Indigenous estate	All hubs
Project 1.7 Threatened and migratory species and threatened ecological communities	All hubs
Project 2.5 Addressing Kakadu's strategic research needs	All hubs
Project 3.3 Enhancing the resilience of urban rivers: informing the regional restoration of the Djarlgaroo Beelie (Canning River, Perth)	The Marine and Coastal (MAC), Climate Systems (CS) and Sustainable Communities and Waste (SCaW) are all currently exploring potential contributions to this cross-hub project.
Project 3.8 Developing an Indigenous ranger monitoring platform	Potentially a cross-hub project with Marine and Coastal Hub, and Sustainable Communities and Waste Hub
Project 3.15 Developing a national Indigenous environmental research network	Aligned with but independent of the Marine and Coastal Hub's Project 3.2:

Cross-hub projects	Other Hubs involved
	'Developing a national environmental research network: marine and coastal case studies'.
Project 3.18 Enhancing climate-adaptation responses in regional natural resource management planning by incorporating resilience investment	Climate Systems Hub involved
Project 3.19 Climate-resilient landscapes: an adaptation case study in NSW's Northern Rivers region	The Climate Systems Hub will provide data, information and guidance on climate hazards due to current and projected climate change, including extreme events

## Emerging priorities

Each year, specific emerging priorities may be identified by the department, hubs or third parties for delivery as research projects. If endorsed by the department, the hub will develop research project/s to address the emerging priority.

Hubs will be flexible and adaptable to respond to emerging priorities, with the ability to rapidly scale output, bring in external expertise or respond if additional resources are made available. Hubs are required to set aside 10% of their annual funding (in any category) so that they can respond to emerging priorities. These funds can be rolled into the subsequent year if they are not used.

Emerging-priority projects will be developed outside the hub's annual research-proposal process. Once emerging-priority projects have been approved, the hub's research plan and activity budget for the relevant calendar year will be amended and emerging priorities will be included in the hub's annual progress reports.

There was one emerging-priority project in 2023, *Research in response to the rediscovery of Australia's most imperilled reptile, the Victorian grassland earless dragon* (Zoos Victoria).

## Performance against milestones

### Performance against funding agreement milestones

All milestones for the reporting period and to date have been met as per the funding agreement (Milestones 1 (Signing of Agreement by the department) to 16 (Delivery of draft Research Plan 2024 to the department)).

### Performance against the research plan milestones

Information on project progress and performance is provided in Attachment A.

## Measuring success

### Hub outcomes and outputs

## Short- to medium-term outcomes – quantitative measures

**Table A: Quantitative performance measures (short- to medium-term outcomes)**

**Notes: For the third year of NESP2 hubs, the reporting period is 1 January 2023 to 31 December 2023. Unless specified otherwise, the term ‘research-user’ refers to departmental and/or external users. The data below will ideally provide numbers derived from routine Hub monitoring and reporting. Where an estimate is provided, please explain how it was determined.**

No.	Performance measure	Result for reporting period (numerical only)	Explanation, if any
1	Proportion of projects (active or completed in the reporting period) for which there is a research-user actively engaged in the project: a) co-design b) research delivery c) use and research uptake	a) 37/37 b) 37/37 c) 37/37	
2	Research outputs in the reporting period provided to research-users on time and as identified in the approved research plans: a) total number b) proportion	a) 5 b) 5/5	Four reports and one research data/spatial data was provided to research users in 2023.
3	Proportion of completed research projects that are confirmed to meet the needs of departmental research-users as identified at project co-design stage	3/3	
4	Number of projects that: a) are Indigenous-led b) meet research and management priorities of Indigenous stakeholders c) are Indigenous-led projects that also meet research and management priorities of Indigenous stakeholders.	a) 7/37 b) 11/37 c) 18/37	In addition to the 7 Indigenous led projects, the Hub is supporting 11 co-designed projects which meet research and management priorities of Indigenous stakeholders. Many additional projects being delivered by the Hub may also support Indigenous Research Users.
5	Number of peer-reviewed, NESP-funded publications during the reporting period	4	<ol style="list-style-type: none"> <li>Robinson, C.J., Urzedo, D., Macdonald, JM, Ligtermoet, E., Penton, CE, Lourie, H., A. Hoskins (2023) Place-based data justice practices for collaborative conservation research: A critical review, Biological Conservation, 288, 110346, <a href="https://doi.org/10.1016/j.biocon.2023.110346">https://doi.org/10.1016/j.biocon.2023.110346</a></li> <li>Goolmeer T. &amp; van Leeuwen S (2023). Indigenous knowledge is saving our iconic</li> </ol>

Resilient Landscapes Hub Annual Progress Report 2023

No.	Performance measure	Result for reporting period (numerical only)	Explanation, if any
			<p>species. Trends in Ecology &amp; Evolution. <a href="https://doi.org/10.1016/j.tree.2023.03.010">https://doi.org/10.1016/j.tree.2023.03.010</a>.</p> <p>3. van Leeuwen S. &amp; Miller-Sabbionia, C. (2023) Impacts of wildfire on Indigenous cultural values, In: Rumpff L., Legge S.M, van Leeuwen S., Wintle B.A. &amp; Woinarski J.C.Z (eds) Australia's Megafires: Biodiversity Impacts and Lessons from 2019-2020. CSIRO Publishing</p> <p>4. Rossiter-Rachor, N. A., Adams, V. M., Canham, C. A., Dixon, D. J., Cameron, T. N., &amp; Setterfield, S. A. (2023). The cost of not acting: Delaying invasive grass management increases costs and threatens assets in a national park, northern Australia. Journal of Environmental Management, 333, 116785.</p>
6	Number of NESP research citations in other researchers' publications during the reporting period	26	
7	Number of completed NESP products, research publications, datasets and metadata that are discoverable and accessible in accordance with <i>NESP data and information guidelines</i> and the funding agreement	17	
8	<p>a) The number of datasets and management tools produced by hub research and made public.</p> <p>b) The number of other datasets and management tools that benefited from hub research and outcomes.</p> <p>Management tools include but are not limited to monitoring systems; web-based decision support systems; environmental management tools for Indigenous communities, waters and land management; plans of management for Indigenous Protected Areas (IPAs), co/jointly managed parks, marine park plans of management, conservation agreements.</p>	<p>a) 3</p> <p>b) 4</p>	

Resilient Landscapes Hub Annual Progress Report 2023

No.	Performance measure	Result for reporting period (numerical only)	Explanation, if any
9	Number (full-time equivalent) during the reporting period of: <ul style="list-style-type: none"> <li>a) PhD students</li> <li>b) post-doc and early-career researchers</li> <li>c) mid-career researchers</li> <li>d) Indigenous researchers</li> <li>e) individual volunteers (total)</li> <li>f) individual Indigenous volunteers (total)</li> <li>g) Indigenous sub-contractors</li> </ul>	<ul style="list-style-type: none"> <li>a) 3.5</li> <li>b) 37</li> <li>c) 25.7</li> <li>d) 5.7</li> <li>e) 51</li> <li>f) 16</li> <li>g) 133</li> </ul>	(g) 91 casual employed staff were supported to engage in digital ranger program workshops (i.e. Project 1.5 Monitoring Resilient Landscapes)
10	Number of knowledge-sharing and communication events and activities held or shared: <ul style="list-style-type: none"> <li>a) with on-ground managers (general)</li> <li>b) jointly with Indigenous researchers and Traditional Custodians</li> <li>c) that are Indigenous-led</li> </ul>	<ul style="list-style-type: none"> <li>a) 93</li> <li>b) 42</li> <li>c) 17</li> </ul>	
11	Proportion of hub staff and researchers who have completed: <ul style="list-style-type: none"> <li>a) Indigenous cultural capability training</li> <li>b) Indigenous cultural and intellectual property training</li> <li>c) both Indigenous cultural capability training and Indigenous cultural and intellectual property training</li> </ul>	<ul style="list-style-type: none"> <li>a) 24</li> <li>b) 35</li> <li>c) 21</li> </ul>	In 2023, the Hub comprised of 172 staff and researchers including Project Leaders, Team Members, Key Researchers, central Hub administration, Members of the HSC, IAP and REC and Indigenous Research Associates. Of the 172 staff members 77 (44%) have completed either ICIP or Cultural awareness training with 21 having completed both. The Indigenous Facilitation Team continues to deliver a comprehensive training schedule to ensure Hub staff are equipped with the skills required to successfully partner with Indigenous contributors.
12	Proportion of hub projects overall that fall within the categories of the Three-category approach: <ul style="list-style-type: none"> <li>a) Category 1: Indigenous led</li> <li>b) Category 2: Co-design</li> <li>c) Category 3: Communicate</li> </ul>	<ul style="list-style-type: none"> <li>a) 7/37</li> <li>b) 11/37</li> <li>c) 19/37</li> </ul>	Categories were updated for all projects to reflect changes to the revised Three Category Approach workbook.
13	Proportion of hub projects that have been developed in consultation with the hub Indigenous facilitator or the Indigenous Facilitation Network	17 / 37	



Resilient Landscapes Hub Annual Progress Report 2023

No.	Performance measure	Result for reporting period (numerical only)	Explanation, if any
14	<p>Number of guidelines about best-practice that the hub has produced or co-produced in the reporting period, for:</p> <ul style="list-style-type: none"> <li>a) knowledge brokering</li> <li>b) Indigenous partnerships and products (including design of flagship engagement activities)</li> <li>c) environment and climate management within the scope of the hub's research</li> </ul>	<ul style="list-style-type: none"> <li>a) nil</li> <li>b) nil</li> <li>c) 4</li> </ul>	<p>The hub produced 4 best-practice guidelines in 2023:</p> <ol style="list-style-type: none"> <li>1. <u><a href="#">A power analysis to inform design of a monitoring program to detect trends in Tjakura</a></u></li> <li>2. <u><a href="#">Best-practice management of feral cats and red foxes: workshop 2 report</a></u></li> <li>3. <u><a href="#">Supporting knowledge sharing, natural resource management and regional planning: identifying similar regions through integrated data analysis</a></u></li> <li>4. <u><a href="#">Improving outcomes for threatened species and ecological communities considered by the Commonwealth approval process .1: Suggestions from EAD officers.</a></u></li> </ol>

## Longer-term outcomes – qualitative measures

The Hub is in its 'research underway' stage, with many projects started relatively recently. As such, it is too early to fully evaluate the long-term outcomes achieved from the Hub's research. We can, however, report that all projects involved a co-design process with research end-users, many with a strong focus on Indigenous engagement. Most projects also have some degree of Indigenous engagement with 18 projects Indigenous-led or co-designed with Indigenous partners.

The Hub completed three projects in 2023: (i) Project 1.5 Monitoring Resilient Landscapes (ii) Project 2.3 Using integrated data analysis to assess regional transferability and (iii) Project 3.6 Methods for identifying areas important for biodiversity.

The emerging long-term outcomes of these three projects are discussed below.

*Project 1.5 Monitoring Resilient Landscapes* focused on Indigenous co-design of digital protocols for environmental monitoring. On-country workshops with Kakadu, Warddeken and Mimal Elders and rangers / coordinators (held in Kakadu and West Arnhem Land) scoped the support of Traditional Owner and Indigenous rangers in applying digital tools to monitor changes to co-designed healthy country indicators before and after agreed pig and/or buffalo management actions. The project received strong community support, in which it was endorsed by the Warddeken and Mimal Boards and discussed with Kakadu Bininj/Mungguy Board members at the recent Kakadu Research Committee Meeting in September 2023. This project has led to a film, released in November 2022, on the Indigenous Digital Women Rangers' work, featuring interviews with Indigenous women rangers. The strong initial community support and ongoing discussions within communities is a promising indication this project may lead to community-led practice change with Traditional Owners and Indigenous rangers more willing to adopt digital technologies for environmental monitoring and management. The project also contributes to practice change within the scientific community with a peer-reviewed journal, published in November 2023, on 'Place-based data justice practices for collaborative conservation research: A critical review'. This review steps out the 'skills and methods scientists need when using data to support environmental decisions with Indigenous and local communities.

The outcomes of the *Project 2.3 Using integrated data analysis to assess regional transferability* will help decision-makers to determine the extent to which research undertaken in one region is transferable to another region. The project developed a one stop guide for decision makers. It provides information on datasets available at a national level, under what access agreements and how they can be used to support decision making. Regional profiles were developed and used to match regions to the most relevant types of natural resource planning approaches. These regional groups can also foster collaboration by helping managers to identify their peers for learning and sharing of solutions. A report summarising these key findings and contributions has been completed and will shortly be published on the hub website.

*Project 3.6 Methods for identifying areas important for biodiversity.* This project leveraged the data compiled in projects 1.4 (Socioeconomic insights for resilient landscapes) and 2.3 (Using integrated data analysis to assess regional transferability) of the Resilient Landscapes Hub (RLH), as well as past work completed under the previous phase of NESP by the Threatened Species Recovery Hub, which compiled data on threatened species and tenure data. The project assessed a range of available methods for identifying and defining areas in Australia important for biodiversity, and their alignment to international, state and territory approaches. The synthesis of this data will support policy makers to choose a final national approach to map priority areas for biodiversity. The final report will be published on the hub website in early 2024.

Finally, it is also worthwhile noting that a report, published in December 2023, from the ongoing *Project 2.7: Research to support the management of priority desert threatened species* has recently been used by the project's research users to inform management decisions. Recommendations from

the report 'A power analysis to inform design of a monitoring program to detect trends in [Tjakura](#)' have directly informed standardised monitoring of Tjakura across its range (this includes surveys done as part of Mulyamiji March). A standardised monitoring effort allows for more precise assessments of burrow counts, and helps to ensure that trends in [Tjakura](#) counts can be confidently detected from future monitoring.

## NESP impact stories

NESP impact stories are provided at Attachment B ([The long-term impact of research investment, innovative, accessible science communication](#) and [Embedded partnerships facilitate the design of environmental research](#)). Impact stories showcase the contribution of NESP-funded research beyond contributions to academia, including to the environment, economy, society, culture, public policy and quality of life.

In future years, we plan to focus our impact stories to address:

- how the hub has collaborated with research users to better understand decision-makers' needs or the key questions that research needs to address
- how the hub is successfully partnering with government, community and industry stakeholders
- how the hub is successfully partnering with Indigenous Australians throughout the work of the hub
- how the hub is using innovative approaches to connect science with policy-making and decision-making
- how the research conducted by the hub has been used to inform on-ground action or policy
- how the hub has improved the national environmental information base through delivery of open-access data or other data-related activities.

## Collaboration and partnerships

NESP encourages a collaborative, multi-disciplinary approach to environmental and climate research. Key to the success of the hub will be the capacity to foster partnerships across hubs and with a wide range of decision-makers across the Australian community, including Indigenous communities, to achieve positive environmental, social and economic outcomes.

The hub builds on the leadership and governance model of the previous NESP Northern Australia Environmental Resources Hub which demonstrated excellence in solutions-focused, impactful research that was co-designed with stakeholders, responsive to evolving management priorities, and strongly embraced Indigenous partnership and knowledge. While being hosted by UWA, we have a national footprint based on 4 regional nodes led by universities (Western: UWA; Northern: JCU; Eastern: GU; Southern: UTas) and a national node hosted by CSIRO.

## Meetings and Engagement

### Governance

- Hub Chairs (monthly)
- REC (fortnightly)
- HSC (2–3 times per year)
- IAP
- All Hub Leaders, Cross-cutting Initiative Leaders, Senior Indigenous Facilitators x 1
- Hub Leaders' meetings (informal)

- Marine and Coastal Hub, Sustainable Communities and Waste Hub
- Initiative Leaders/Knowledge Brokers
  - Climate adaptation x 2 , Protected place management x 3, Waste impact management x 1.

## Department

- Minister's Office
- Hub Liaison Officer (monthly)
- Cross-hub data management group (monthly)
- Co-design workshops
  - invasive species
  - fire
  - water and wetlands
  - restoration and recovery
  - socioeconomic insights
  - monitoring
  - regional planning
- Environment Approvals Division, Queensland North Assessments.

## States and territories

- Cross-jurisdictional Chief Environmental Scientists x 2
- State government NRM and environment agencies (most states and territories)

## Hub research providers and research users

Project and priority setting meetings with multiple research-user organisations were held in 2023 (non-exhaustive list below):

- Bush Heritage Australia, Bunya Peoples Aboriginal Corporation, National Landcare Network, NRM Regions Australia, Feral Cat Taskforce, Kakadu Board of Management, Telstra Foundation, Microsoft, Amazon Web Services, Terrestrial Ecosystem Research Network, Australian Research Data Commons, Atlas of Living Australia, Indigenous Desert Alliance, North Australian Indigenous Land and Sea Management Alliance, Indigenous Land and Sea Corporation, Water Trust Australia, regional NRM groups, State government agencies, Tasmanian Land Conservancy, and Wet Tropics Management Authority.

## Knowledge brokering

The Resilient Landscapes Hub will maximise the impact of its research through the implementation of its *Knowledge brokering strategy* that commits to knowledge brokering activities that:

- contribute to program-level knowledge brokering planning and activities
- strengthen the connections, synthesis and collaboration between other hub staff and the broader NESP partnerships team
- are designed, planned, prioritised and delivered in consultation with the department, research users and other stakeholders to ensure they meet user needs at times and in formats that are most useful
- involve research users in research design, development and implementation to ensure the research meets their needs and aligns with policy, planning and management objectives
- facilitate delivery and adoption of research outputs by research users

- inform the hub's cross-cutting research initiative of threatened and migratory species and threatened ecological communities
- build the capacity of the hub's knowledge-brokering team so that the hub implements best-practice approaches to knowledge brokering
- develop processes and products that synthesise hub outputs and establish a legacy.

In implementing this strategy, the hub will ensure alignment with the broader NESP [Knowledge brokering and communications strategy](#).

The hub is well underway in addressing all the major points of the strategy above and has achieved this by primarily focusing on facilitating meetings between researchers and research users during 2023. These meetings reached a broad range of departmental users and the hub has also been flexible in having subsequent meetings with any sections that were missed initially. Synthesising priorities and feedback from such a broad suite of research users has guided the hub in creating a range of projects that have a clear pathway for uptake by research users.

Additionally, the hub has refined our internal processes to ensure that project teams are doing everything possible to facilitate increased knowledge brokering throughout projects. This has included providing them with more information around timelines for feedback and supporting researchers to seek feedback on research outputs.

## Communication

The Resilient Landscapes Hub has been maximising the impact of its research through communications activities and products outlined in its *Communication strategy* that:

- contribute to program-level communications planning and activities
- are designed, planned, prioritised and delivered in consultation with the department, research users and other stakeholders to ensure they meet user needs at times and in formats that are most useful
- raise awareness of the hub, its projects and their outcomes, and its cross-cutting research initiative of threatened and migratory species and threatened ecological communities
- meet acknowledgement and accessibility requirements
- support projects to plan and implement knowledge brokering and communication activities
- make research products and findings accessible to decision-makers, communities and other research users during and beyond the life of the program
- develop processes and products that synthesise hub outputs and establish a legacy.

In implementing this strategy, the hub will ensure alignment with the broader NESP [Knowledge brokering and communications strategy](#).

Since launching the hub, we've continued to expand our library of [freely available symbols](#). Our symbols are a great tool for diversifying and broadening approaches to science and environmental communication. More than 1,000 people have registered to download these symbols and we continue to see them used in innovative and diverse ways.

We're also pleased to share our [updated website](#) which emphasises improved navigation and accessibility. You can continue to find all the project information and outputs from past research programs, including the Northern Australia Environmental Resources Hub from the first phase of NESP, on the website.

## Website and social media statistics for 2023

### Website

- 20,000 unique page views and 8,234 visitors ('users') (2021: ~3,500 views and ~850 visitors)
- 3 highest-traffic pages: Homepage; Projects; Graphics Library
- most came in through 'organic search' (56%) and 'direct' (i.e. typing in our URL) (36%). Organic social was 30%.

### E-newsletter

- distributed to 2,342 recipients (net gain of 148 subscribers or 6.3%)
- July 2023 newsletter: 719 opened email (33.3%), 147 clicked something in the email
- October 2023 newsletter: 662 opened email (30.5%), 167 clicked something in the email
- '[Indigenous advisory panel](#)' news post got the most clicks, then '[Mapping methods](#)' page, then '[Indigenous monitoring platform](#)'
- 35.2% open rate vs 39.3% open rate of our peers
- 13.7% click rate vs 6.1% click rate of our peers

### LinkedIn (note: Feb 22–Feb 23)

- 19,502 impressions (2021: 755 impressions, 2022: 7,835 impressions)
- 725 reactions, 19 comments, 40 reposts

### Twitter (note: 1 Jan 2023 – 31 Dec 2023)

- 55,000 impressions (2021: 35,000 impressions, 2022: 55,000 impressions)
- top 3 tweets (impressions) were
- (i) [3 new Indigenous Research Associates](#) tweet, with 22,478 impressions
- (ii) Dingo research retweet, with 1,824 impressions
- (iii) [Gamba grass website](#) tweet, with 1696 impressions
- Followers: 1155 (increase of 122 followers, a 10.5% increase)

### Facebook (note: 1 Jan 2023 – 31 Dec 2023)

- reach: 10,829 (2022 was 11,500)
- page visits: 2,033 (2022 was 467, so this is an increase of 364.2%)
- followers: 1,763 (as at 7 February 2024)
- link clicks: 242
- posts: 90 (increase of 26.8%)

### Instagram (note: 1 Jan 2023 – 31 Dec 2023)

- was set up on 9 August 2023
- reach: 316 (2022 was 0, so an increase of 100%)
- page visits: 241 (2022 was 0, so another increase of 100%)
- content interactions: 298 (up 100%)
- followers: 138 (as at 7 Feb 2024)
- posts: 36 (increase of 100%)
- stories: 1 (increase of 100%)

## Indigenous partnerships

The Resilient Landscapes Hub has been facilitating effective Indigenous participation and Indigenous-led involvement in the research program (co-design through to co-evaluation) through a participatory '2-way, right-way' approach.

This participatory approach is outlined in our *Indigenous partnerships strategy* and is focussed on:

- honouring the perspectives and aspirations of our Indigenous partners
- being authentic, inclusive and culturally safe
- seeking community consensus on pathways to progress
- building the capacity of both Indigenous and non-Indigenous partners
- utilising appropriate metrics to assess effectiveness and efficiency
- being cognisant of the need to take time.

Throughout 2023, the Hub's focus on Indigenous Facilitation has continued to grow with the recruitment of an Indigenous Research Facilitator and a Senior Research Officer who, in collaboration with the Senior Indigenous Facilitator have delivered a range of novel initiatives to promote and enhance Indigenous partnerships across the work of the Hub.

This includes:

- Establishing an Indigenous Advisory Panel within the Hub's governance framework to guide the development of research plans and provide advice on how to improve Indigenous partnerships within the scope of existing projects,
- Compiling and developing targeted resources to support researchers in developing and maintaining Indigenous partnerships,
- Establishing researcher "drop-in sessions" to provide pathways for researchers to seek advice on matters relating to Indigenous partnerships.
- Hosting one on one project Indigenous facilitation meetings to ensure researchers are well equipped with the skills and information to support successful Indigenous partnerships.
- Providing training to researchers and project partners in best practice approaches to deal with Indigenous Cultural and Intellectual Property (ICIP) and build cultural competency.
- Fostering ongoing collaborative relationships with Indigenous partner organisations.

Project 1.6 (Indigenous knowledge and managing the Indigenous estate) has continued to progress throughout 2023. As a result of this project, the project leader and team have been able to liaise with several First Nations peak organisations and representative bodies, First Nations research users and non-Indigenous researchers to commence work to identify research priorities or initiate research proposals that address long-standing, no-regrets, First Nations-identified research needs.

Indigenous led projects developed under Project 1.6 and approved include Project 3.15 (Developing a national Indigenous environmental research network), Project 3.16 (Recognising culturally significant entities) and 3.19 (Climate-resilient landscapes: an adaptation case study in NSW's Northern Rivers region). This portfolio builds on previously approved Indigenous led projects such as Project 3.8 (Developing an Indigenous monitoring platform), and Project 2.7 (Research to support the management of priority desert threatened species)

Much of the impetus for the existing projects (approved or concept) has been derived from the Senior Indigenous Facilitator's engagement with other First Nations colleagues at conferences and

workshops or on advisory committees and through identification of research priorities identified by First Nations representative bodies, organisations and communities.

Through a joint initiative between with the CSIRO and in recognition of the Hub's commitment to growing the network of Indigenous academics, the UWA based Resilient Landscapes Hub has recruited three Indigenous Research Associates. The Associates will work within the Hub while undertaking Higher Degrees by Research with the aim that their projects will align with the Resilient Landscapes Hub's priorities and support opportunities for incorporating traditional knowledge and cultural insights into environmental conservation. The Hub's Indigenous Facilitation Team are currently supporting efforts to extend this model across to different partner universities.

## Data management

The hub has been operating consistently in accordance with our data management strategy, ensuring that all data collected from hub activities align with the FAIR (Findable, Accessible, Interoperable, Reusable) principles. This commitment facilitates the sustainable and long-term management of data assets.

In early June, we welcomed a Data Wrangler to help implement our data strategy, given the number and range of newly approved projects across the hub. The hub's Data Wrangler is working with project teams to assess and update the current state of data holdings and the list of expected data repositories. Our Data Wrangler has also been attending monthly meetings with counterparts from other hubs, sharing knowledge and techniques to ensure uniformity and the adoption of best practices. A particularly fruitful partnership has been formed with the Marine and Climate Hub, from which we have acquired documents and insights that have improved our data management practices.

A collaborative effort is underway to co-design a project with the Australian Research Data Commons (ARDC), aiming to achieve interoperability across institutional repositories, given the diverse locations of the hub's outputs. This initiative addresses gaps in specific repositories, confronts implementation challenges, and ensures compliance with minimum metadata standards for ARDC metadata harvesting protocols. This project represents a proactive step towards bridging gaps in data management and enhancing interoperability among repositories.

Our hub remains committed to maintaining and enhancing our data management practices as we move forward. This involves continuously improving our internal processes, fostering collaboration across hubs, and engaging with broader data management communities. By adopting these strategies, the hub sets a precedent for excellence in data management, ensuring our data assets are effectively preserved and accessible for future research.

## Hub-level risk management

All risks identified in the hub's risk management plan are being actively managed.



# Financial information

## **Annual financial reporting**

Financial information for the Resilient Landscapes Hub is to provided in Attachment C.

## Attachments

- Attachment A – Resilient Landscapes Hub Research projects and outputs
- Attachment B – Resilient Landscapes Hub Research NESP impact stories
- Attachment C – Resilient Landscapes Hub Research Financial information and asset schedule.