



National Environmental Science Program

# National Environmental Science Program Climate Systems Hub

## Research Plan 2021



## Abbreviations

ACCESS - Australian Community Climate and Earth-System Simulator  
ACS - Australian Climate Service  
AFAC – National Council for Fire and Emergency Services  
AIMS – Australian Institute of Marine Science  
ANU – Australian National University  
BoM – Bureau of Meteorology  
CCiA - Climate Change in Australia  
CLEX - Centre of Excellence for Climate Extremes  
CLIVAR - Climate and Ocean: Variability, Predictability and Change Project  
CMIP - Coupled Model Intercomparison Project  
CORDEX - Coordinated Regional Climate Downscaling Experiment  
COSIMA - Consortium for Ocean-Sea Ice Modelling in Australia  
COWCLIP - Coordinated Ocean Wave Climate Project  
CSC – Climate Science Centre  
CSIRO - Commonwealth Scientific and Industrial Research Organisation  
DAWE – Department of Agriculture, Water and Environment  
DESE – Department of Education, Skills and Employment  
DISER - Department of Industry, Science, Energy and Resources  
DPIPWE - Department of Primary Industries, Parks, Water and Environment (Tasmania)  
DR-SAT - Drought Resilience Self-Assessment Tool  
EAC - Eastern Australian Current  
ENSO - El Niño–Southern Oscillation  
ESCC - Earth Systems and Climate Change Hub  
ESCI - Electricity Sector Climate Initiative  
ESM - Earth Systems Model  
GBRMPA - Great Barrier Reef Marine Park Authority  
GCM – Global Climate Model  
GCP – Global Carbon Project  
GOOS - Global Ocean Observing Systems  
IOD – Indian Ocean Dipole  
MDBA - Murray–Darling Basin Authority  
Monash – Monash University  
NARCLIM – NSW and ACT Regional Climate Modelling  
NASA - National Aeronautics and Space Administration  
NCRIS - National Collaborative Research Infrastructure Strategy  
NESP – National Environmental Science Program  
NPA - Northern Peninsula Area  
NRI - National Research Infrastructure  
NRM – Natural resource management  
RECCA - Regional Carbon Cycle Assessment and Processes  
SAM - Southern Annular Mode  
SDG – Sustainable Development Goal  
SSPs - Shared Socioeconomic Pathways  
UMelb – University of Melbourne  
UN – United Nations  
UNFCCC - United Nations Framework Convention on Climate Change  
UNSW – University of NSW  
UTAS – University of Tasmania  
WCAG - Web Content Accessibility Guidelines  
WCRP - World Climate Research Programme  
WMO - World Meteorological Organization  
XJ COP – Cross Jurisdiction Community of Practice

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## Introduction

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### The National Environmental Science Program

The National Environmental Science Program (NESP) is a long-term commitment by the Australian Government to environment and climate research.

The first phase of the NESP invested over **\$145 million** (2014-15 to 2020-21) into 6 research hubs and emerging priority research projects. The second phase will invest **\$149 million** (2020-21 to 2026-27) into 4 new research hubs.

The program:

- provides evidence for the design, delivery and on-ground outcomes for environmental programs
- helps decision-makers, including from Indigenous communities, build resilience
- supports positive environmental, social and economic outcomes.

More information on the NESP is available at <http://www.environment.gov.au/science/nesp>.

### Hub role

The Climate Systems Hub, as with the NESP Program, stands at a crossroad. From the past we aspire to build upon the many successes of the NESP Phase 1 Earth Systems and Climate Change (ESCC) Hub. Towards the future, we embrace new NESP Phase 2 challenges, including the cross-cutting Mission research portfolios, strengthening Indigenous Partnerships, and utilising Data Management for optimal delivery of decision support tools that realise Australia's applied science needs for practical management outcomes.

Taking a moment to look way back where this journey originated, we consider the first paragraph of the [2014 NESP Guidelines](#): "The scope of the National Environmental Science Programme (NESP) is to deliver applied environmental science, particularly focused on biodiversity and climate systems research." The Climate Systems Hub will firmly build upon the legacy of the many past science activities, research outputs and outcomes of the ESCC Hub.

This imperative is reflected in the scope of ongoing activities in the 2021 Research Plan. Looking forwards, the central focus of our 2021 Research Plan is to engage in a process of co-design to identify the most appropriate research priorities to deliver the NESP Phase 2 program outcomes. This will be approached in a collegiate manner across the wider NESP Phase 2 program, while incorporating a diverse inclusion of stakeholder and next-user opinions and needs. A central part of the co-design will be identification and acknowledgement of past successes of ESCC Hub research, so that they may be built upon going forwards.

At this crossroad in time between NESP Phase 1 and NESP Phase 2, through co-design of research activity, we aspire towards co-production of future research outputs. Ultimately the new Hub strives to constructively contribute to the overall success of all four Hubs and cross-cutting Missions comprising delivery of the NESP Phase 2 program.

The Climate Systems Hub will invest in scientific research activities and outputs that address the needs of the cross-hub Climate Adaptation Mission. The three intended outcomes to be delivered across the whole of National Environmental Science Program are as follows:

- credible peer reviewed, timely research that is used by decision-makers to answer questions and develop solutions to problems

- research findings and practical guidance for decision-makers, stored in a manner that is discoverable and accessible, and where appropriate integrated into end-users' databases and decision support tools
- enhanced environmental science and research capability amongst researchers, end-users and Indigenous Australians.

To achieve this, the Hub will provide climate systems applied science, decision tools and practical management options. These will support the Program outcomes, and with additional collaboration, the other three NESP Phase 2 Hubs:

- Marine and Coastal
- Resilient Landscapes
- Sustainable Communities and Waste.

The Hub's Climate Adaptation Mission will seek to foster these collaborations via developing interactions and relationships with the other three cross-Program Missions:

- Protected Place Management
- Threatened and Migratory Species and Ecological Communities
- Waste Impact Management.

For supporting and delivering the co-design phase of RP2021 the Hub will directly target the four research scope areas of the Climate Systems Hub research as outlined below.

- Progress the development of national climate services capabilities and systems (CS1.1, 1.2, 1.3)
- contribute to the development of the next generation of climate projections (CS1.3, 1.4, 1.5)
- leading the further development of Australia's global climate model, ACCESS (CS1.7)
- advance understanding of Australia's climate systems and processes (CS1.4-1.6, 1.8).

The research themes are scaffolded by the Knowledge Brokering, Communications, Data Management and Indigenous Partnerships Strategies. We aim to achieve Specific, Measurable, Attainable, Relevant, and Time-Bound (SMART) activities across the Hub.

## Purpose of Research Plan

This Research Plan was developed by the Climate Systems Hub, in consultation with the Department of Agriculture, Water and the Environment and other key stakeholders.

The purpose of the Research Plan is to outline:

- the research priorities the hub is funded to investigate, including those related to the cross-cutting mission the hub is funded to lead on
- the research projects that will address these priorities
- how the research projects will be co-designed and delivered to end-users
- how the outputs of the research will be communicated and brokered to key stakeholders
- how the impact of the research will be measured
- how hubs will work collaboratively within and across hubs.



This Research Plan also provides appropriate detail on the management and governance of the hub (including but not limited to):

- outlining the broader funding profile
- identification of key staff and research organisations
- the identification of risks and monitoring to ensure success.

## Research

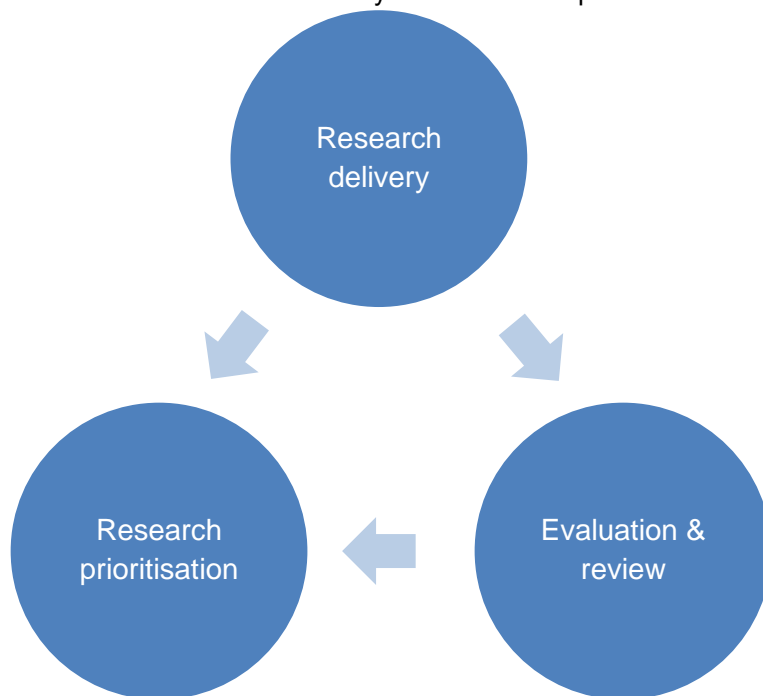
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### Research priorities

The Climate Systems Hub is committed to a body of activity that includes short and long-term research projects. Each activity year the department will work with the Minister, the hubs and other key stakeholders to identify and refine research priorities and develop projects that align with these priorities.

This research prioritisation is a rolling process and key milestones in each activity year will inform the process including the Annual Progress Report and submission of the next Research Plan.

This ongoing consideration and evaluation of research outputs and impact builds confidence in the performance of the Hub and the effectiveness of the program. It also provides the basis for the flexibility needed in the Climate Systems Hub to engage in new themes of research in an adaptive manner, and ensures that the Hubs' focus is fixed on the delivery of relevant and practical research.



The Climate Systems Hub RP2021 is a 12-month effort with four distinct quarterly phases:

1. July-September 2021 – *inception phase 1 of co-design*

- call for Expression of Interest to participate in inception of Knowledge Brokering, Indigenous Partnerships, Data Management and Communications strategies
- development of program logic and research scope pathways to impact
- outset of stakeholder engagement and strategic co-design
- undertake ongoing research activity

2. October-December 2021 - *inception phase 2 of co-design*

- participation in strategic co-design, including research prioritisation, program logic and pathways to impact
- undertake ongoing research activity.

3. January-March 2022 – *implementation phase 3 of co-design*

- development of RP2022
- undertake ongoing research activity

4. April-June 2022 – *implementation phase 4 of co-design*

- preparation of RP2022
- finalisation of ongoing research activity

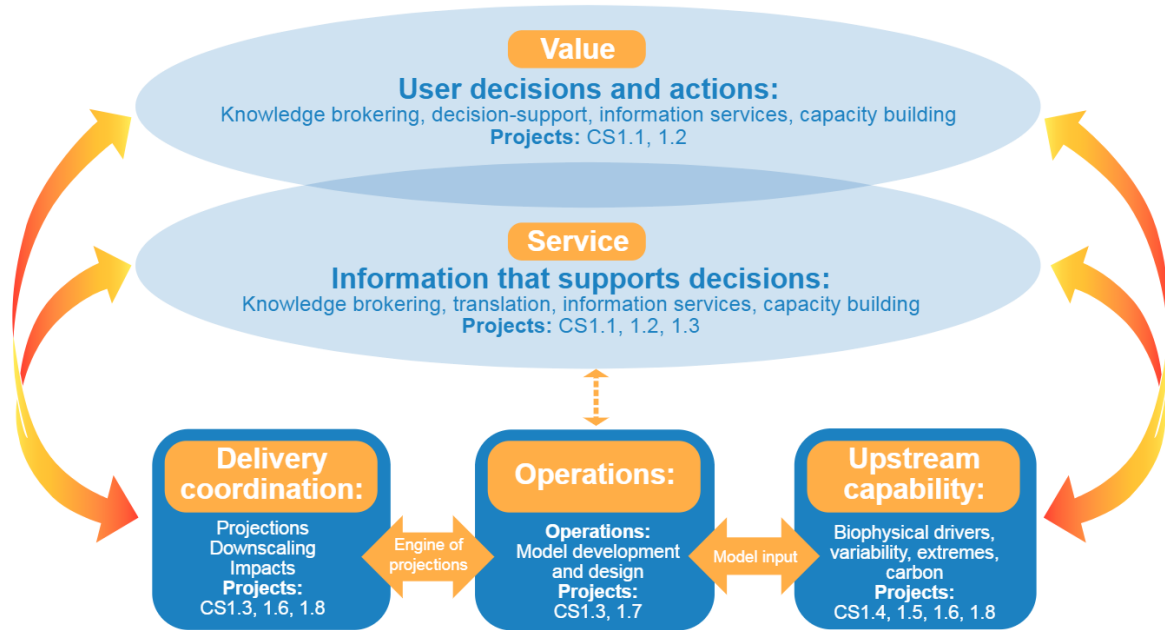
Broadly, the research priorities of the Climate Systems Hub align to the four aims outlined in the NESP research scope overview of the Climate Systems Hub to:

1. maintain our world-class capability in multidisciplinary Earth system science and modelling
2. advance understanding of Australia's climate variability, extremes and associated drivers, including the fundamental drivers of bushfires, drought and rainfall in the Australian region
3. develop applied decision-making tools and information to inform policy and programs to prepare Australia to manage emerging risks and opportunities
4. undertake cross-hub coordination for the 'climate adaptation' functional mission to support climate information to program hubs to drive integrated adaptation research across the program to support evidence-based decision-making and improve Australia's climate resilience.

The Climate Systems Hub feeds into a landscape of climate services (i.e. provision of climate information for use in decision-making, Hewitt and Street 2021) that need to be extended and integrated into other knowledge systems and decision settings. There is both numerous potential stakeholders, next-users and end-users as well as organisations with a similar purpose to this Hub (e.g. Australian Climate Services). This is a complex landscape for the Hub and the NESP Program more broadly to negotiate. In RP2021 we look to work with the Department to develop a high-level understanding of the opportunities for the Climate Systems Hub in this landscape (CS1.1, 1.3 in particular will consider this).

It is also important that our work delivers to applied needs and leads to desirable outcomes. One way that we can represent the range of Hub and cross-Hub activities is to consider the 'value chain' representing the range of activities needed to research, develop, produce and deliver fit-for-purpose climate products or services to end users (Figure 1). Understanding the connections or links in the value chain helps not only those who seek information and decision-support, but also those who deliver capability up-stream to understand how their work supports user decisions and actions both directly and indirectly.





**Figure 1** Schematic of the value chain provided by the Climate Systems Hub, from what can be described as 'foundational science

## Research projects

The Climate Systems Hub **RP2021** envisages an *inception* period (July-December 2021) focussing on the identification of research priorities, and an *implementation* period (January-June 2022) incorporating planning of **RP2022**. Our project plans reflect this priority and invest significant effort in scoping, planning and co-design of the research program and projects.

In RP2021 we have organised our efforts around our key capabilities outlined in the NESP *research scope overview* for the Climate Systems Hub, comprising the following:

1. **Supporting evidence-based decision-making and improved climate adaptation in response to climate change** – led by the Climate Adaptation Mission, working closely with the Hub's Indigenous Partnerships, Data Management, and development of climate services planning (**CS1.1, 1.2, 1.3**).
2. **Climate projections science** – science underpinning and ultimately exploiting the NextGen Climate Projections for Australia (**CS1.3**).
3. **Earth system modelling with ACCESS** – ongoing development of the ACCESS model and deployment to terrestrial and marine applications (**CS1.7**).
4. **Climate Processes** – underpinning research informing national climate knowledge for Hub projects, NESP program, and national stakeholder needs (**CS1.4, 1.5, 1.6, 1.8**).

A list of research projects to be funded under the Climate Systems Hub RP2021 are listed below. For more detail on each specific project, please refer to the Climate Systems website. The Climate Systems (CS) Hub research projects are as follows:

- CS1.1 Adapting to tomorrow's climate
- CS1.2 Indigenous-led knowledge and response to climate change
- CS1.3 Regional knowledge for local action
- CS1.4 Understanding climate variability
- CS1.5 Preparing for emerging climate extremes
- CS1.6 The changing Ocean's coastal and climate impacts
- CS1.7 Modelling the future
- CS1.8 Australia's land and ocean carbon and acidification.

## Missions

NESP 2 also includes research focused on four functional missions, each led by a single hub but progressed in conjunction with all hubs. These missions are designed to facilitate cross-hub collaborations and consideration of the environment as an integrated whole

We are working toward coordination across the other Hubs and Missions to deliver collaborative outcomes for the whole of NESP program. All four Hubs have committed to working together in this delivery. We will appoint Mission champions to help facilitate each Mission program (CS1.1). Likewise, each of the other three Hubs has agreed to identify a Climate Adaptation Mission champion to facilitate Mission-led research.

## Emerging Priorities

Emerging priority research may be initiated by the Minister, the department or other key end users, and a proportion of the hub's budget is set aside for emerging priorities. Hubs will submit project plans for emerging priority research as required. As with annual research plans, these will be assessed in

relation to alignment with high priority needs and adherence to NESP guidelines and approved by the department. There are no emerging priorities projects included with this research plan.

## Engaging with research users

This Research Plan reflects an understanding of the considerable benefits of investing time in identifying and prioritising stakeholders. The investment should net a benefit from efficient effort in engaging stakeholders, matching ambition and needs to Hub resourcing and capability, and provide a strategic research program that underpins the life of the Climate Systems Hub.

Over the inception phase of RP2021 we will work through a scoping and engagement process with the following five steps:

<p><b>Step 1 Identify, analyse, plan</b> (July - August 2021)</p>	<ul style="list-style-type: none"> <li>Identify who are our stakeholders, key-groupings and sub-groupings</li> <li>analyse their interest in the Hub outcomes and outputs, the role they might play in the Hub, any information that might help us better understand their needs, priorities and issues</li> <li>plan our approach to different groups, identify priority stakeholders (and why they are a priority) and how we will engage with stakeholder groups</li> <li>establish within hub co-design working group (representatives from projects, knowledge brokering, data wrangling, Indigenous engagement and communication teams).</li> </ul>
<p><b>Step 2 Engage</b> (July - September 2021)</p>	<ul style="list-style-type: none"> <li>Within Hub review of NESP1 achievements and impacts, research gaps, key stakeholders</li> <li>understand needs – what problems are stakeholders trying to answer.</li> </ul>
<p><b>Step 3 Hub wide strategic planning</b> (September - October 2021)</p>	<ul style="list-style-type: none"> <li>Review user needs and identify key pathways to impacts that will inform research themes</li> <li>test and refine strategic priorities for Hub and Mission</li> <li>build research and activity themes for RP2022 and forward.</li> </ul>
<p><b>Step 4 Prioritise and scope research projects</b> (October - November 2021)</p>	<ul style="list-style-type: none"> <li>Review and refine program logic with DAWE</li> <li>identify project opportunities and research questions within themes</li> <li>prioritise projects based on national application (transferable outcomes), capability and partnerships.</li> </ul>
<p><b>Step 5 Co-design projects</b> (November 2021 – March 2022)</p>	<ul style="list-style-type: none"> <li>Project leaders engage and co-design projects with key users and partners</li> <li>project plans developed and submitted as part of RP2022.</li> </ul>

Engaging with stakeholders to ensure activities deliver fit-for-purpose outcomes and outputs, is at the core of the Hub and Mission success. By undertaking a process of stakeholder engagement we seek to ensure:

- we have a good understanding of the views and needs of our stakeholders
- there is effective engagement with a wide range of stakeholders, including key influencers, to maximise awareness of the Hub's work and the potential for uptake and use of outputs
- we understand how our stakeholders which to be engaged with and communicated to our work
- stakeholder-relevant research priorities are identified in support of the Hub and Climate Adaptation Mission, contributing towards impact and uptake

- key information and advice from stakeholders feed into the design, development and implementation of Hub and Mission research, products, and communication.

To facilitate two-way engagement between technical content experts and users, we will appoint a co-design leader within each research project. They will facilitate engagement, scoping and co-design across research themes and participate in the Hub's Co-design Working group alongside our Knowledge Brokers, Indigenous Facilitator, Data Wrangler, Communications Officer and Hub Leads. The Co-design Working group will help facilitate and coordinate stakeholder engagement.

Through the co-design process, we will develop prioritised research goals for the Climate Systems Hub that build integrated pathways bringing together physical science, ecological knowledge, Indigenous knowledge, practice, place-based knowledge and policy directed to a specific need or outcome. For example, a prioritised research goal may be directed to a specific natural system such as coasts or marine ecosystems, have a regional or sector focus, or directed to a specific outcome (e.g. a decision support tool or knowledge platform). It is possible the goals will be a combination of these.

## Expected outcomes and outputs

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The expected outcomes of the NESP are to produce research that:

- enhances our understanding of Australia's environment, climate and weather
- is communicated clearly to relevant stakeholders and the public
- is discoverable and accessible
- informs decision-making and addresses environmental priorities.

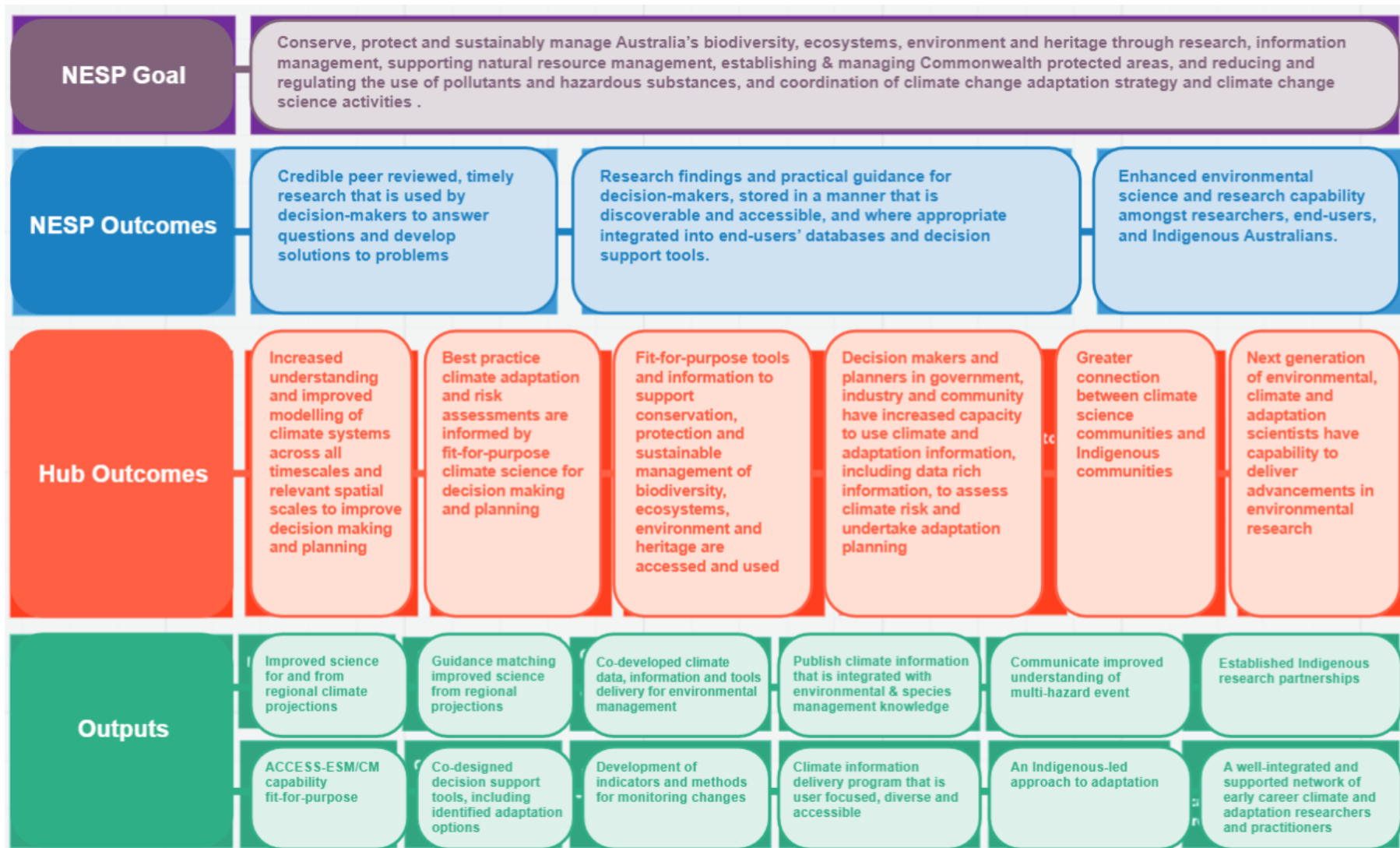
Research under the NESP is expected to inform the policy and program delivery of the Department of Agriculture, Water and the Environment. More broadly, it will engage and inform key stakeholders with an interest in the outputs of environmental and climate science research, including state and local governments, business and industry, community groups, Indigenous land managers, Indigenous communities, and education institutions.

### Hub outcomes and outputs

Our draft program logic (Figure 2) provides an initial vision of the Climate System Hub strategic goals. It demonstrates linkages from foundational research to Indigenous Facilitation, the Climate Adaptation Mission, Knowledge Brokering and Data Management approaches. The program logic will be refined through the inception phase. In particular we will look to test the identified outcomes and refine our outputs and activities. It will also be the building block of the Hub's monitoring and evaluation activities. We will use a log-frame approach to understand assumptions of meeting Hub outcomes, develop a set of questions to ask and indicators to demonstrate progress toward each outcome. A monitoring and evaluation framework will be developed as part of the start-up activities in RP2021. The program logic will be revisited each year to test if it remains fit for purpose. In order to achieve this iterative, co-design approach, 2021 will be spent establishing collaborative partnerships, understanding research gaps and needs, shaping the strategic vision of the program and prioritising research projects and outputs.

We begin in RP2021 by addressing key climate challenges that can be addressed by research partners representing Australia's climate science capability excellence. The Climate Adaptation Mission is tasked to meet national needs adapting to tomorrow's climate (CS1.1). The Hub and Mission combine to understand Indigenous-led knowledge and response to climate change (CS1.2). The nexus of foundational and applied science will produce regional knowledge for local action (CS1.3). Interpreting these efforts requires a deep understanding of climate variability (CS1.4). Such understanding facilitates preparing for emerging climate extremes (CS1.5), and for the changing ocean's coastal and climate impacts (CS1.6). The ACCESS model will be used for modelling the future (CS1.7) of global climate. Policy relevance includes informing Australia's land and ocean carbon and acidification (CS1.8).

The Climate Systems Hub will contribute to shaping national resilience by building a climate research program with practical on-ground results, integrated across broader risk and resilience initiatives for Australia. The Climate Systems Hub provides the opportunity to further develop Australia's climate science capability while working directly with adaptation practitioners. Our vision involves scientists, practitioners, data-users and decision-makers participating in a feedback loop.



**Figure 2:** Climate Systems Hub draft program logic provides indicative Hub outcomes and outputs. We anticipate a revised program logic will be completed for RP2022, co-developed through stakeholder engagement.

## **Foundational research**

Understanding the physical processes behind large-scale climate drivers and how they interact has been the longstanding goal of climate scientists around the world. With the added complexity of unprecedented climate change, it is crucial that we understand how the drivers of Australian climate will change in response to global warming. Knowing how key variables like rainfall and temperature will fluctuate and change in various regions is the basis of policy planning and decision-making. Current projections and information based on previous research, provides a range of future scenarios that can be difficult to plan to. In some regions, for example, plausible scenarios of rainfall change include both drier or wetter conditions. While we can respond to climate change with current projections, increased precision of projections will help iteratively refine adaptation responses and improve efficiencies in actions.

It may not be easy to draw a direct line between foundational research and policymaking, however the pursuit of fully understanding the climate system is a mammoth task faced being tackled piecemeal by every climate scientist around the world. It is important to keep in mind that every advancement in understanding is a step towards i) better representation of physical processes in the models, which then leads to ii) more reliable and accurate climate projections, which leads to iii) better decision making and a more informed public. Ultimately, we aim to contribute to a society, nation, and world which is prepared for the climate “code red for humanity” (U.N. Secretary-General António Guterres, 2021).

## Outcomes for 2021

Key outcomes for RP2021 include:

- a well-defined understanding of key end-user knowledge needs obtained through knowledge brokering and co-design activities
- increased collaboration and cooperation across climate science, adaptation science efforts, social science and ecological science to more effectively build knowledge and solutions for environmental management and decision making
- effective engagement with stakeholders and partner networks building on those established in NESP Phase 1 to ensure the Climate Systems Hub produces fit-for-purpose research and outputs
- synthesised and accessible climate science research to support decision making and build capacity
- continuing investment in foundational science capability.

The key outputs for RP2021 include:

- finalised Knowledge Brokering, Communication, Data management, and Indigenous Partnerships strategies
- a co-design framework to guide engagement, research prioritisation and co-design throughout the life of the Hub
- a monitoring and evaluation framework and implementation plan
- a co-developed research program that targets user needs, builds cross-hub collaboration and supports end-user needs to manage their climate risks
- identification of priority projects, project teams and stakeholder partners for the next RP2022 that address the key strategic outcomes of the Climate Systems Hub
- submission of draft RP2022
- a suite of reports, communication outputs and draft journal papers that capture new insights arising from continued analysis of NESP Phase 1 research
- a monitoring and evaluation framework.



## Collaboration and partnerships

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The 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.

As detailed in our application, to be truly effective, large scientific projects begin with a deep exploration of both end user needs and existing complementary research and guidance. The DAWE and other levels of government (including our partner states/territories through the Interjurisdictional Chief Environmental Scientists Community of Practice (IJCES CoP)) are a gateway for support, advice and networking. These institutes with their broader visions and mandates provide essential advice on connections to larger risk and resilience initiatives. We will work with DAWE and other end-users through governance arrangements and throughout project life. They will be part of project design, planning, production, testing and delivery. We hope in this way they will also be our greatest advocates and a pathway to broader communication and up-take. Individual data contacts for each project have been, or will be, identified. These data contacts will work with the Hub's Data Wrangler to ensure that project data is identified and treated in accordance with the Hub's Data management strategy.

We will build collaborative partnerships with all Hubs and Missions to address complex, cross-disciplinary challenges and provide practical solutions. Participation in the Cross-Hub Senior Governance Committee and Cross-Hub Mission Forum will be important avenues for identifying cross-Hub opportunities for multi-disciplinary research of particular benefit to stakeholders. Likewise, the Indigenous Facilitation network supported by the department will provide opportunities for contribution and cross-hub collaboration on projects specifically supporting Indigenous-led and informed activities, under the guidance of the Hub's Indigenous Partnerships Strategy.

The Climate Systems Hub comprises 8 partners. The new Hub welcomes the Climate Science Community of Practise (CoP) of the Interjurisdictional Chief Environmental Scientists (IJCES). They bring highly relevant experience into delivering applied science outcomes at the community level across all regions of the nation. The other seven partners are well known to DAWE through their role in the predecessor NESP Earth Systems and Climate Change (ESCC) Hub. The participation of these partners ensures the Hub's prominence as the central go-to place for expertise in Australian climate science. The CSIRO and BoM maintain continuity over a long history as national agencies central to our climate science and delivery. The five participating universities enhance the depth of research capability within the Hub, and also bring intergenerational renewal to climate systems science through their role in the Australian Research Council Centre of Excellence for Climate Extremes (CLEX). Together, these 8 partners comprise the expertise, capability and capacity to deliver Hub and NESP outcomes.

## **Partnering and collaborating with Indigenous Australians**

Our engagements encompass principles of Free Prior Informed Consent. We value engagement that is respectful to cultural protocols of the community and their country. A First Nations reference group, comprising the Indigenous Research Facilitator, knowledge broker, researchers and others when required, will continue principles of Indigenous-led and co-designed protocols, in accordance with the Hub's Indigenous Partnerships Strategy. This ensures our research accords to co-design respecting cultural protocols and safety. There are many peoples and many cultures. We respect the provision and ownership of traditional knowledge.

Our co-development protocols were seeded at the National Dialogue on Climate Change (November 2018) where relationships with 70 First Nation Peoples were developed and left deep impressions on the science and management staff involved. Our principles of Indigenous leadership and co-design continue to evolve. They have been further refined at the National First Peoples Gathering on Climate Change (NFPGCC) held in March 2021 and co-designed with researchers and First Nations Peoples; and at the Australian Meteorological and Oceanographic Society's 2020 workshop "Cross-cultural communication and climate change: considerations for engaging with First Nations peoples."

The Hub will not only build on the last six years of learning, but it is also developing an engagement framework that encompasses the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and ensures that two complex knowledge systems, modern science and ancient traditional culture, come together to provide all communities knowledge to protect country in the face of climate change. Our engagements embrace the research principles established by the Australian Institute of Aboriginal and Torres Strait Islander Studies' Guidelines for Ethical Research in Australian Indigenous Studies. We deliver Indigenous-led research and processes that build Traditional Knowledge into our research outputs.

Indigenous Cultural Intellectual Property (ICIP) will be identified as early as possible in the Hub's work and where appropriate, in individual projects. ICIP will be managed in accordance with the Hub's Indigenous partnership and Data Management strategies. The practical details will be given attention from the outset of the Hub's co-design phase and will accord with the NESP Indigenous Partnership Principles.

While it is inappropriate to identify alignment of specific projects comprising RP2021 to the 3-category approach at this early stage, we acknowledge our intent to do so through the Hub's inception (July-December 2021) and implementation (January-June 2022) of co-design over the course of this research plan. The 3-category approach and our broad intended Indigenous Partnerships stakeholder profile are further detailed below.

### ***Category 1 Approach - Consult and Collaborate***

Potential Traditional Owner participants are identified through several ways such as:

- a direct approach from a member of a Traditional Owner group via conferences and workshops
- networking within First Nations communication methods
- networking within stakeholder interactions
- existing Traditional Owner relationships and their partners.

Pre-discussions with the Indigenous Facilitator and Knowledge Broker, then initial discussions with the Traditional Owner group governance process identifying their major concerns, often rapid changes to their environment impacting their Indigenous cultural heritage. These discussions should include the following actions and priorities:

- Consult with the Traditional Owner group to co-design agenda
- open a framework of inclusiveness and Indigenous-led priorities - important from inception

- consideration that Traditional Owners need to be empowered and feel empowered as they have cultural authority and agency of their respective country.

Communication via email and phone calls are made to convey:

- acknowledgement of discussions
- an opportunity to meet with key members/representatives of the Traditional Owner group via their respective governance processes
- the role of NESP Phase 2 – Climate Systems Hub, including key milestones of NESP Phase 2
- outline the role of the Indigenous Facilitator.
- outline the role of the Knowledge Broker
- explain co-design principles
- explain Indigenous-led.

Given Indigenous perspectives encompassing their value and knowledge systems, Traditional Owners have progressively over millennia responded to a process of adaptation. It is crucial from the outset in the field of climate science, or the changing climate observed by Traditional Owners impacting Land and Sea Country, that discussions of adaptation is likely to occur. It is therefore prudent to include the Climate Adaptation Mission Lead (pending capacity) to participate and learn with Traditional Owners, Indigenous Facilitator and knowledge broker towards a co-design and multi-disciplinary approach in the research design and planning. Further capabilities are identified through these initial discussions.

Identified cross-hub collaboration through the Indigenous Facilitation Network are kept abreast in terms of potential Indigenous researchers and core capabilities. Indigenous consultation and engagement are embedded in the learnings of the National First Peoples Gathering on Climate Change and are consistent with the 3 Category Approach.

**Category 2 – Partnership development**

Category 2 is based on the efficacy of the approach and engagement executed in Category 1.

**Category 3 – Communicate outcomes**

Throughout the development and implementation of the research, all key decisions and strategies are to be outlined in an appropriate communicate method to Traditional Owners and relevant stakeholders directly and to the public indirectly (websites – Traditional Owner, Local stakeholders and partners, CS Hub Coms, DAWE, newsletters etc). All desktop studies are outlined to respective Traditional Owner groups.

**Indigenous Partnerships Table of Stakeholders**

The Climate Systems Hub Indigenous Partnerships strategy may from time to time consult on the following list of stakeholders relevant to cultural authority, protocols and processes, policy, and general matters.

<b>Hub</b>	<b>Primary</b>	<b>Secondary</b>
<ul style="list-style-type: none"> <li>• Climate Science Partners</li> <li>• NESP Indigenous Facilitation Network</li> </ul>	<ul style="list-style-type: none"> <li>• Core National First Peoples Gathering on Climate Change (NFPGCC) working group – former Steering Committee members</li> <li>• Traditional Owner groups corporations</li> <li>• Registered Native Title Bodies Corporate</li> <li>• Prescribed Body Corporate</li> <li>• Aboriginal Land Councils</li> <li>• Indigenous corporations</li> <li>• Departmental policymakers</li> <li>• Indigenous Advisory Committee</li> <li>• Identified policymakers in other federal government departments.</li> </ul>	<ul style="list-style-type: none"> <li>• Peak Indigenous bodies</li> <li>• General public</li> <li>• Environment non-government organisations</li> </ul>

The funding must be expressed, in the table below, as a percentage of the total for any given calendar year noting that funding for applied science, decision tools and practical management options must total at least 70% of the funding. The balance of the funding can be allocated between knowledge capture (10-20%), communication (5-10%), and administration (5-10%). 10% of total budget per calendar year must be set aside for emerging priorities.

<b>Item</b>	<b>Percentage</b>
Applied science, decision tools and practical management options	70%
Knowledge capture	15%
Communication	5%
Administration	10%

Under the terms of the NESF, the minimum total for recipient and other contributions for the life of the program is 100% of the funds paid by the department under the NESF Funding Agreement.

## References

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Hewitt, C.C., Street, R. (2021) Climate services for managing societal risks and opportunities, *Climate Services*, 23, <https://doi.org/10.1016/j.cliser.2021.100240>

## APPENDIX 1: NESP Project assessment criteria

### 1. Impact

- What is the management action or policy development that could be taken as a consequence of the delivery of this project? Is this clearly articulated in the project plan?
- Does the project plan refer to responsibilities, policies or programs to which the research will be directly relevant?
  - Does the project plan identify one or more departmental contacts, and were they consulted in the development of the draft? Were their suggestions taken on board?
  - Does the project plan incorporate one of the research needs identified by the department for the hub?
- Are the outcomes articulated in the project plan directed towards end-user needs/ practical management?
- Are the outcomes clearly articulated?
- Does the research clearly support policy development, regulation and investment?
- Is there a path to adoption for the research outcomes and direct links to line areas and the responsibilities of the department?
- How does the project align with the NESP Research scope overview and research priorities identified for the hub?
  - Does the research approach clearly address one or more of the research priorities (for example, rather than the plan just saying it does)?
  - How strong/direct is the link between the research proposal and the priorities identified? Is there a large proportion of the research that doesn't clearly address a priority?
  - Does the project plan identify one or more departmental contacts, and were they consulted in the development of the draft? Were their suggestions taken on board?
  - Does the project plan incorporate one or more of the research needs identified by the department for the hub?
- At a hub level how much funding is proposed for projects addressing the same research priority? Is the distribution of funds across priorities appropriate?

### 2. Outputs

- Are the outputs of the project clearly described, with at least some tailored to support management/policy actions (for example, to assist uptake of the research by the department and other end-users)?
- If outputs are to be designed with stakeholders to directly meet their needs, is this clearly stated?

### 3. Project design

- Is the project well designed?
- Do you have any suggestions that would increase the value of the project?
- Is there a clear link between the research and practical and tangible environmental outcome (direct links or secondary links with a clear path to outcomes)?
- Could the research question or approach be refined to better suit research needs or the needs of other end-users? Are specific research questions clearly articulated, or is there a clear approach to doing so?
- Does the project leverage other programs or investments?

- Are you aware of other work being undertaken, or done in the past, that the project may duplicate?
  - Does the proposal refer to and acknowledge previous or existing work (for example, previous Australian Government programs, state and territory government research), and clearly build on the outcomes of that work?
- Is there a scanning or synthesis process proposed that will review existing understanding to help identify gaps and specific research questions? Will this process consider relevant research beyond that done by the hub partners?

#### **4. Data management and accessibility**

- Are the NESP Data management and information guidelines being followed?
- Do the project proposals list a repository or repositories for data, and indicate timing for publishing of the data? Note: Timing of publication should be not more than 1 year after the end of the project.
- Have metadata standards been indicated? For example, ISO 19115-1, OGC or ISA 19139 MCP
- If an exception is stated for sensitive data, cultural data or species data, does it align with the NESP Data management and information guidelines.
- Has the hub indicated that publications will not be made open access? Note: All publications are to be open access at either the point of publication or at a specified future date.
- Has a data contact been specified for each project?

#### **5. Knowledge brokering and communications**

- Do the project proposals describe the approach to knowledge brokering and communications?
- Have specific communications and knowledge brokering actions and activities been included in the project proposals? For example:
  - Does the proposal identify how end-users will be engaged from the outset of the project?
  - Does the proposal identify pathways to adoption by end-users?
  - Have target audiences and stakeholders been considered?
  - Does the proposal align with the hub's knowledge brokering and communications strategy?
- Do the project proposals include a commitment to developing activities in an appropriate timeframe?

#### **6. Indigenous inclusion**

- Do the projects have appropriate Indigenous inclusion?

#### **7. Time and budget**

- What are the risks associated with delivering the project on time and within budget?
- Does the approach represent the best and most efficient way of addressing the research need?
- What is the scale and scope of the research needed to deliver the research outcomes? Is it commensurate with the budget and time and resources allocated to the project?

#### **8. Project personnel**

- Does the project team provide evidence that they have a history of delivering research that is useful and used by managers and policymakers?
- Is there evidence that their project meets the objectives of the program and requirements of the Funding Agreement?

- Has the project team demonstrated engagement with the department and other stakeholders in developing and delivering research?
- Is there any feedback from departmental staff involved in previous work delivered by this research group?
  - If this feedback consolidates any concerns with the current project proposal, consider deferring or providing specific feedback.

**Recommendation**

<b>Well supported and meets criteria</b>	<b>Modifications required</b>	<b>Not supported and/or does not meet criteria</b>	<b>Defer for resubmission</b>
The proposed project performs strongly against the majority of criteria, and there are no 'Red flags'. It is well supported by end users in the department.	The proposed project would perform strongly against the majority of criteria if identified modifications are made prior to final assessment. 'Red flags' are relatively easily resolved or clarified.	Considerable further work is required. Red flags will be complex/time consuming to resolve/ Project not well scoped/does not meet Department's needs.	Significant changes or significant additional information required. Project proposal to be further developed and resubmitted.