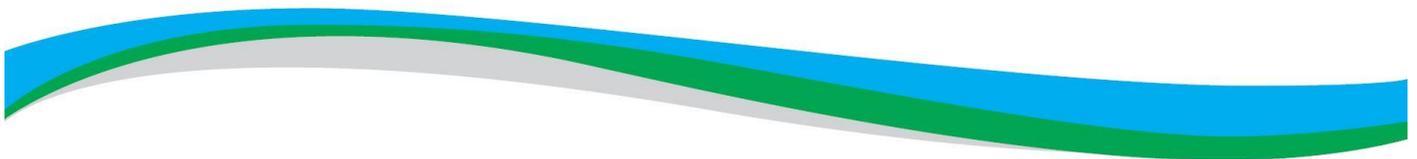


# Annual Research and Development Plan and Budget 2018-19



[www.goyderinstitute.org](http://www.goyderinstitute.org)



The Goyder Institute for Water Research is a partnership between the South Australian Government through the Department for Environment and Water, CSIRO, Flinders University, the University of Adelaide, the University of South Australia and the International Centre of Excellence in Water Resources Management. The Institute enhances the South Australian Government's capacity to develop and deliver science-based policy solutions in water management. It brings together the best scientists and researchers across Australia to provide expert and independent scientific advice to inform good government water policy and identify future threats and opportunities to water security.



Goyder Institute Associates typically contribute expertise and capabilities in areas outside of those contributed by the Goyder Institute Partners. Associates may participate in capacity building, knowledge exchange and/or specific research projects, and invest in the Goyder Institute Research programme with in-kind commitments in the same manner as Goyder Institute Partners. The Associate organisations below have contributed to outcomes of Goyder Institute research projects.



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## CONTENTS

1	Introduction.....	1
1.1	Research programme .....	1
1.2	Knowledge management.....	2
2	Overview of progress during 2017-18 .....	3
2.1	Strategic planning.....	3
2.2	Research programme .....	3
2.3	Knowledge management.....	3
3	Planned activities for 2018-19.....	8
3.1	Institute funded research projects .....	8
3.2	Knowledge management activities .....	8
3.3	Additional research opportunities.....	9
4	Budget .....	13
4.1	Research programme .....	13
4.1	Administration and knowledge management – 2018-2019.....	13
4.2	Financial position.....	16

# 1 Introduction

The Goyder Institute for Water Research is a partnership between the South Australian Government through the Department for Environment and Water, CSIRO, Flinders University, the University of Adelaide, the University of South Australia and the International Centre of Excellence in Water Resources Management. The Institute enhances the South Australian Government's capacity to develop and deliver science-based policy solutions in water management.

The Institute is currently in its second-term (2015-2019) following a successful first-term (2010-2015). The *Strategic Research Plan 2015–2019* provides a high-level overview of the long-term strategic outcomes for the Goyder Institute research programme for its second term. It identifies three broad research Impact Areas that were identified based on extensive consultation with stakeholders, where research effort of the Institute will be focussed:

## 1. **Economic Development**

Sustainable opportunities for economic development and job creation in South Australia that is underpinned by evidenced-based water resource information.

## 2. **Healthy Ecosystems**

Knowledge to enhance environmental management of urban, regional and natural assets and identification of alternative approaches to achieving multiple outcomes.

## 3. **Climate Action**

Proven opportunities for managing climate risk that support the creation of new, innovative industries that are climate resilient and grow the economy to achieve the State's climate and environmental targets.

Water is central to each of these Impact Areas and is implemented through an integrated set of research projects that contribute to the achievement of the objectives of the Institute. The *Annual Research and Development Plan and Budget* provides an overview of planned activities and budget for the current year, consistent with the *Strategic Research Plan 2015–2019* and Approved Research Projects.

## 1.1 Research programme

The research projects within each Impact Area builds upon research by the Institute undertaken in the first-term - harnessing the research outcomes and partnerships to build and inform the new research investments. Within each Impact Area there are themes that target research investment designed to deliver specific outcomes and/or policy directions that have been identified as priorities by both government agencies and other water industry partners.

The *Strategic Research Plan 2015–2019* identified the proposed distribution of research funding across the three Impact Areas (Table 1). To ensure that the Goyder Institute continues to deliver relevant outcomes for government in the short-, medium- and long-terms, the *Strategic Research Plan 2015-2019* identified the proposed distribution of research funding across different project horizons, with:

- 10-15% to short-term (less than 12 months) targeted science advice projects with clear and immediate uptake in policy and management;
- 25-30% to medium-term applied research projects (1-2 years); and
- 55-60% to longer-term applied research projects (2-3 years).

A target of 30% external co-investment in research projects was established for the second term of the Goyder Institute (Table 1).

**Table 1.** Proposed Investment for each of the three Impact Areas and Goyder Institute outlined in the *Strategic Research Plan 2015-2019*.

Impact Area	Cash contributions	In-kind partner contributions	External contribution target	Total
<i>Economic Productivity</i>	\$3,600,000	\$3,600,000	\$2,400,000	\$9,600,000
<i>Healthy Ecosystems</i>	\$2,000,000	\$2,000,000	\$1,200,000	\$5,200,000
<i>Climate Action</i>	\$1,000,000	\$1,000,000	\$300,000	\$2,300,000
Total	\$6,600,000	\$6,600,000	\$3,900,000	\$17,100,000

The investment by the Goyder Institute considered the following principles in the development and evaluation of research project proposals:

- Research will directly contribute to meeting a priority set by state government;
- Research will demonstrably support the capacity of state government to implement adaptive management processes in water management;
- Research will build capacity inside state government to develop better policies, and inside research organisations to undertake better science;
- Investment will be towards the best initiatives amongst the research partners that have a demonstrated capacity to achieve the highest standards in science;
- The highest return in terms of outcomes achieved per dollar invested will be supported;
- All partners have had the opportunity to engage in project development;
- Each project proposal will include team members from at least two research partners;
- Investment will result in high-quality research outcomes;
- There must be a clear and funded pathway for technology transfer to ensure that research outcomes are adopted;
- Project leaders will have a demonstrated excellence in project management;
- Administrative overheads will be kept to a minimum; and
- Preference will be given to projects with a significant proportion of external funding (co-investment) that contributes to the strategic objectives of the Institute.

The Research Programme is managed through the Goyder Institute Office. This includes undertaking knowledge management activities that are focussed on facilitating direct and indirect uptake of research outputs into decision-making in both the short- and long-terms.

## 1.2 Knowledge management

A focus of the Goyder Institute is to ensure that the research outcomes inform decision-making. This includes undertaking focussed knowledge management activities that ensure that the Goyder Institute science is available in an accessible and meaningful format now and in the future. This will help ensure that the expert science created by the Goyder Institute is embedded in partner organisations and other stakeholders that could benefit from the outcomes of the research investment.

## 2 Overview of progress during 2017-18

### 2.1 Strategic planning

With the current tranche of funding due to end on 30<sup>th</sup> June 2019, the Management Board and Director of the Institute focussed effort during 2017-2018 on planning for the future of Institute. The Management Board approved extending the second-term of the Institute to 30<sup>th</sup> June 2020 using the current tranche of funding. This will allow the Institute to successfully complete the current research programme and knowledge management activities; identify and establish new collaborative research opportunities; and transition to the third-term of the Institute. New research opportunities will be pursued through multiple sources, including Commonwealth, Interstate and International Governments and Industry in addition to the State Government.

### 2.2 Research programme

Significant progress was made during 2017-2018 (Table 2). This included the establishment of four new research projects and the commencement of projects within the *Healthy Ecosystems* Impact Area (Table 2). Newly established projects within the *Health Ecosystems* Impact Area were:

- *Ecological connectivity of the River Murray: managing ecological outcomes and water quality risks through integrated river management*
- *Socio-ecological assessment of the ecosystems, industries and communities of Spencer Gulf*
- *Translating Ngarrindjeri Yannarumi into water resource risk assessments*
- *Science advice for restoring the Ecological Character of the South Lagoon of the Coorong*

In addition, a new project within the *Climate Action* Impact Area was established: *Carbon Offsets Research to Support the State Carbon Sequestration Strategy*. Further details regarding the projects can be found on the Goyder Institute website ([www.goyderinstitute.org](http://www.goyderinstitute.org)).

### 2.3 Knowledge management

Knowledge management continued to be advanced during 2017-2018 (Table 2). This included the establishment of Project Advisory Committees of new research projects and ongoing involvement in Project Advisory Committees in existing projects. The direct involvement in government staff within projects continued to be a critical component of facilitating the uptake of the research into government decision-making. Additional specific highlights have included:

- A training session for water professionals for the *Climate Resilience Analysis Framework and Tools* project, which was attended staff from 8 different organisations.
- A Water Industry Alliance *Lunch and Learn* event on the *Small-Scale Desalination by Capacitance Deionization for Treatment of NAP Waters* project.
- Participation at the South Australian Natural Resource Management Conference including:
  - A Goyder Institute panel session regarding future water challenges and opportunities.
  - A Goyder Institute conference session featuring the projects: *Coastal carbon opportunities: demonstrating additionality and potential for future offsets in South Australia*; *From salt to C - carbon sequestration through ecological restoration at the Dry Creek Salt Field*; and *Research to support the State carbon sequestration strategy*.
  - Individual presentations featuring the projects: *Knowledge gap analysis and testing model fitness for offsetting greenhouse gas emissions through increasing soil organic carbon and improving nitrogen efficiency in South Australian clay modified soils*; *Ecological connectivity of the River Murray: managing ecological outcomes and water quality risks through integrated river management*; and *Translating Ngarrindjeri Yannarumi into water resource risk assessments*.

**Table 2.** Summary of progress for Research projects during 2017-2018.

Impact Area	Theme	Project title	Partners	Project aim	Science progress	Knowledge management progress
<i>Economic Development</i>	Mining and Energy	<i>Finding long-term outback water solutions</i>	CSIRO, Flinders University, DEW	Identify and characterise potential groundwater resources in the Musgrave Province of the Anangu Pitjantjatjara Yankunytjatjara (APY) Lands, including their capacity to provide viable water supplies.	<ul style="list-style-type: none"> <li>• Drilling access approved by APY Lands Board and drilling mobilised.</li> <li>• Survey of approximately 40 wells and installation a groundwater level logger.</li> <li>• Completion of report on the initial interpretation of Airborne Electromagnetic data and mapping.</li> <li>• Completion of a technical report describing characteristics of the unconstrained regional aquifer.</li> </ul>	<ul style="list-style-type: none"> <li>• Presentations of preliminary findings to the project Steering Committee.</li> <li>• Consultation with the APY Lands Board.</li> </ul>
	Northern Corridor	<i>Sustainable expansion of irrigated agriculture and horticulture in Northern Adelaide Corridor</i>	SARDI, CSIRO, Flinders University, UniSA, DEW	Assess how the water resources available in the Northern Adelaide Corridor can be used sustainably for the development of industries that generate new employment opportunities in the region.	<ul style="list-style-type: none"> <li>• Completion of soil characterisation.</li> <li>• Development of conceptual and 1-dimensional numerical soil models.</li> <li>• Development of interpolated phreatic groundwater depth maps.</li> <li>• A summary of water quality data for available water sources (e.g. reclaimed water, Gawler River and stormwater).</li> </ul>	<ul style="list-style-type: none"> <li>• Reports summarising the soil chemistry data have been delivered to 3 growers that allowed access to their properties for soil sampling.</li> </ul>
		<i>Assessment of small-scale desalination by capacitive deionization for treatment of Northern Adelaide Plains waters</i>	UniSA	Assess the viability of capacitive deionisation (CDI) technology for the desalination of marginal-salinity groundwater and recycled water for horticultural production in the Northern Adelaide Plains.	<ul style="list-style-type: none"> <li>• Field-testing of CDI unit at two locations with recycled water and slightly brackish groundwater.</li> <li>• Compilation of information that can support decision-making by stakeholders and government agencies on desalination technology options including CDI systems for the intensive horticulture industry.</li> <li>• Production of final technical report.</li> </ul>	<ul style="list-style-type: none"> <li>• Water Industry Alliance <i>Lunch &amp; Learn</i> session.</li> <li>• Storage of data.</li> </ul>
<i>Climate Action</i>	Carbon Neutral	<i>Coastal carbon opportunities: demonstrating additionality and potential for future</i>	University of Adelaide, CSIRO, SA Water, DEW	Estimate baseline carbon stocks and carbon storage in South Australian coastal ecosystems (seagrass, mangrove and saltmarsh environments) and	<ul style="list-style-type: none"> <li>• Completion of all fieldwork including: installation of sediment elevation tables and subsequent monitoring program; collection of sediment core and vegetation samples (carbon content and</li> </ul>	<ul style="list-style-type: none"> <li>• Presentations of preliminary findings to the Project Advisory Committee.</li> <li>• Participation in national workshop focused on developing methods for including blue carbon</li> </ul>

		<i>offsets in South Australia</i>		demonstrate potential for future carbon offsets.	dating in cores); and drone-based vegetation surveys. <ul style="list-style-type: none"> <li>• Development of drone-based methods for modelling mangrove above-ground biomass.</li> <li>• Assessment of broad-scale change in mangrove and saltmarsh distribution across the state.</li> </ul>	projects into the Emissions Reduction Fund. <ul style="list-style-type: none"> <li>• Presentations at the South Australian NRM Science conference.</li> <li>• Maintaining project team website and social media accounts.</li> </ul>
		<i>From salt to C; carbon sequestration through ecological restoration at the Dry Creek Salt Field</i>	Flinders University, University of Adelaide, UniSA, DEW	Ascertain a proof of concept that reconnecting coastal wetlands to tidal flow will lead to a re-establishment of saltmarsh and mangrove vegetation, carbon abatement and the provision of other ecosystem services.	<ul style="list-style-type: none"> <li>• Completion of the first field surveys - sampling soil carbon and greenhouse gas emissions before and after tidal reconnection.</li> <li>• Completion of pilot experiments on mangrove propagule establishment in different soils.</li> <li>• Evaluation of carbon accounting methods is underway and a database for co-benefits is being populated.</li> </ul>	<ul style="list-style-type: none"> <li>• Presentations of preliminary findings to the Project Advisory Committee.</li> <li>• Workshops with Silverstrum Climate Associates, including a masterclass on standard carbon accounting methods.</li> <li>• Presentation of the project as the only case-study from Australia at a workshop with the Commonwealth Department of Environment and Energy on a 'Blue Carbon' method for the Emissions Reduction Fund.</li> <li>• Presentation at the South Australian NRM Science conference.</li> </ul>
		<i>Knowledge gap analysis and testing model fitness for offsetting greenhouse gas emissions through increasing soil organic carbon and improving nitrogen efficiency in clay modified soils</i>	SARDI, DEW	Identify knowledge gaps for offsetting greenhouse gas emissions through increasing soil organic carbon and improving nitrogen efficiency in South Australian clay modified soils.	<ul style="list-style-type: none"> <li>• Development of a detailed database of soil carbon stocks in clay modified soils with associated soil properties, plant productivity, climatic and implementation practices.</li> <li>• Identification of parameters that require further research to enable accurate carbon stock predictions using the National Carbon Accounting model for clay modified soils.</li> <li>• Preparation of a draft technical report.</li> </ul>	<ul style="list-style-type: none"> <li>• Presentations of findings to the Project Advisory Committee.</li> <li>• Presentation at the South Australian NRM Conference.</li> </ul>

		<i>Carbon offsets research to support the State carbon sequestration strategy</i>	UniSA, University of Adelaide, DEW	Assess South Australian carbon offset supply opportunities and limitations and co-benefit opportunities for a range of available Emission Reduction Fund methods in different land use zones.	<ul style="list-style-type: none"> <li>• Economic analysis (carbon supply and co-benefits) conducted on four case-studies.</li> <li>• Preparation of a seven draft technical report.</li> </ul>	<ul style="list-style-type: none"> <li>• Presentations of preliminary findings to the Project Advisory Committee.</li> <li>• Presentation at the Australian Agricultural and Resource Economics Society Annual Meeting.</li> <li>• Two presentations about at the South Australian NRM Conference.</li> </ul>
	Extreme Events	<i>Climate resilience analysis framework and tools</i>	University of Adelaide, CSIRO	Develop and demonstrate a methodology to assess the vulnerability of industries and natural resources to the impacts of climate change and hydroclimate variability.	<ul style="list-style-type: none"> <li>• Completion of the development of the climate resilience framework and tools.</li> <li>• Completion of open-source software, <i>foreSIGHT</i>.</li> <li>• Completion of technical report outlining the framework.</li> <li>• Completion of a technical report outlining a case-study on managed aquifer recharge.</li> </ul>	<ul style="list-style-type: none"> <li>• Running of a training workshop that was attended by 25 water professionals from CSIRO, DEW, SA Water, Bureau of Meteorology, PIRSA, Water Research Australia, Salisbury Council and Inside Infrastructure.</li> <li>• Presentations of findings to the Project Advisory Committee.</li> <li>• Presentation at the MODSIM conference.</li> </ul>
Healthy Ecosystems	Catchments	<i>Ecological connectivity of the River Murray: managing ecological outcomes and water quality risks through integrated river management</i>	University of Adelaide, CSIRO, SARDI	Identify the optimal operations of multiple infrastructure assets to facilitate the transfer of resources, propagules and biota and manage water quality risks.	<ul style="list-style-type: none"> <li>• Completion of the setup of a hydrological model that integrates the River Murray from the SA border to Lock 3, including Chowilla, Pike and Katarapko Floodplains.</li> <li>• Collation and interpretation of historical data to identify periods of increasing cyanobacterial abundance.</li> <li>• Completion of the first year of field data collection.</li> </ul>	<ul style="list-style-type: none"> <li>• Presentations of preliminary findings to the Project Advisory Committee.</li> <li>• Presentation at the South Australian NRM Conference.</li> </ul>
	Coasts and marine	<i>Socio-ecological assessment of the ecosystems, industries and communities of Spencer Gulf</i>	SARDI, University of Adelaide, Flinders University, DEW	Undertake a comprehensive assessment of the socio-economic status of the ecosystems, industries and communities of Spencer Gulf and develop tools for evaluating the benefits	<ul style="list-style-type: none"> <li>• Development of preliminary indicators with an initial focus on physical and biological oceanography and seagrasses and socio-economic indicators.</li> <li>• Collation of existing spatial data layers.</li> <li>• Establishment of a demonstration version of a spatial analysis tool for</li> </ul>	<ul style="list-style-type: none"> <li>• Presentations of preliminary findings to the Project Advisory Committee.</li> </ul>

				and impacts of current and future activities.	identifying/evaluating the suitability of sites throughout Spencer Gulf for various activities.	
Communities	<i>Translating Ngarrindjeri Yannarumi into water resource risk assessments</i>	Flinders University, DEW, Ngarrindjeri Regional Authority	Develop and trial a tool and methodology that supports the translation of Ngarrindjeri Yannarumi Assessments into Water Resource Plan risk assessments.	<ul style="list-style-type: none"> <li>• Initiation of literature review of national and international contexts regarding the integration of indigenous knowledge, values and wellbeing into natural resources management risk assessments.</li> </ul>	<ul style="list-style-type: none"> <li>• Presentations of preliminary findings to the Project Advisory Committee.</li> <li>• Presentation at the South Australian NRM Conference.</li> </ul>	
Catchments	<i>Science advice for restoring the Ecological Character of the South Lagoon of the Coorong</i>	University of Adelaide, SARDI, Flinders University, CSIRO, DEW	Provide decision-makers with recommended actions for restoring the Ecological Character of the South Lagoon of the Coorong.	<ul style="list-style-type: none"> <li>• Expert panel workshop to discuss recommended actions.</li> <li>• Preparation of a draft technical report.</li> </ul>	<ul style="list-style-type: none"> <li>• Written briefing to the Minister for Environment and Water and DEW regarding interim recommendations.</li> </ul>	

## 3 Planned activities for 2018-19

### 3.1 Institute funded research projects

All existing research projects will be completed during 2018-2019 (Table 3). This will include the completion of field, laboratory and desktop-based research and the development and publication of technical reports. There remains \$80,958 for new research projects for the second term of the Institute. These funds will be allocated to strategic priorities of the State Government as they arise under the direction of the Research Advisory Committee and Management Board.

For 2018-2019 there also remains \$126,134 for new expert panel assessments for the second term of the Institute.

Approximately \$20,000 of this has been allocated to a new project titled *Independent review of science underpinning reductions to licensed water allocation volumes proposed in the Lower Limestone Coast Water Allocation Plan* (see further details below). The South-East Natural Resources Management Board has allocated \$50,000 to this project as an additional State Government cash contribution.

The remaining \$106,134 for expert panel assessments will be allocated to strategic priorities of the State Government as they arise under the direction of the Research Advisory Committee and Management Board.

#### ***Independent review of science underpinning reductions to licensed water allocation volumes proposed in the Lower Limestone Coast Water Allocation Plan***

This independent science review will support a South Australian Government's election commitment and will consider the science that underpinned the policies that led to proposed reductions to water allocations of irrigators in the Lower Limestone Coast Water Allocation Plan. It will determine whether the science that was used at the time of the Water Allocation Plan remains robust and continues to support the objectives of the Water Allocation Plan (sustainability of the groundwater resource to support community values and groundwater dependent ecosystems).

The project will form part of the Institute's *Economic Development* Impact Area but will have broader impacts for resource sustainability and environment water requirements and so is also relevant the *Healthy Ecosystems* Impact Area.

### 3.2 Knowledge management activities

Knowledge management activities will remain a priority during 2018-2019 (Table 3). This will include the ongoing involvement of Project Advisory Committees in all projects. Furthermore, the direct involvement in government staff within projects will continue to be a critical component of facilitating the uptake of the research into government decision-making. With the completion of all existing research projects, additional Knowledge Management activities will be undertaken, including:

- The publication of technical reports
- The publication of e-newsletter articles summarising the outcomes of research projects
- Briefing subject matter experts and policy leaders in government agencies on the research outcomes
- The production of synthesis papers and fact-sheets
- The storage of data and models in publicly-accessible formats
- Knowledge adoption workshops and training sessions
- Presentations of Goyder Institute projects in the Water Industry Alliances *Lunch and Learn* series
- Presentations of Goyder Institute projects in ICE WaRM's webinar series
- Presentations of Goyder Institute projects at international science and management conferences

### 3.3 Additional research opportunities

With the majority of the Institute's research budget for the second-term allocated, attention will be focussed on generating new research opportunities for the Institute partners, consistent with the strategic planning undertaken during 2017-2018. Several future opportunities have been identified by the Institute, which will be pursued during 2018-2019. These include:

- A food-energy-water nexus research programme
- A research programme to support the restoration of the South Lagoon of the Coorong
- A Murray-Darling Basin Freshwater Research Consortium
- A research project to support innovation in the forestry sector in the South-East of South Australia
- A research project on urban water management practices for the protection of coastal waters to support Green Adelaide
- A research project supporting climate adaption within South Australia
- Research projects working with Rajasthan Centre of Excellence in Water Resource Management
- Research projects working with Chinese and other international partners identified as part of the State Governments International water trade initiative

**Table 3.** Summary of planned activities for 2018-2019. A detailed workplan of knowledge management activities is currently being prepared - some activities outlined within the table below may be undertaken between July 2019 and December 2019.

Project title	Planned science activities	Planned knowledge management activities
<b>Finding long-term outback water solutions</b>	<ul style="list-style-type: none"> <li>• Completion of the drilling and pumping test program.</li> <li>• Completion of ground-based geophysics and a groundwater sampling program.</li> <li>• Completion of updated conceptual groundwater model and a groundwater knowledge integration system.</li> <li>• Completion of final technical reports.</li> <li>• Preparation of journal articles.</li> </ul>	<ul style="list-style-type: none"> <li>• Presentation of project findings to Project Steering Committee.</li> <li>• Presentation of findings at a stakeholder knowledge adoption workshop, webinars and Lunch &amp; Learn series.</li> <li>• Production of synthesis papers or fact sheets.</li> <li>• E-newsletter article summarising project outcomes.</li> <li>• Publication of final technical reports on website.</li> <li>• Data storage.</li> </ul>
<b>Sustainable expansion of irrigated agriculture and horticulture in the Northern Adelaide Corridor</b>	<ul style="list-style-type: none"> <li>• Preparation of guidelines for the sustainable expansion of irrigation and risk maps, integrating the HYDRUS modelling based on baseline soil status and existing soil quality guidelines for the water quality parameters identified for the different water sources.</li> <li>• Completion of final technical reports.</li> <li>• Preparation of journal articles.</li> </ul>	<ul style="list-style-type: none"> <li>• Presentation of project findings to Project Advisory Committee.</li> <li>• Presentation of findings at a stakeholder knowledge adoption workshop, webinars and Lunch &amp; Learn series.</li> <li>• Production of synthesis papers or fact sheets.</li> <li>• E-newsletter article summarising project outcomes.</li> <li>• Publication of final technical reports on website.</li> <li>• Data and model storage.</li> </ul>
<b>Assessment of small-scale desalination by capacitive deionization for treatment of Northern Adelaide Plains waters</b>	<ul style="list-style-type: none"> <li>• Completion of final technical reports.</li> <li>• Preparation of journal articles.</li> </ul>	<ul style="list-style-type: none"> <li>• Presentation of findings at a stakeholder knowledge adoption workshop, webinars and Lunch &amp; Learn series.</li> <li>• Presentation at symposium on desalination hosted by the South Australian Hydrological Society.</li> <li>• Production of synthesis papers or fact sheets.</li> <li>• E-newsletter article summarising project outcomes.</li> <li>• Publication of final technical reports on website.</li> </ul>
<b>Coastal carbon opportunities: demonstrating additionality and potential for future offsets in South Australia</b>	<ul style="list-style-type: none"> <li>• Completion of synthesis and reporting of findings.</li> <li>• Completion of a published scientific paper on the novel, validated coastal carbon survey method.</li> <li>• Completion of a research review document that summarises all currently available data on SA coastal carbon ecosystems and their co-benefits.</li> <li>• Completion of a published scientific paper and summary report for industry and policy-makers on the potential for altered tidal inundation (sea-level rise) to alter coastal carbon storage potential in SA.</li> <li>• Preparation of additional journal articles.</li> </ul>	<ul style="list-style-type: none"> <li>• Workshop to inform the development of State's blue carbon strategy.</li> <li>• Presentation of project findings to Project Steering Committee.</li> <li>• Presentation of findings at a stakeholder knowledge adoption workshop, webinars and Lunch &amp; Learn series.</li> <li>• Presentations at Australian Marine Science Association conference.</li> <li>• Production of synthesis papers or fact sheets.</li> <li>• E-newsletter article summarising project outcomes.</li> <li>• Publication of final technical reports on website.</li> <li>• Maintenance of project website (Uni of Adelaide) and social media.</li> <li>• Data storage.</li> </ul>

<b>From salt to C; carbon sequestration through ecological restoration at the Dry Creek Salt Field</b>	<ul style="list-style-type: none"> <li>• Completion of final technical reports, relating to: <ul style="list-style-type: none"> <li>○ Revegetation experiments</li> <li>○ Analysis of carbon dynamics and sequestration</li> <li>○ Carbon offset for Dry Creek salt field</li> </ul> </li> <li>• Preparation of a description of the pathway to market for Dry Creek salt field restoration.</li> <li>• Preparation of journal articles.</li> </ul>	<ul style="list-style-type: none"> <li>• Workshop to inform development of State’s blue carbon strategy.</li> <li>• Presentation of project findings to Project Steering Committee.</li> <li>• Presentation of findings at a stakeholder knowledge adoption workshop, webinars and Lunch &amp; Learn series.</li> <li>• Production of synthesis papers or fact sheets.</li> <li>• E-newsletter article summarising project outcomes.</li> <li>• Publication of final technical reports on website.</li> <li>• Data storage.</li> </ul>
<b>Knowledge gap analysis and testing model fitness for offsetting greenhouse gas emissions through increasing soil organic carbon and improving nitrogen efficiency in South Australian clay modified soils</b>	<ul style="list-style-type: none"> <li>• Completion of final technical reports.</li> <li>• Preparation of journal articles.</li> </ul>	<ul style="list-style-type: none"> <li>• Presentation of project findings to Project Steering Committee.</li> <li>• Presentation of findings at a stakeholder knowledge adoption workshop, webinars and Lunch &amp; Learn series.</li> <li>• Production of synthesis papers or fact sheets.</li> <li>• E-newsletter article summarising project outcomes.</li> <li>• Publication of final technical reports on website.</li> </ul>
<b>Carbon offsets research to support the State carbon sequestration strategy</b>	<ul style="list-style-type: none"> <li>• Completion of stakeholder interviews and reporting.</li> <li>• Completion of final technical reports.</li> <li>• Completion of journal article manuscripts on carbon supply and carbon co-benefits.</li> </ul>	<ul style="list-style-type: none"> <li>• Workshop to inform development of State’s blue carbon strategy.</li> <li>• Presentation of project findings to Project Steering Committee.</li> <li>• Presentation of findings at a stakeholder knowledge adoption workshop, webinars and Lunch &amp; Learn series.</li> <li>• Production of synthesis papers or fact sheets.</li> <li>• E-newsletter article summarising project outcomes.</li> <li>• Publication of final technical reports on website.</li> <li>• Data storage.</li> </ul>
<b>Climate Resilience Analysis Framework and Tools</b>	<ul style="list-style-type: none"> <li>• Completion of final technical reports.</li> <li>• Preparation of journal articles.</li> </ul>	<ul style="list-style-type: none"> <li>• Presentation of findings at a stakeholder knowledge adoption workshop, webinars and Lunch &amp; Learn series.</li> <li>• Production of synthesis papers or fact sheets.</li> <li>• E-newsletter article summarising project outcomes.</li> <li>• Publication of final technical reports on website.</li> </ul>
<b>Ecological connectivity of the River Murray: managing ecological outcomes and water quality risks through integrated river management</b>	<ul style="list-style-type: none"> <li>• Refinement of eco-hydro relationships based on field data.</li> <li>• Second year of data collection.</li> <li>• Upscaling, integration into Source model, uncertainty analysis and scenario modelling.</li> <li>• Validation of eco-hydro relationships based on additional field data.</li> <li>• Completion of final technical reports.</li> <li>• Preparation of journal articles.</li> </ul>	<ul style="list-style-type: none"> <li>• Presentation of project findings to Project Steering Committee.</li> <li>• Presentation of findings at a stakeholder knowledge adoption workshop, webinars and Lunch &amp; Learn series.</li> <li>• Production of synthesis papers or fact sheets.</li> <li>• E-newsletter article summarising project outcomes.</li> <li>• Publication of final technical reports on website.</li> <li>• Data and model storage.</li> </ul>

<b>Socio-ecological assessment of the ecosystems, industries and communities of Spencer Gulf</b>	<ul style="list-style-type: none"> <li>• Completion of database for information used to estimate ecological, economic and social performance indicators and establish time-series.</li> <li>• Identification of potential target and trigger reference points.</li> <li>• Development of data layers with spatially explicit information on environmental conditions, ecological assets and human activities.</li> <li>• Completion of the assessment of socio-ecological status of Spencer Gulf and guidelines for future assessments.</li> <li>• Completion of final technical reports.</li> <li>• Preparation of journal articles.</li> </ul>	<ul style="list-style-type: none"> <li>• Presentation of project findings to Project Steering Committee.</li> <li>• Presentation of findings at a stakeholder knowledge adoption workshop, webinars and Lunch &amp; Learn series.</li> <li>• Production of synthesis papers or fact sheets.</li> <li>• E-newsletter article summarising project outcomes.</li> <li>• Publication of final technical reports on website.</li> <li>• Data storage.</li> </ul>
<b>Translating Ngarrindjeri Yannarumi into water resource risk assessments</b>	<ul style="list-style-type: none"> <li>• Completion of literature review.</li> <li>• Development of translating mechanism and testing of the mechanism.</li> <li>• Recommendations on how to adapt DEW's risk assessment process.</li> <li>• Completion of final technical reports.</li> </ul>	<ul style="list-style-type: none"> <li>• Presentation of project findings to Project Steering Committee.</li> <li>• Presentation of findings at a stakeholder knowledge adoption workshop, webinars and Lunch &amp; Learn series.</li> <li>• Production of synthesis papers or fact sheets.</li> <li>• E-newsletter article summarising project outcomes.</li> <li>• Publication of final technical reports on website and preparation of journal articles.</li> </ul>
<b>Science advice for restoring the Ecological Character of the South Lagoon of the Coorong</b>	<ul style="list-style-type: none"> <li>• Completion of final technical report.</li> </ul>	<ul style="list-style-type: none"> <li>• E-newsletter article summarising project outcomes.</li> <li>• Publication of final technical reports on website.</li> <li>• Written briefing to the Minister for Environment and Water and DEW outlining the recommendation actions.</li> <li>• Meeting with the Minister for Environment and Water and DEW to discuss the recommendation actions.</li> </ul>

## 4 Budget

### 4.1 Research programme

There is good agreement between target budgets for the research programme as outlined in the *Strategic Research Plan 2015-2019* and actual budgets for the three Impact Areas. A total of \$6,392,908 of Goyder Institute cash has been allocated to second-term research projects (Table 3), with the following breakdown to each of the three Impact Areas:

- 55% to *Economic Development*, compared to a target of 55%;
- 26% to *Healthy Ecosystems*, compared to a target of 30%; and
- 19% to *Climate Action*, compared to a target of 15% (Table 4).

A total of \$2,090,575 has been paid from Goyder Institute funds to research partners for second-term research projects (Table 3). The remaining forecast expenditure for research projects to 30<sup>th</sup> June 2019 is \$4,302,333. This equates to an approved allocation of 97% of the research budget outlined in the *Strategic Research Plan 2015-2019*. The remaining funds consist of \$80,958 for research projects and \$126,134 for expert panel assessments and will be allocated to specific projects as priorities arise for State Government.

The *Strategic Research Plan 2015-2019* included a target of 30% external co-investment into research projects for the second term of the Institute (Table 5). Currently, total external cash contributions represent 32% of the total cash budget and total external contributions (cash and in-kind) represent 27% of the total research budget (cash and in-kind). External contributions consist of \$2,690,667 cash and \$2,980,000 in-kind and have resulted in a total value of the research program of \$21,132,796 compared to the target of \$17,100,000 (Table 4). The Goyder Institute has also established additional projects that complement the current research program. These projects are funded entirely by sources beyond the minimum State Government contribution to the Institute and have a total value of \$411,976.

The Goyder Institute Agreement requires that in-kind contributions to research projects match the cash contributions by the State. In-kind contributions by research partners exceeds the Institute cash contributions by \$2,676,313 with a total of \$9,069,221 of in-kind contributions provided by research partners.

### 4.1 Administration and knowledge management – 2018-2019

The Administration and Knowledge Management budget for 2018-2019 has been prepared (Table 5). Consistent with the strategic planning of the Institute, this is allocated to second-term activities and activities associated with the transition to the third-term.

For second-term activities the total labour budget is \$289,050 and the total operating is \$104,580 - giving a total of \$393,900. The total Knowledge Management budget is \$74,650.

For third-term transition activities the total budget is \$168,418. Combined, the Administration budget of second and third term transition activities is \$558,318.

**Table 3.** Research Programme budget. This does not include projects entirely funded by sources beyond the minimum State Government contribution to the Institute.

Impact Area	Theme	Project title	Institute cash	2015-17 actual	2017-19 committed	Partner in-kind	External cash	External in-kind	Total external	Total value
<b>Economic Development</b>	Mining & Energy	GFLWS3	\$1,904,400	\$380,000	\$1,524,400	\$1,904,400	\$2,570,000	\$0	\$2,540,000	\$6,348,800
	Northern Corridor	Northern Corridor	\$1,550,253	\$699,319	\$850,934	\$1,550,253	\$0	\$0	\$0	\$3,100,506
		Desalination trial	\$30,000	\$0	\$30,000	\$32,000	\$30,000	\$0	\$30,000	\$92,000
<b>Economic Development subtotal</b>			<b>\$3,484,653</b>	<b>\$1,079,319</b>	<b>\$2,405,334</b>	<b>\$3,486,653</b>	<b>\$2,600,000</b>	<b>\$0</b>	<b>\$2,600,000</b>	<b>\$9,571,306</b>
<b>Healthy Ecosystems</b>	Catchments	River Murray	\$1,299,970	\$283,407	\$1,016,563	\$1,299,970	\$0	\$1,665,000	\$1,665,000	\$4,264,940
		Coorong	\$23,866	\$0	\$23,866	\$24,916	\$0	\$2,167	\$2,167	\$50,949
	Coasts & Marine	Spencer Gulf	\$300,000	\$40,000	\$260,000	\$647,082	\$315,000	\$65,000	\$380,000	\$1,327,082
	Communities	Yannarumi	\$48,525	\$10,665	\$37,860	\$50,026	\$0	\$0	\$0	\$98,551
<b>Healthy Ecosystems subtotal</b>			<b>\$1,672,361</b>	<b>\$334,072</b>	<b>\$1,338,289</b>	<b>\$2,021,994</b>	<b>\$315,000</b>	<b>\$1,732,167</b>	<b>\$2,047,167</b>	<b>\$5,741,522</b>
<b>Climate Action</b>	Carbon Neutrality	Coastal carbon	\$400,021	\$203,931	\$196,090	\$1,430,445	\$45,000	\$175,000	\$175,000	\$2,005,466
		Salt to C	\$336,000	\$213,380	\$122,620	\$1,360,645	\$0	\$783,500	\$783,500	\$2,480,145
		Soil carbon	\$50,000	\$50,000	\$0	\$50,000	\$20,000	\$0	\$20,000	\$120,000
		Carbon co-benefits	\$250,000	\$50,000	\$200,000	\$519,612	\$0	\$0	\$0	\$769,612
	Extreme Events	CRAFT	\$199,873	\$159,873	\$40,000	\$199,872	\$0	\$0	\$0	\$399,745
<b>Climate Action subtotal</b>			<b>\$1,235,894</b>	<b>\$677,184</b>	<b>\$558,710</b>	<b>\$3,560,574</b>	<b>\$65,000</b>	<b>\$958,500</b>	<b>\$1,023,500</b>	<b>\$5,819,968</b>
<b>Research programme total</b>			<b>\$6,392,908</b>	<b>\$2,090,575</b>	<b>\$4,302,333</b>	<b>\$9,069,221</b>	<b>\$2,980,000</b>	<b>\$2,690,667</b>	<b>\$5,670,667</b>	<b>\$21,132,796</b>

**Table 4.** Comparison of actual and target allocations to the Research Programme Impact Areas. This does not include projects entirely funded by sources beyond the minimum State Government contribution to the Institute.

Impact Area	Target Institute cash	Actual Institute cash	Target partner in-kind	Actual partner in-kind	Target total external	Actual external cash	Actual external in-kind	Actual total external	Target total value	Actual total value
<b>Economic Productivity</b>	\$3,600,000	\$3,484,653	\$3,600,000	\$3,486,653	\$2,400,000	\$2,600,000	\$0	\$2,600,000	\$9,600,000	\$9,571,306
<b>Healthy Ecosystems</b>	\$2,000,000	\$1,672,361	\$2,000,000	\$2,021,994	\$1,200,000	\$315,000	\$1,732,167	\$2,047,167	\$5,200,000	\$5,741,522
<b>Climate Action</b>	\$1,000,000	\$1,235,894	\$1,000,000	\$3,560,574	\$300,000	\$65,000	\$958,500	\$1,023,500	\$2,300,000	\$5,819,968
<b>Total</b>	\$6,600,000	\$6,392,908	\$6,600,000	\$9,069,221	\$3,900,000	\$2,980,000	\$2,690,667	\$5,670,667	\$17,100,000	\$21,132,796

**Table 5.** 2018-2019 financial year Administration and Knowledge Management budget for second term activities and Administration budget for third-term transition activities.

Administration - second-term activities	2018/19 Budget
Director	\$110,128
Research Manager	\$106,593
Chair	\$27,330
ICE WaRM Support Services	\$45,000
<b>Labour Total</b>	<b>\$289,050</b>
Communications & marketing	\$48,170
Travel and events	\$8,000
Memberships and sponsorships	\$5,500
Accommodation	\$26,000
Tax, bank fees and auditing	\$4,400
Insurance	\$5,700
General operating	\$7,080
<b>Operating Total</b>	<b>\$104,850</b>
<b>Total administration-second term activities</b>	<b>\$393,900</b>
Administration - third-term transition activities	2018/19 Budget
Director	\$73,418
Business development support	\$40,000
Travel	\$25,000
Communication and marketing	\$30,000
<b>Total administration- third term transition activities</b>	<b>\$168,418</b>
Knowledge Management - second-term activities	2018/19 Budget
Synthesis papers	\$5,500
Adoption workshops	\$5,500
Data and model storage	\$10,000
Conference and panel sessions	\$35,000
Website maintenance	\$18,650
<b>Total Knowledge Management</b>	<b>\$74,650</b>

## 4.2 Financial position

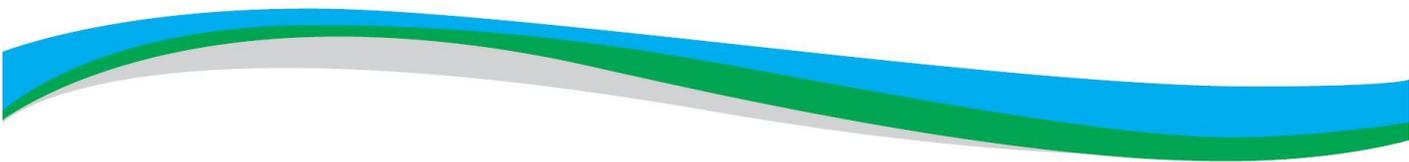
The cash balance of Goyder Institute funds held at ICE WaRM as at 30<sup>th</sup> June 2018 was \$3,962,961. This accounts for the transfer of funds from CSIRO to ICE WaRM as part of the transition from the first term of the Institute to the second term; the annual payment from State Government; interest received; and all Project, Administration and Knowledge Management expenses from 1<sup>st</sup> July 2017 to 30<sup>th</sup> June 2018. The calculations for the balance have been externally audited and are outlined below:

ICE WaRM Balance of funds at 1 <sup>st</sup> July 2017	\$330,441.00
Balance of Goyder's funds transferred from CSIRO November 2017	\$3,102,318.00
DEW State Grant 2017-2018 received December 2017	\$2,000,000.00
Interest received to 30 June 2018 on funds balance	<u>\$33,614.50</u>
	\$5,466,373.50
Less: Project payments to 30 June 2018	(\$1,005,176.00)
Less: Administration costs	(\$436,368.81)
Less: Knowledge management costs	<u>(\$61,867.60)</u>
Balance 30 <sup>th</sup> June 2018	\$3,962,961.09

Accounting for the remaining \$2 million payment from State Government; forecast interest payments; and all forecast Project, Administration and Knowledge Management costs for 2018-2019 (Table 3 and 5), the forecast cash balance to 30<sup>th</sup> June 2019 is \$572,245. These calculations are summarised below:

ICE WaRM balance of funds at 1 <sup>st</sup> July 2018	\$3,962,961.09
DEW State Grant 2018-2019	\$2,000,000.00
Estimate of interest to 30 June 2019 on funds balance	<u>\$40,000</u>
	\$6,002,961.09
Less: Approved project payments to 30 June 2019	(\$4,302,333)
Less: New project payments to 30 June 2019	(\$205,415)
Less: Administration costs	(\$558,318)
Less: Knowledge management costs	(\$74,650)
Less: External project payments	<u>(\$290,000)</u>
Forecast balance 30 <sup>th</sup> June 2019	\$572,245.09

The Management Board have approved using the balance of funds to extend the second-term of the Institute to 30<sup>th</sup> June 2020. This will allow for the successful completion of Knowledge Management activities following the completion of all research projects by 30<sup>th</sup> June 2019 and facilitate a transition to the third-term of the Institute, consistent with the strategic planning undertaken during 2017-2018.



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The Goyder Institute for Water Research is a partnership between the South Australian Government through the Department of Environment, Water and Natural Resources, CSIRO, Flinders University, the University of Adelaide, the University of South Australia and the International Centre of Excellence in Water Resources Management.