

## PROJECT COORONG

# Healthy Coorong, Healthy Basin



## Healthy Coorong, Healthy Basin Update

Welcome to the December 2022 edition of the *Healthy Coorong, Healthy Basin* (HCHB) Update. In this edition, we highlight some of the key program milestones from the second half of 2022, including key findings and outcomes of the Scientific Trials and Investigations (T&I) Project, the release of the *Coorong Infrastructure Investigations: Feasibility and Future Directions* document, and updates to the On-Ground Works Project.

In June 2022, the Program reached a major milestone with the conclusion of HCHB Phase 1. With HCHB now in a 'bridging' phase, foundational partnership and monitoring activities are being maintained ahead of HCHB Phase 2, which is expected to commence in early 2023, subject to Australian Government funding approval. For information on the HCHB Program or questions relating to this update, please contact [projectcoorong@sa.gov.au](mailto:projectcoorong@sa.gov.au).

Please note the River Murray in South Australia is currently experiencing a [flood event](#). For guidance and more information, please see below.

*The Coorong, connected waters and surrounding lands have sustained many unique First Nations cultures and economies since time immemorial. The Healthy Coorong, Healthy Basin program acknowledges the range of First Nations rights, interests and obligations for the Coorong and connected waterways and the cultural connections that exist between Ngarrindjeri and First Nations of the South East peoples across the region and seeks to support their equitable engagement.*

*Aboriginal and Torres Strait Islander readers are advised that the following document may contain images and names of people who have died.*

[projectcoorong.sa.gov.au](http://projectcoorong.sa.gov.au)



Australian Government





## River Murray Flood Information

The River Murray in South Australia is currently experiencing a flood event.

For up to date information on the SA River Murray flood, please visit the Department for Environment and Water [River Murray Floods](#) webpage, or the state government website [sa.gov.au River Murray Flood](#).

The latest information about water levels, flow rates, barrage operations, as well as navigational issues and construction activities are available via the weekly [River Murray Flow Report](#), including the Flood Advice. To receive this information directly to your inbox every Friday, please [subscribe to the weekly SA River Murray Flow Report](#).

For a [list of current warnings](#) with near real-time information on current SA SES warnings, incidents and when available, locations to collect sandbags, please visit the [SES website](#) or the [sa.gov.au River Murray Flood](#) page.

To stay informed of changing weather conditions, please visit the [Bureau of Meteorology website](#).

## Trials and Investigations reaches completion

**The HCHB Program reached a major milestone in June 2022 with completion of the HCHB Scientific Trials and Investigations (T&I) Project.**

Delivered in partnership with the [Goyder Institute for Water Research](#) and the Ngarrindjeri Aboriginal Corporation, the intensive 2 year-long [T&I Project](#) brought together independent experts in multi-disciplinary, collaborative teams involving more than 70 researchers and 20 government scientists. The Project forms the largest ever investment into scientific research in the Coorong region.

Focussing on key research themes of: nutrient dynamics, aquatic plants and algae, food webs, waterbirds, First Nations knowledge and climate adaptation, the T&I Project has provided critically important knowledge, data, and tools to inform future management actions to improve the long-term health of the Coorong.

Specialists in hydrology, biogeochemistry, aquatic ecology, quantitative modelling, First Nations knowledge and social science were all drawn upon to deliver on priority research questions, with a strong focus on building capacity for early career researchers in South Australia. Research partners of the Goyder Institute for Water Research included the CSIRO, Flinders University, the University of Adelaide and UniSA, along with associate partner the South Australian Research and Development Institute (SARDI).

The completion of this major research program is a significant step in the HCHB Program and establishes a solid evidence base that is supporting plans for the future, as well as providing managers and the community with greater confidence in future management directions.

## Key Trials and Investigations findings and their role in informing Coorong restoration and future management

Collectively, the T&I Project has significantly enhanced the [scientific knowledge base](#) of the Coorong, leading to several key findings.

At the start of the T&I Project, it was evident that following the [Millennium Drought](#), the southern Coorong had entered an algal-dominated state, in comparison to the historic 'healthy' state dominated by aquatic plants (e.g. *Ruppia*).

These observations were expected to be related to changed nutrient cycling processes and interactions between salinity, water levels and nutrient availability.

Through the T&I Project, researchers gained a significant improvement in their understanding of [nutrient dynamics](#), leading to the system now being defined as a hyper-eutrophic (high nutrient) system. These conditions promote the growth of phytoplankton and filamentous algal blooms. Moreover, the extreme salinities and the flow-on effects in the South Lagoon, have resulted in the limited presence and abundance of 'ecosystem engineers', native [aquatic plants](#) and sediment macroinvertebrates.

Without these organisms to oxygenate sediments and promote healthy nutrient cycling, there is limited ability to relieve the eutrophic conditions which are present. The relationship between hydrology, nutrient dynamics and plant-algae interactions fills a fundamental gap in understanding the system and is critical for informing how the site is managed into the future. This understanding is essential to the design and implementation of restoration strategies for the Coorong.

With an effort to ensuring that these research findings directly inform policy and program decisions at a whole-of-system level, dedicated investigations and model development (e.g. the Coorong Dynamics Model) have also played an important role in integrating historic and current research findings.

The T&I Project has also led to several other significant improvements in the understanding of the Coorong, including:



*HCHB Trials and Investigations food webs researchers sampling fish in the Coorong in October 2021 (Photo: Anthony Newbery, Flinders University)*

- Reduced salinities, along with reduced availability of nutrients, will promote the recovery and recolonisation of aquatic plant and benthic macroinvertebrate communities, driving the system toward a more desirable state as a whole.
- Slow but continued long term recovery of key components of the southern Coorong ecosystem have been observed, however, the condition of the ecosystem remains compromised by the hyper-eutrophic conditions.
- Improved nutrient processes and ecological response models have been developed using the new information gained from the nutrient dynamics, aquatic plant and algae, food webs and waterbird research.
- Investigations into waterbird movements and populations have significantly improved our understanding of the role that the Coorong plays in the ecology of these highly mobile and important species, including when and why the Coorong becomes a critical habitat.
- The bringing together of Western Science and Ngarrindjeri cultural knowledge of the Kurangk (Coorong), has been facilitated by the development of a Ngarrindjeri-led [cultural knowledge database](#).
- The development and application of collaborative approaches to understanding the implications of climate change for the system and how it is managed, is critical for the strategic planning of the site. This also provides lessons for how to consider climate change for the management of protected areas more broadly.

Critical to the success of the T&I Project has been the strong collaboration fostered between scientists, First Nations, and the community. The HCHB Program extends a big thank you to all involved who have worked incredibly hard and contributed to this significant body of work.

A suite of fact sheets summarising this new knowledge of nutrient dynamics, hydrology and plant-algal interactions are available on the [HCHB Publications page](#).

### **Next Steps for Trials and Investigations**

An update to the [State of the Southern Coorong discussion paper](#), along with a detailed State of the Coorong technical synthesis, and a Scientific T&I key findings report, are currently in preparation based on the final outcomes of the T&I Project. This is in addition to the remaining T&I technical reports, which are anticipated to be available by the end of 2022, following a robust, quality and independent review process (refer following article for a list of reports recently released).

Over the coming year, HCHB will continue to incorporate key science findings into HCHB planning and implementation as we move into the next phase of the Program. This includes using final data updates to improve feasibility modelling in infrastructure investigations, further developing the restoration strategy, and undertaking critical water quality and ecological monitoring.

# New Trials and Investigations reports released

**New reports from the Scientific Trials and Investigations Project have been published and are now available.**

Following a mammoth period of T&I research and reporting, we are pleased to announce the following technical reports are now publicly available on the [Project Coorong Publications page](#) and the [Goyder Institute for Water Research's Technical Reports webpage](#).

The Goyder Institute is the delivery partner for 5 of the 7 research components of the HCHB T&I project, providing independent research to inform future management decisions for the Coorong region. The independence of this research is important in ensuring the validity of the science undertaken by the T&I Project.

Prior to publication, all T&I Project reports undergo a robust, quality review process undertaken by the Goyder Institute. This includes an internal review by the Goyder Institute, and an external peer review by relevant technical experts. This process ensures that all reports are of a sufficient standard, including technical and scientific merit, and that they are presented in a form that assists thorough decision-making.

To view each report, please select the link on the report title or the image thumbnail. To view the complete list of HCHB publications available, please visit the [Project Coorong Publications webpage](#).

## Understanding Coorong nutrient dynamics



### **Sources and transport of nutrients in the Coorong**

Describes outcomes of investigations into nutrient sources and transport in the Coorong, including quantifying the major external nutrient sources and nutrient transport processes in the Coorong system and the calculation of a nutrient budget.



### **Coorong nutrient cycling and fluxes**

Details outcomes of investigations into nutrient cycling and fluxes in the Coorong, including a sediment quality survey, in situ and ex situ experiments on the influence of environmental conditions, microbial ecology (particularly denitrification), benthic macroinvertebrate influence, and the impacts of sediment resuspension.



### **A scientific evaluation to inform nutrient removal options for the Coorong**

Presents a scientific assessment and evaluation of options to reduce nutrient availability and conditions that promote excessive algal growth in the Coorong. This assessment was informed by emerging evidence from T&I nutrient dynamics investigations, scientific literature review and local expert opinion.

## Investigating the drivers and control of filamentous algae and restoration of aquatic plants in the Coorong



### **Distribution and seasonality of the Ruppia dominated aquatic macrophyte community and filamentous algae in the southern Coorong**

Presents the findings of investigations, aiming to establish the current extent and condition of the *Ruppia* Community and filamentous algae communities in the southern Coorong at times of the year critical to the lifecycle of the *Ruppia* Community. This report outlines results of 4 seasonal field surveys. The report compares these with environmental conditions to establish if there were measurable changes in *Ruppia* Community condition concurrent with water delivery and accepted ecological drivers of change (i.e. water levels, salinity, sediment condition etc.).



### **Microbial community composition of the southern Coorong including evaluating seasonal variation and sediment, water column, aquatic macrophytes and filamentous algae as substrates for microbial growth**

Details findings of investigations into the microbial communities present in the Coorong South Lagoon, and in the southern parts of the North Lagoon, to improve our understanding of changes in microbiota over time in relation to water quality and promoting (or not) the growth of the *Ruppia* Community.

## **Restoring a functioning Coorong food web**



### **Primary food resources for key waterbirds and benthic fish in the Coorong**

Fills critical dietary knowledge gaps by identifying the major food resources and their relative contribution to the diets of a small-bodied, resident prey fish (lagoon goby) and 5 important waterbird species in the Coorong.



### **Food resource availability, energy content and nutritional value of major food sources for key fish and waterbird species under varying environmental conditions in the Coorong**

Presents findings of field and laboratory investigations focussed on habitat requirements and key environmental drivers for trends in food resource availability (i.e. abundance, biomass, and distribution) and bioenergetics of key food resources in the Coorong.



### **Ecosystem models to inform the development of strategies to restore a functioning South Lagoon food web in the Coorong**

Describes the development of quantitative food web models for the North Coorong (Murray Estuary and North Lagoon) and South Lagoon and the use of these models to inform the development of strategies to restore a functioning South Lagoon food web. The models draw on the improved understanding of Coorong food web dynamics gained through the T&I Project.

## **Maintaining viable waterbird populations**



### **Response models for key waterbird species of the Coorong**

Details the development and validation of quantitative response models for representative key waterbird species that link the occupancy and abundance of these species, and the proportion of birds observed foraging, to living and non-living drivers.



### **Recommended habitat quality measures for key waterbird species in the Coorong**

Explores the most appropriate measures of habitat quality for key waterbird species in the Coorong based on a literature review, analysis of long-term data, and a field study. Synthesises results from these activities by assessing how habitat quality could be most feasibly measured for 10 representative key waterbird species in the Coorong.



### **Response models for waterbird species of the south-east of South Australia**

Presents quantitative waterbird response models developed at 2 different spatial scales (priority and broader landscape wetlands within the south-east of South Australia) and outlines key findings to inform management.



### **Spatial and temporal habitat use by key waterbird species in the Coorong**

Presents tracking data, movement analyses and interpretation for representative key waterbird species (including sharp-tailed sandpiper, red-necked avocet and Australian pelican) in the Coorong and broader landscape. Describes results for home range and core use areas, foraging and behavioural states, and discusses habitat use for key waterbird species within the Coorong and wetland use beyond the Coorong.

## **Integration**



### **Summary of Coorong hydrological, biogeochemical and ecological models**

Summarises previously developed Coorong models that are used to simulate past and future conditions, scenario test management options and to evaluate the impact of water for the environment provisions. Describes the rationale for preferred models and identifies model creation/improvement as part of the HCHB Program across different model themes.



### **Coorong decision-making framework, supporting ecosystem based management**

Outlines the development of a decision-making framework for the Coorong that summarises and evaluates inputs and outputs from the Coorong Dynamics Model in a manner that describes the anticipating responses of the ecosystem to management scenarios.

## **Other publications**



### **Monosulfidic Black Ooze (MBO) formation, cycling and management in the Coorong**

Technical note outlining what MBO is, how MBOs are formed, extent of MBOs in the Coorong, why MBOs are a problem in the Coorong and what can be done to reduce the build-up on MBOs in the Coorong.

*Note: Whilst not an output of the T&I Project, this technical note was published by The University of Adelaide and was funded by the HCHB Program.*



### **Assessing waterbird habitat quality in the Coorong**

Fact sheet on assessing waterbird habitat quality in the Coorong published by the Goyder Institute for Water Research. Includes key findings from the technical report *Recommended habitat quality measures for key waterbird species in the Coorong* (refer above), and a summary of key waterbird species of the Coorong.

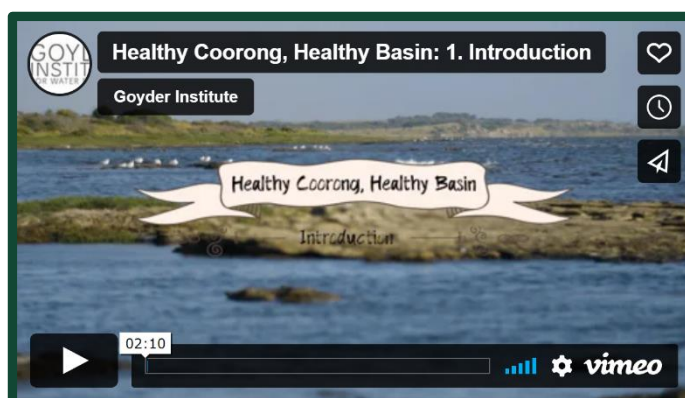
## New videos showcase Coorong research

*The content in this article is based on a previous news article published by the Goyder Institute for Water Research available [here](#).*

Following the conclusion of the T&I Project in June 2022, a series of short videos have been produced highlighting the high-quality, independent research undertaken by HCHB's research delivery partner, the [Goyder Institute for Water Research](#).

The videos were produced by the [University of South Australia's Creative Unit](#) and showcase the ground-breaking work of the multi-disciplinary collaborative teams across the HCHB and Goyder Institute partnership, including CSIRO, Flinders University, The University of Adelaide, the University of South Australia, and SARDI.

The 5 videos (below) highlight each of the Goyder Institute-led research components, along with an introductory video of the research, available [here](#). Click on the component title to view each respective video.



**[Nutrient Dynamics](#)** – improving knowledge of nutrient cycling, how to maximise nutrient turnover into productive elements such as plants, invertebrates, fish and birds, and incorporating knowledge into a management response strategy. You can read more about the Nutrient Dynamics research [here](#).

**[Aquatic Plants and Algae](#)** – undertaking research and trials to shift the system from being dominated by algae to being dominated by aquatic plants. You can read more about the Aquatic Plants and Algae research [here](#).

**[Food Webs](#)** – developing an integrated, quantitative food web model for the Coorong that can assess food web responses to various conditions. This is based on investigations of the food resources and conditions required to increase food resource availability and energy supply for key biota (waterbirds and fish). You can read more about the Food Webs research [here](#).

**[Waterbirds](#)** – understanding habitat quality for waterbirds to inform management actions aimed at increasing the abundance and distribution of waterbirds in the Coorong, with a specific focus on the Coorong South Lagoon. You can read more about the Waterbirds research [here](#).

**[Climate Adaptation](#)** – undertaking a climate change vulnerability assessment of the Coorong and identifying the adaptation pathways required to maintain the ecological values of the Coorong into the future under a changing climate. You can read more about the Climate Adaptation research [here](#).

*The Goyder Institute for Water Research was the delivery partner for 5 research components of the HCHB Scientific Trials and Investigations Project, providing independent research to inform future management decisions for the region.*

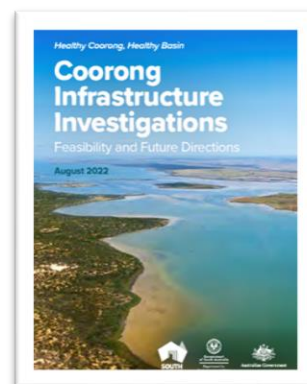
# Coorong Infrastructure Investigations - Feasibility and Future Directions document released

In September 2022, the *Healthy Coorong, Healthy Basin* program released its [Coorong Infrastructure Investigations: Feasibility and Future Directions](#) document.

Earlier in the year, consultation was undertaken on the Coorong Infrastructure Investigations draft Feasibility Assessment Report and Summary. Feedback from this consultation has now been incorporated into the [final](#) version of this report and extensive planning has been undertaken for the next phase of the program.

The feasibility investigations identified that variants of a connection between the Coorong South Lagoon and Southern Ocean (with or without targeted dredging as a complementary action) have the most potential for improving the health of the Coorong South Lagoon.

The [Coorong Infrastructure Investigations: Feasibility and Future Directions](#) document summarises the journey to feasibility assessment and outlines which concepts will be progressed through the next stage of further investigations, design and approvals, from 2022 to 2024.



Subject to Australian Government funding approval, the next stage of the Coorong Infrastructure Investigations Project will involve 2 years of:

- Detailed Engineering Designs
- Cost Analysis
- Environmental Impact Assessments
- Further Cultural Heritage Assessments
- Legislative Approvals (including *Environment Protection and Biodiversity Conservation Act 1999*)
- Further Socio-Economic and Cost-Benefit Assessments

This remains an investigations project and no decision has been made to proceed with any particular option.

Community, First Nations and stakeholder consultation will continue throughout the process and before any decision to proceed is made.

Should a suitable long-term management option for the Coorong South Lagoon be identified, appropriate approvals obtained, and a decision made by governments to proceed with its construction, the earliest that any Coorong infrastructure on-ground works could commence would be 2025.

Any decision to proceed to construction would be subject to Australian and South Australian government consideration and approvals.

## On-Ground Works Project update

The **On-Ground Works (OGW)** Project aims to implement short to medium term on-ground works to help mitigate threats to key Coorong biota, while longer term management solutions are investigated and implemented.

### Teringie Wetland

The OGW project team continues to plan for works to install new infrastructure to improve water management at the Teringie wetland complex with construction likely to begin in 2023, weather permitting. The proposed on-ground works at Teringie, which aims to provide an additional 18 hectares (82% increase) of critical shorebird habitat, will install 2 regulating structures in order to improve water level management and wetting and drying regimes in the wetland complex, and connect the north, east and south basins.

One structure will be constructed at the inlet between Teringie north and Lake Alexandrina, while the other will be built between Teringie east and Teringie north, which will allow for water to enter the east basin that could also flow through into the south basin, completing the connection between the basins. Access to the site will be restricted during construction. Further information will be provided closer to construction.



*Teringie wetland (photo: Murraylands and Riverland Landscape Board)*

### Tolderol Game Reserve

The OGW project team continues to plan for works to install new infrastructure to improve water management and vehicle access at Tolderol Game Reserve, which is estimated to provide an additional 61 hectares of available managed critical shorebird habitat. Detailed survey works are scheduled to take place during the 2022/23 summer months. In order to facilitate these survey works, selected basins in the reserve are required to remain largely dry. Supplemental watering activities will take place at the site over the 2022/23 wader season, to maintain suitable wader habitats in selected basins.

Please note that the planned spring 2022 closure at Tolderol Game Reserve was postponed to allow for further project planning and scope refinement. Tolderol Game Reserve will remain open to the public during the 2022/23 wader and hunting seasons.

### Waltowa Wetland

The OGW project team continues to engage with stakeholders and surrounding land-owners at Waltowa Wetland to facilitate options to construct new infrastructure to improve water management at Waltowa, with the aim of providing an additional 35 hectares of available managed critical shorebird habitat.

## Coorong Partnership Communique

The 19th meeting of the [Coorong Partnership](#) was held on 6 October 2022 at the Tailem Bend District Council.

The South Australian National Parks and Wildlife Service provided an update on the Visitor Experience Plan Engagement Summary for Coorong National Park. The partnership also heard from Principal Scientists from the HCHB Program on some of the key findings from the T&I Project, along with an update on the First Nations Partnerships.

The Communique from this meeting and all other past Coorong Partnership meetings are available on the [Project Coorong Website](#).

If you have any questions on this update, or if you would like to request a presentation on the project to your stakeholder group, or anything else related to Project Coorong, please contact the project team at [projectcoorong@sa.gov.au](mailto:projectcoorong@sa.gov.au).

*The Government of South Australia's Healthy Coorong, Healthy Basin Program is jointly funded by the Australian and South Australian government.*



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