December 2020

PROJECT COORONG

Healthy Coorong, Healthy Basin

Welcome to the December 2020 update for the Healthy Coorong Healthy Basin (HCHB) program. In this edition we highlight some of the recent infrastructure options decisions, and take a look at what's been going on in the field in our Trials and Investigations project.

There's been a lot to celebrate lately for the Healthy Coorong, Healthy Basin Program, including the first year of the Coorong Partnership. The Coorong and Lakes Alexandrina and Albert celebrate 35 years as a Ramsar-listed wetland this month recognising the area's international ecological importance.

If you would like more information on the HCHB Program or have questions on anything contained in this update please contact the program team at projectcoorong@sa.gov.au

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.

Shortlist of Coorong infrastructure options released following community consultation

HCHB's Coorong Infrastructure Investigations Project has recently released the shortlist of infrastructure and management options that will be investigated to support long-term health of the Coorong, with a focus on the South Lagoon.

You may have been involved in our engagement process earlier this year where the community were asked for their input into which options they felt would best meet the needs of the Coorong, helping to restore its health. This was an extensive engagement process which involved local residents, First Nations, various stakeholders and the broader South Australia community.

Following analysis of all the feedback gathered, the following five infrastructure options have been shortlisted and will now undergo a detailed feasibility assessment through 2021:

- A connection between the Coorong South Lagoon and Southern Ocean
- Coorong Lagoon dredging to improve connectivity
- Lake Albert to Coorong Connector
- Further augmentation of South East Flows to the Coorong
- Additional automated barrage gates.

Feasibility investigations will include extensive ecological response modelling, engineering feasibility investigations and ongoing community, landowner and First Nations consultations.

At this stage, this is an investigation into feasibility only, not a decision to proceed with any of these concepts. Further community consultation will be required on any options deemed to be feasible before such a decision would be made.

Detailed information on the shortlisted options and the consultation outcomes is on the DEW website here.

Information on how you can get involved in the next phase of this process will be made available on the DEW website and through future updates.

On-Ground Works

The HCHB On-Ground Works, Regional Bird Refugia project has been working with community groups (including the Tolderol Working Group) and land holders to develop designs for wetland improvement projects at three sites around the Lower Lakes: Tolderol Game Reserve, Waltowa and Teringe. The project proposes to install new or renew old infrastructure (i.e. culverts, regulators, pipes) to improve water management to provide shorebird habitat. Any works proposed will be subject to Australian Government consideration of funding.

The wetland improvement projects, if approved, will increase our management capability to provide refugia for waterbirds of the Coorong at Tolderol Game Reserve, Waltowa wetland and Teringie wetland while longer term solutions for the Coorong are being investigated.

The Coorong Partnership celebrates its first year

The final Coorong Partnership meeting for 2020 marked the end of the Partnership's first year.

Reflecting on its establishment year, the Partnership identified site visits to the North Lagoon and the South Lagoon with the Minister for Environment and Water, David Speirs, as highlights that showcased the breadth and complexity of the issues and opportunities.

Looking forward to 2021, the Partnership is eager to work with DEW to explore more visitor experience and economic development opportunities (particularly with First Nations), as well as facilitate community input into the Coorong Infrastructure Investigations Project.

The Chair, the Honourable Dean Brown AO, thanked members for their enthusiasm and commitment over the Partnership's first year, during what have been exceptional and extraordinary times. The members expressed the importance of the Partnership meetings in keeping the members informed and up-to-date across all projects in the Coorong region, so that they can then share this information throughout their networks and communities. The Partnership hopes to be able to hold more face-to-face meetings in 2021 and looks forward to being able to open these meetings up to the community when it safer to do so.

The Partnership will next convene in early February 2021.

World Wetlands Day Science Forum 2021

World Wetlands Day is celebrated on 2 February each year to raise global awareness about the vital role of wetlands for people and our planet. This day also marks the date of the adoption of the Convention on Wetlands of International Importance (Ramsar Convention) in Ramsar, Iran, on 2 February 1971.

To celebrate, Project Coorong will be hosting a full day event on 2 February 2021 with a focus on "Science Informing Action".

Presenters from Healthy Coorong, Healthy Basin, The Living Murray and the Goyder Institue will discuss themes from across the Coorong and Lakes Alexandrina and Albert Ramsar Wetland site including:

- First Nations Knowledge
- Coorong water quality and aquatic plants
- Coorong fish, waterbirds and invertebrates
- Lower Lakes ecology
- Climate change, hydrological trends and infrastructure investigations.

Please note that this event is subject to COVID-19 related approvals and may need to be altered or run online at short notice. Registration instructions can be found here on Eventbrite.

Spring field work observations

Researchers from the Goyder Institute for Water Research have been out in the field this spring collecting data to inform decisions on actions to improve the health of the South Lagoon. The work forms part of the Healthy Coorong, Healthy Basin Trials and Investigations Project.

Nutrients

Water quality sampling was undertaken at around 20 locations in the Coorong in September 2020, timed to coincide with a period of both barrage and South East drainage inflow. The water samples will be analysed to track different nutrients and isotopes (i.e. different versions of the same element) and improve our understanding of water sources and the movement of water and nutrients in the Coorong.

A field trip was conducted in early November to collect sediment cores from Policeman's Point, Parnka Point, and Noonameena to study nutrient and sulphide concentrations. The research team also trialled a new technique using sediment cores to investigate nutrient flux (the transfer of nutrients from the sediments to the overlying water, and vice versa), and are currently analysing the results. Sediment cores in the South Lagoon reveal the remains (e.g. shells) of a formerly thriving community of invertebrates in the sediments, now absent, which has had implications for water quality. Currently, the sediments of the South Lagoon are mostly anoxic and in poor health.

Aquatic plants and algae

A large-scale, detailed baseline survey was conducted which looked at aquatic plant distribution/health and filamentous algae presence at over 100 sites. Sampling included collection of sediment cores to assess the presence and density of *Ruppia tuberosa*, a native seagrass that is a major food source for the waterbirds, including migratory shorebirds that inhabit the Coorong. *Ruppia* also provides nursery habitat for fish and improves the health of sediments. Continuous water temperature monitoring in shallow and deep water is also occurring. The data collected will be used to analyse the impacts of temperature and water quality in shallow and deep waters on algal distribution and growth. This is important to understand, as thick, floating mats of filamentous algae can smother native *Ruppia* and prevent successful reproduction.

Food webs

Food web research continues both in the field and laboratory to investigate distribution, abundance, biomass, productivity and energetic values of key food resources. This includes monthly sampling of macroinvertebrates and seasonal sampling of fish and zooplankton. Fish have been collected to examine their gut contents and analyse what they are eating. The research will be used to develop a detailed food web model to investigate the impacts of potential management scenarios and help maximise ecological outcomes for the Coorong.

What have we seen?

Some interesting observations from recent field trips include:

- Several pieces of evidence are emerging that unhealthy nutrient cycling is occurring in the South Lagoon. We are seeing high ammonia levels in the sediment and mostly very low levels of nitrate. Denitrifying bacteria, which are beneficial as they can remove nutrients for algae from the aquatic system, appear to be inactive.
- *Ruppia* has been observed to be oxygenating the sediment and reducing black ooze in the surface sediment via oxygen pumping by its roots.
- Macroinvertebrate burrows are also oxygenating the sediment where present (only in the northern region of the North Lagoon in lower salinity water).
- *Ruppia* is expanding its distribution in the Coorong possibly due to favourable weather conditions and water levels over the past 3-4 years. This growing season has the potential to have heavy seed set most likely due to delayed onset of algal mat formation from lower water temperatures into November. In contrast, at the same time last year the algal mats were already extensive, reaching the surface and smothering the *Ruppia* plants as they were setting seeds. The current extent and condition of *Ruppia* beds in the South Lagoon and southern North Lagoon is the best it has been since prior to the Millennium Drought, however the potential for smothering algal mats to develop over the summer remains a concern.

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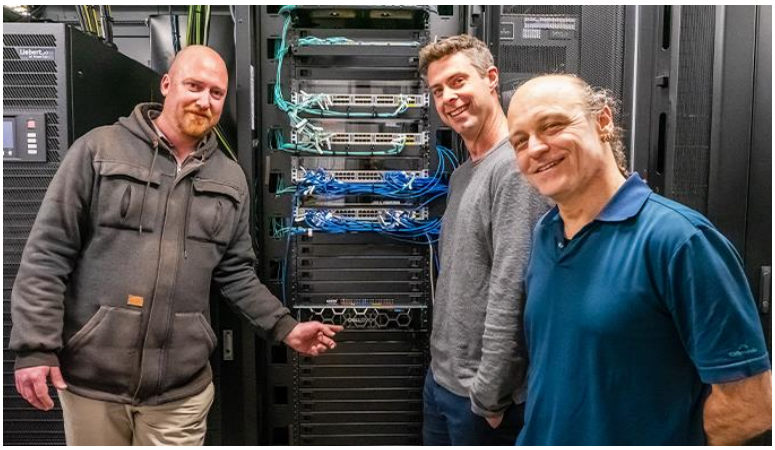
- There is a distinct *Ruppia* flowering gradient over the Coorong with northern sites flowering first.
- Smallmouth hardyhead, the dominant fish species in the South Lagoon, were seen moving through the Salt Creek outlet fishway during winter flows, with black swans aggregating around the brackish water.
- Species previously unrecorded in the area, including an anemone, a marine leech, and an aquatic snail (*Liloa brevis*), have been found in subtidal sediments in the Murray Mouth.

To find out more about the science that's informing actions to help improve the health of the South Lagoon, register for our science forum on 2 February 2021.

Integrated system-scale modelling is underway

Integrated system-scale modelling tasks are now underway to help us better understand the interactive effects of water flows and biogeochemical processes on habitat conditions for aquatic plants, fish and waterbirds in the Coorong. This work includes new hydrological modelling of ocean and River Murray inflows, which allow us to trace movement and 'flushing' of water throughout the Coorong lagoons under different operational scenarios.



Matt Gregory, Matt Gibbs and Carl Purczel with one of the two servers used for modelling. The server machines have good quality graphics cards for highly parallel processing to make the modelling undertaken as part of HCHB possible

Preliminary analyses show limited flushing of water out of the Coorong South Lagoon under recent flow conditions, which likely contributes to ongoing accumulation of salt and nutrients in the system. Collectively, these modelling activities will provide direct support for evidence based decision-making in the Coorong based on the improved ability to simulate hydrodynamic, water quality and ecological changes under different management scenarios. This is one of the many ways that science is informing action to improve the health of the Coorong.

Water Resource Optimisation

In late October, a device that measures water direction and speed was installed at Pelican Point. Known as an Acoustic Doppler Current Profiler, or ADCP, the instrument is being used to help resource managers better understand when and how much water flows into the Coorong. Pelican Point is situated at the south-eastern end of the Tauwitchere barrage, just at the entrance to the Coorong's North Lagoon. The ADCP will be installed at Pelican Point for at least 6 months, then it will be moved to new locations in the Coorong where understanding flow is important and will continue monitoring.

The expanding Coorong water quality monitoring network now includes a new weather station at Parnka Point. Installed in November, the device continuously measures wind direction and strength, as well as solar radiation. This information is provided live to the public via the WaterConnect site and will be used to help resource managers make evidence based (and adaptive) site management decisions. Another weather station will be added at Long Point early in 2021.

In December, new instruments will be purchased that continuously measure water quality. They will be installed at four key Coorong locations in the early part of 2021. These instruments will provide real-time, telemetered information on a number of different water quality parameters, including: salinity, temperature, turbidity, pH, and dissolved oxygen.

The manual collection of water quality samples at 3-weekly intervals from 20 key locations in the Coorong continued throughout 2020 and will remain in place until at least June 2022. These samples are analysed in a laboratory and will be used to validate and verify the Coorong's ecological model.

Development of the software management tool called the Coorong, Lower Lakes and Murray Mouth Management Action Database or CLLMM MAD commenced in October. The CLLMM MAD will enable resource managers to store the results of their management actions as well as the steps they took to implement them. Doing this allows resource managers to review previous management actions and their outcomes in order to inform future decision making.

Another software management tool, known as the Coorong Automated Forecasting System or CAFS, will commence development in early 2021. This management tool will capture weather condition, water quality information – from the Coorong water quality monitoring network described above – and ecological modelling to forecast when and how much water should be released through the barrages for the best environmental benefit.

Coorong and Lower Lakes celebrate 35 years as a Ramsar-listed wetland

The Coorong and Lakes Alexandrina and Albert celebrate 35 years as a Ramsar-listed wetland this month recognising the area's international ecological importance. The Ramsar Convention is an international treaty that aims to halt and where possible, reverse the loss of wetlands around the world. It also seeks to conserve the remaining wetlands through wise use and education about their value and importance.

South Australia's Coorong and Lower Lakes are internationally recognised for supporting rare and endangered plants and animals, as well as significant populations of waterbird and fish species. The site is the Traditional lands of the Ngarrindjeri and is part of the living body of the Ngarrindjeri Nation – it is of enormous cultural significance.

Ramsar listing raises the international profile of the site, increases collaboration across all levels of government and seeks to improve long-term management of the wetland as well as increasing legislative protection through the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Through Project Coorong the South Australian Government is working with the community, Traditional Owners, scientists, the Australian Government and basin states to protect, monitor and manage the Coorong and Lakes Alexandrina and Albert Ramsar Site.

If you have any questions on this update or anything else related to Project Coorong, please contact the project team at projectcoorong@sa.gov.au

The South Australian Government's Healthy Coorong, Healthy Basin Program is jointly funded by the Australian and South Australian governments.