WetMAP Stage 4

Monitoring Wetlands 2022-24



Monitoring of waterbirds, vegetation, frogs and fish in wetlands

Overarching Aim

To demonstrate how waterbirds, vegetation, frogs and fish in wetlands respond to water for the environment (also known as environmental water).

Background

Wetlands globally, including Australia, are experiencing substantial decline. A key action to restore wetland health is the allocation and delivery of environmental water to rivers and wetlands. This action seeks to support, maintain or improve the health of wetland plant and animal communities.

Significant commitments to restoring waterway health are made by the Victorian government, the Commonwealth (e.g. the Basin Plan) and as part of Australia's commitment to the Ramsar convention. It is therefore critical to evaluate the effectiveness of actions such as the delivery of environmental water in meeting the outlined ecological objectives. Demonstration of the outcomes of environmental water requires effective and rigorous monitoring. Targeted research to quantify relationships between key ecological values and hydrology can also contribute to evaluating the outcomes of environmental water.

WetMAP Stage 4 includes both monitoring and research. This fact sheet outlines the approach to monitoring of waterbirds, vegetation, frogs and fish, during Stage 4 which commenced primarily in 2022.

*WetMAP commenced in 2014. Stages 1 and 2 involved development of a framework, manuals and proposed approaches. Monitoring commenced in Stage 3 (2017-2020); this incorporated a process of ongoing adaptive management regarding monitoring methods, sites and research questions.

> Wetland Monitoring and Assessment Program for environmental water (WetMAP)





Energy, Environment and Climate Action

Monitoring in wetlands

Wetland monitoring

Between 2017 and 2020 monitoring of the effectiveness and outcome of releases of environmental water occurred in some Victorian wetlands. Through WetMAP Stage 3 this included two years of monitoring for frogs and birds, and three years of monitoring for vegetation and fish. Additional monitoring has occurred to address the needs of catchment management authorities.

WetMAP Stage 4 continues to include monitoring of vegetation, waterbirds, fish and frogs. During this stage, vegetation monitoring commenced in June 2022. The flooding which occurred in Victoria during spring 2022 caused significant delays in the monitoring program, particularly for the vegetation surveys. The flood provided a unique opportunity to document responses to such a large flood. Waterbird monitoring commenced in November 2021, and frog monitoring commenced in September 2023. Limited fish monitoring is occurring. This involves ongoing surveys of the nationally threatened Murray Hardyhead in four wetlands and an analysis and evaluation of existing spawning and recruitment data for this species.

Aims

• To contribute to Victoria's obligations under the Murray-Darling Basin Plan (Schedule 12, Matter 8).

- To address immediate management needs of catchment management authorities (CMAs).
- To ensure regular data collection for particular environmentally watered wetlands.
- To provide data that can contribute to informing future monitoring priorities.

Site Selection

Monitoring sites were selected in consultation with catchment management authorities (CMAs) and DEECA Water and Catchments. Wetlands were selected to address the aims outlined above.

The sites complement, but do not overlap, other monitoring programs across the state, such as Ramsar, The Living Murray Program (TLM), and the Victorian Murray Floodplain Restoration Project (VMFRP).

Most sites are in northern Victoria, and are primarily wetlands that receive environmental water. The wetlands vary considerably in their inundation histories and regimes.

Some wetlands that do not receive environmental water (called unwatered wetlands) are also monitored. Their inclusion will help provide context for interpreting changes through time at watered wetlands, plus provide important information on how wetland biota respond to changes in hydrology at a broader range of wetlands.



Figure 1: Location of monitoring sites, developed in consultation with CMAs and DEECA.







Management Context

Wetland vegetation monitoring

Sites

This monitoring occurs at 34 wetlands across six CMA regions including:

- 26 wetlands that receive environmental water.
- eight wetlands that do not receive environmental water.



Figure 2: Carapugna Black Box wetland

Approach

Vegetation data is sampled in 10 m x 10 m plots. All species present within the plot are recorded along with a cover estimate for each species as well as ground layers (e.g. litter and bare ground). Photo points are also taken at each plot.

Survey timing is an important consideration for vegetation monitoring in wetlands. The composition of vegetation present varies over time during, and after, floods, with wetland vegetation cycling through wet and dry phases as the hydrological conditions change. In line with WetMAP Stage 3, surveys occur within two months of a flood drawing down (i.e. the water receding), to coincide as much as possible with the maximum expression of species richness and biomass, particularly of specialist wetland species.



Figure 3: Carrying out a vegetation survey at Moodies Swamp

Wetland bird monitoring

Sites

This monitoring occurs at 34 wetlands across four CMA regions, including:

• 15 wetlands that receive environmental water

• 17 wetlands that do not receive environmental water. (This includes Dock Lake that is planned to receive environmental water in future)

• two wastewater treatment plants (WTPs), which provide regional context for waterbird numbers and help assess patterns of seasonality.

Approach

Waterbird surveys in each wetland occur once in spring/ early summer and once in late summer/autumn.

Full waterbird counts are undertaken, with all birds seen and heard recorded. At each wetland, two observers scan the inundated area using binoculars and a tripodmounted spotting scope, from enough vantage points to ensure the entire wetland is surveyed. Breeding activity is recorded; this is considered confirmed only if eggs or flightless young are observed.

Data is also collected on the extent of different structural habitat types at each wetland and the use of these habitats by the bird species observed. The data collection method follows that developed in WetMAP Stage 3 (Papas et al. 2021).



Figure 4: (top) Banded Stilts and a Black Swan; (bottom) Australian White Ibis nestlings.





Wetland frog monitoring

Sites

This monitoring occurs at 29 wetlands across five CMA regions including

- 19 wetlands that receive environmental water.
- 10 wetlands that do not receive environmental water.

Approach

Acoustic monitoring is used to record frog absence/ presence and species richness. AudioMoth loggers have been placed at 1-3 locations at each wetland during the breeding season of most species (i.e. spring-summer). The number of AudioMoths deployed is dependent on the size and accessibility of each wetland. They are placed close to the water (i.e. at the wetted edge), with an adequate distance in between units if more than one is used per wetland.

ARI has developed an AI ('artificial intelligence') model to automate frog species recognition in large bioacoustic datasets. This model is used to assess audio recordings from each field site to provide probabilistic predictions of which frog species are calling within each recording.



Figure 5: An AudioMoth placed on a small tree

Outputs

- Brief Field Survey Updates after field trips.
- Progress, annual and final reports.

The following data will be generated:

• Data on waterbird abundance, waterbird species richness (including migratory shorebirds), waterbird breeding and waterbird habitat (breeding and habitat data will be complimented by more targeted data collected as part of related WetMAP research projects).

• Data on vegetation species richness and cover, including incidental records of threatened and invasive species, from previously sampled wetlands and newly added wetlands (including previously 'dry' wetlands that have now been inundated due to flooding).

• Data on frog abundance and species richness collected by Audiomoths. An additional benefit from this

method of data collection may be the incidental recording of cryptic bird species, such as the Australian Bittern.

• A better understanding of how biota responded in unwatered wetlands that were inundated in recent floods relative to environmentally watered wetlands. This comparison is particularly informative for vegetation, which can have seeds and tubers dormant for many years between watering events.

Outcomes

• Continuity of historical monitoring data on waterbirds, vegetation and frogs across wetlands in Victoria, as well as collection of data from additional wetlands which incorporate a greater selection of water regimes.

• Improved evidence base regarding the response of waterbirds, veg and frogs to environmental water delivery (and flooding) in wetlands, to inform management.

The value of long-term monitoring

Long-term monitoring generates a time series of data, collected across varying landscapes. This will gradually improve our understanding of how different systems respond to water delivery across various conditions, including how this compares to, and is influenced by, antecedent conditions. It also improves the capacity to undertake more in-depth analyses to increase our ecological understanding of environmentally watered wetlands, and the waterbird, vegetation and frog communities that they support.

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Papas et al. (2021). Wetland Monitoring and Assessment Program for environmental water: Stage 3 Final Report. Arthur Rylah Institute for Environmental Research Technical Report Series No. 322. Department of Environment, Land, Water and Planning, Heidelberg, Victoria.



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4