

Wetland Monitoring and Evaluation Plan Progress Update

Healthy Waterways Strategy 2018 Monitoring Evaluation Reporting and Improvement Framework Version 1.0

June 2019

Purpose

To describe progress to date on wetland monitoring, or surveillance, and the preparation of a monitoring and evaluation plan for regional wetlands as required by the *Healthy Waterways Strategy 2018* (Melbourne Water 2018).

Background

Our region includes around 65,000 'wetlands'. Wetlands are incredibly diverse, complex and variable. The term 'wetland' covers a range of habitats: from small depressions filled only temporarily by rainwater – but which might be important breeding sites for native frogs – to the vast intertidal areas of Westernport; from small farm dams to urban lakes and reservoirs of importance to human life and liveability; from large complexes of sewage treatment ponds to dynamic, ever-changing natural wetlands. To develop a monitoring program addressing the diverse range of values and threats affecting the condition of our varied wetlands is challenging.

Natural wetlands have largely been overlooked by legislation and management in the past. It has been estimated that up to 37% of natural wetlands across Victoria have been lost since 1835, with a further 30% of wetlands degraded through changes to their hydrology (DSE 2003; Olsen & Weston 2004). A comprehensive and effective wetland monitoring and evaluation plan is essential to correct our limited information on our wetlands and to improve their protection and management.

In alignment with the Victorian Waterway Management Program, the *Healthy Waterways Strategy 2018* identifies eight key research areas essential to addressing critical short-term and/or strategic long-term knowledge gaps, building the knowledge base to inform and refine strategic decision-making and policy development and improving our understanding of the effectiveness of management activities. For example, improving our understanding of management techniques that are most effective to protect and improve the ecological health of wetlands is an identified area of research in the Strategy. The diverse knowledge gaps are being addressed by investment both in large-scale research collaborations that focus on national priorities and industry direction (e.g. cooperative research centres [CRCs] including the CRC for Water Sensitive Cities), and in collaborations that can be more responsive to local research needs. Two of the major research collaborations that directly support the Strategy are Melbourne Waterway Research-Practice Partnership (MWRPP) and Aquatic Prevention Pollution Partnership (APPP). Knowledge gained through these research collaborations progressively increase our ability to strategically plan and deliver waterway management activities and understanding of the nature and timing of investment outcomes.

The next section highlights a selection of recent work, including a sample of the research being undertaken to address knowledge gaps in the Strategy.

Selection of recent work

To inform our wetland MEP since the launch of the *Healthy Waterways Strategy 2018* we have:

- Continued work to improve our mapping of regional wetlands (with the Waterways Ecosystem Research Group, University of Melbourne, and Grace Detailed-GIS Services).
- Commenced an investigation of the potential value of a Tassled Cap Wetness (TCW) index, derived from ortho-rectified and cloud masked satellite data produced by Geosciences Australia, to determine past hydroperiods of regional wetlands (with the Centre for Freshwater Ecosystems, La Trobe University).
- Run an improved wetland prioritisation exercise to identify and rank wetlands by conservation status and native biodiversity values. 'Social value' wetlands such as urban lakes and drinking water reservoirs are also included and ~250 wetlands, or wetland complexes, of significance have been identified.
- Commissioned Index of Wetland Condition (IWC) assessments (DEPI 2013) of priority wetlands to fill a gap in our knowledge identified by the Healthy Waterways Strategy 2018. Our focus has been to obtain baseline data for little studied wetland ecosystems: first, the nationally listed Seasonal Herbaceous Wetlands and, second, billabongs. In this work we will test whether it is useful to add more detail to the IWC vegetation element to improve our ability to detect wetland responses to management interventions or threats (with Ecology Australia Pty Ltd).
- Continued remote-sensing of vegetation cover at stormwater treatment wetlands, with a third assessment scheduled for 2020/21.
- Commissioned preparation of a wetland monitoring and evaluation plan, which has commenced with a review of possible approaches and discussions with experts and stakeholders (with Jacobs Australia).
- Commissioned research towards spatial prioritisation of management action for biodiversity outcomes in streams and wetlands, by extending existing spatial tools for instream biota and developing new spatial planning tools to develop Habitat Suitability Models (HSM) for wetland-dependant biota.
- Commissioned several wetland research projects through research agreements, including:
 - Monitoring of 26 constructed wetlands, with the deployment of depth metres to log water levels and assess hydrological function, as part of a study to develop stormwater wetland performance indicators (Waterways Ecosystem Group, University of Melbourne).
 - Investigating the efficiency and effectiveness of aquatic pollution assessments within wetlands (Aquatic Pollution Prevention Partnership [A3P], RMIT).
 - Research to determine the major sources and fate of sediments in streams, wetlands, estuaries and bays to inform management opportunities.
 - Progressing research into the impacts of 'next generation' citizen science programs examining the adoption of 'next generation' digitally-mediated citizen science programs. The research is considering the new forms of 'community' that might be supported by these technologies and the relationship with face-to-face and place-based volunteer experiences.
- Initiated review to improve social values for wetlands and monitoring approach. The existing perceptions survey undertaken by Melbourne Water since the mid-1990s will continue. However additional questions and the ability to get finer scale data most relevant to wetlands is being investigated.

Proposed approach

The Wetland MEP will provide direction to Melbourne Water and other agencies responsible for delivery, and inform public groups and other stakeholders.

There is a multitude of values associated with our wetlands. The Wetland MEP envisions a tiered approach that collects information at different spatial scales to answer different questions (see Table 1). We can collect detailed information on only a small number of sites (true monitoring), and limited information on many sites (surveillance). The framework outlined here attempts to balance these competing realities for our wetlands.

Surveillance monitoring provides an ability to report the status of key values, track change in critical background conditions that influence key values and are critical parameters to modelling such as habitat suitability modelling. Surveillance monitoring enables tracking of changes such as in ecosystem system health, but also has potential to track stream function measures and assess responses to climate change and background conditions.

Intervention monitoring will be undertaken where confidence in the relationship between environmental conditions and values is low or the confidence in actions and resulting environmental conditions is low. All management actions or interventions rely upon some combination of ecological theory, expert judgement, empirical data, statistical modelling and the background assumptions and uncertainties inherent in each. For instance, successful restoration or regeneration of vegetation under given starting conditions depends on application of appropriate techniques such as site preparation, seeding/planting, weeding, fencing and thinning, at appropriate times. Considerable uncertainties may surround intervention actions including what counts as 'success'. A common response to addressing these questions and uncertainties is to prescribe intervention monitoring and adaptive management.

The Ecosystem services framework will be developed for our region in the coming years. The analytical process for developing an ecosystem services conceptual model for the *Healthy Waterways Strategy 2018* will be developed in accordance best practices for standardising measurement of ecosystem services, whilst ensuring meaning for Victorian context and informed by relevant literature on the environmental and social/economic outcomes related to catchment and waterway investment in Victoria.

Data Analysis Plan (DAP)s will be developed as a component of the monitoring program. A DAP is a map of planned analysis created and committed to before observing outcomes. The DAP will enable the fostering of transparency, openness and reproducibility, and thereby ensuring integrity and quality during MEP implementation.

Table 1 Wetland MEP Tiered Information Approach

Tier (spatial scale)	Theme	Element	Method	Where/ When	Reporting	Who
I. Selected study sites	A. Works effectiveness	1. Project-specific intent e.g. billabong restoration projects, constructed wetland rectification works	Project-specific outcomes assessed using proper experimental design, e.g. replicates and control sites. WETMAP.	As required. Could set requirement for a minimum 25% of all wetland capital projects to include an appropriate	Mid-term, end	Melbourne Water

Tier (spatial scale)	Theme	Element	Method	Where/ When	Reporting	Who
				assessment component		
	B. Performance objectives	2. As defined in the Strategy	Objective specific	All wetlands with Performance Objectives	Mid-term, end	Responsible agency
	C. Specific values	3. Dwarf Galaxias habitat ponds	targeted surveys to determine survival and breeding success	All, annually	Annually	Melbourne Water
		4. Growling Grass Frog habitat ponds	targeted surveys to determine survival and breeding success	All, annually	Annually	DELWP
		5. Ramsar wetlands	Obligatory monitoring of bird numbers and diversity	All, annually	Annually	CMA, or Melbourne Water (Edithvale-Seaford)
		6. Seasonal Herbaceous Wetlands	Objective specific (DELWP) IWC or IWC+	4 to 5-yearly	Mid-term, end	DELWP (Western Grassland Reserve), CMA. Melbourne Water
		7. Stormwater treatment wetlands	Melbourne Water standards	As per Melbourne Water maintenance requirements	As per current standards	
		8. Groundwater dependent ecosystems	IWC-GDE	At priority sites every 3 years	Mid-term, end	Melbourne Water – potential partners Parks Victoria, Councils, Landcare
		9. Drought refuges	eDNA, VEFMAP	At priority sites every 3 years	Mid-term	DELWP, Melbourne Water
II. Sub-set of regional wetlands	D. General values	10. Wetland birds	a. Community-based bird surveys through Birdlife Australia with data used to generate richness indices – leading to: b. Development of Habitat Suitability Models for selected species, and ultimately c. eDNA presence/absence	Quarterly counts at ~200 selected wetlands	Mid-term, end	Melbourne Water
		11. Frogs	a. Initially	a. Initially	Mid-term,	a.

Tier (spatial scale)	Theme	Element	Method	Where/ When	Reporting	Who
			community-based data collection through Frog Census.	community selected wetlands	end	Melbourne Water
			b. Developing into eDNA sampling to ascertain both presence and absence of species	b. ~200 selected wetlands (TBC).		b. Melbourne Water
		12. Fishes	Assessment technique and sampling regime being developed	To be confirmed	Mid-term, end	Melbourne Water
		13. Vegetation	Assessment technique and sampling regime being developed	To be confirmed	Mid-term, end	Melbourne Water
		14. Social	Assessment technique and sampling regime being developed. (Note: drinking water standards for supply reservoirs is long-standing)	To be confirmed	Mid-term, end	
	E. Conditions/ threats	15. Hydroperiod water quality Vegetation extent and condition, connectivity, etc.	a. IWC (or IWC+)	Expert panel to determine survey method and sampling regime: number of wetlands to be assessed and frequency of assessment	Mid-term, end	a. Melbourne Water
			b. eDNA (threats) once developed			b. Melbourne Water
III. Regional (all natural wetlands above some minimum area)	F. Broad-scale condition and trajectory	16. Presence/ absence, hydroperiod, catchment integrity, buffer native veg extent, etc.	Remote-sensed data analysis	4 to 5-yearly analysis	End	Melbourne Water

References

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