

Estuary 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 estuary monitoring, or surveillance, and the preparation of a monitoring and evaluation plan for regional estuaries as required by the *Healthy Waterways Strategy 2018* (Melbourne Water 2018).

Background

Estuaries are where a river meets the sea, including the lower section of a river that experiences tidal flows where fresh water and saline water mix together. For the *Healthy Waterways Strategy 2018*, estuaries are further defined to be at least 1 kilometre in length or have a lagoon greater than 300 metres in length. The downstream extent of an estuary is where the banks of the river end and the waterway meets the bay or ocean.

Of the 133 waterways in the region that flow into the sea, thirty-three waterways have an estuarine component. There are also ten waterways in the region that require further investigation to conclusively determine if they have an estuarine component. There are also waterways in the region that have been piped for some or all of their length. Those that have been piped where an estuary would have previously occurred are not included in this Strategy.

Previously, Melbourne Water planned for and managed 29 of the regions estuaries through the *Healthy Estuary Strategy* (Melbourne Water 2011). In accordance with Victorian government policy, planning for all waterways including estuaries will now be undertaken through the regional waterway strategies. Accordingly, the same 29 estuaries have been incorporated into the *Healthy Waterways Strategy 2018*. To develop a monitoring program addressing the diverse range of values and threats affecting the condition of our estuaries is challenging.

The Index of Estuary condition was developed by the Department of Environment, Land, Water and Planning (DELWP) over the period between 2010 to 2013. During this time data was collected at a range of Melbourne estuaries for vegetation, fish, birds and water quality. Some water quality and fish data has been collected for a range of estuaries on a sporadic basis, but the Estuary MEP will seek to improve monitoring so that more information is available to better track the health of estuaries.

The Estuary MEP includes articulation of the monitoring of catchment contributions to pollutant loads for Port Phillip Bay and Western Port, to acknowledge works benefitting water quality in waterways contributes to achieving targets for the bays. Polluted catchment run-off can have local waterway impacts, be transported downstream to impact estuaries and cumulatively impact on values in embayments such as near shore reefs, seagrass beds and mangroves.

In alignment with the Victorian Waterway Management Program, the 2018 Healthy Waterways Strategy 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, developing strategic decision-making tools and frameworks for the prioritisation of management interventions for estuaries 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 Estuary MEP since the launch of the *Healthy Waterways Strategy 2018* we have:

- Melbourne Water has partnered with DEWLP to undertake Index of Estuary Condition (IEC) assessments with additional fringing vegetation assessments 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 estuary systems including fringing vegetation.
- Scoping an approach to monitor fish in estuaries and use of eDNA.
- Developing scope to commission preparation of an estuary monitoring and evaluation plan, including a review of possible approaches and discussions with experts and stakeholders.
- 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.
- Progressing research to identify and test critical assumptions of interventions and outcomes, their relationships with environmental conditions, and subsequently, on the status/condition of key values of interest.
- Undertaking research to determine the major sources and fate of sediments in streams, wetlands, estuaries and bays to inform management opportunities.
- Initiated review to improve social values for estuaries 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 estuaries is being investigated.

Other recent work that relates to and informs the Strategy:

- Melbourne Water in partnership with DELWP developed the Port Phillip Bay Environmental Management Plan 2017-2027. This work defined pollutant load targets for the protection of the ecology of the Bay and set targets to maintain waterway derived load contributions at 2018 loads. These targets, plus targets for Western Port, have been incorporated into the revision of the State Environment Protection Policy (Waters) and the Strategy.
- Melbourne Water have partnered with DELWP to build a Source catchments model based on a range of water quality and flow monitoring data sets. The model is being used to test the effectiveness of various stormwater policy options and IWM scenarios as well as a range of performance objectives in the Strategy including rural land interventions and wetland maintenance. The model will be used in combination with data to report on annual loads of nutrients and sediment to Port Phillip Bay and Western Port
- As part of the Source catchment development MW and DELWP have developed a range of land use datasets based on current and future projections of urban growth and land use change. These are used in the model to test current and future scenarios.

- Commissioned the development of a new Pollutant Loads water quality monitoring network. This data will be used periodically to recalibrate and validate the Source catchment model.

Proposed approach

The Estuary 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 estuaries. The Estuary 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 select sites (true monitoring), and limited information on many sites (surveillance). The framework outlined here attempts to balance these approaches for our estuaries.

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 social or 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 key 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 Estuary 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	Project-specific outcomes assessed using proper experimental design, e.g. replicates and control sites.	As required. Could set requirement for a minimum 25% of all estuary capital projects to include an appropriate assessment component	1 year, 2 year, 4 year, 10 year	Melbourne Water

Tier (spatial scale)	Theme	Element	Method	Where/ When	Reporting	Who
	b. Performance objectives	2. As defined in the Strategy	Objective specific	All estuaries with Performance Objectives	4 to 5-yearly	Responsible agency
	c. Key values	Estuary Birds – habitat	Targeted surveys to determine bird survival and breeding success	All, annually	Annually	Melbourne Water
		Fish - habitat	Analysis of conditions to support fish survival and breeding success	All, annually	Annually	DELWP
		5. Drought refuge	TBD			
II. Sub-set of estuaries	d. Key values	Estuary birds	a. Community-based bird surveys through Birdlife Australia with data used to generate indices b. Development of Habitat Suitability Models for selected species c. eDNA presence/absence	Quarterly counts at ~29 selected estuaries	4 to 5-yearly	Melbourne Water
	D. Key values	Frogs	a. Initially community-based data collection through Frog Census. b. Developing into eDNA sampling to ascertain both presence and absence of species	a. Initially community selected estuaries b. ~29m selected estuaries (TBC).	4 to 5-yearly	a. Melbourne Water b. Melbourne Water
		Estuary Fish	Assessment technique and sampling regime being developed	To be confirmed	4 to 5-yearly	Melbourne Water
		Vegetation	Assessment technique and sampling regime being developed	To be confirmed	4 to 5-yearly	Melbourne Water
		Social	Assessment technique and sampling regime being developed	To be confirmed	4 to 5-yearly	
	E. Conditions/ threats	Hydroperiod water quality Vegetation extent and condition, connectivity, etc.	a. IEC or equivalent (TBC) b. eDNA (threats) once developed	Expert panel to determine survey method and sampling regime: number of estuaries to be assessed and frequency of assessment	4 to 5-yearly	a. Melbourne Water b. Melbourne Water

Tier (spatial scale)	Theme	Element	Method	Where/ When	Reporting	Who
III. Regional (all estuaries)	F. Broad-scale condition and trajectory	16. Presence/absence, buffer native veg extent, fish etc.	Remote sensed data analysis	4 to 5-yearly analysis	4 to 5-yearly	Melbourne Water
		Pollutant Loads to Port Phillip Bay and Western Port	Water quality data (event based and base flow) Flow data – continuous Source catchment model	Range of key monitoring locations to calibrate and validate the model Model used to integrate data and create catchment load estimations	Annual (model) 4 to 5 yearly data calculations and model recalibration	Melbourne Water

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