

Rivers 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 rivers monitoring, or surveillance, and the preparation of a monitoring and evaluation plan for river across the region as required by the *Healthy Waterways Strategy 2018* (Melbourne Water 2018).

Background

Our region includes around 24,000 kms of rivers and creeks. Rivers are incredibly diverse, complex and variable and range from tiny headwater streams to large lowland rivers. Streams in our region range from being ephemeral due to very dry conditions in the west and perennial in the east. Developing a monitoring program for the diverse range of values, conditions and threats of our rivers is challenging.

While the environmental values of rivers in the *Healthy Waterways Strategy 2018* (the *Strategy*) are represented by six key values: birds, fish, frogs, macroinvertebrates, platypus and vegetation, the intention is to manage for the whole environment (including other animals such as turtles, skinks, water rats and freshwater crayfish). While the key values are a useful surrogate for other biota (values) there will be instances where monitoring specific habitats and species is required – e.g. monitoring for threatened species.

The Strategy also developed regional and sub-catchment targets for three social key values, recreation, community connectivity and recreation. The social values of waterways are becoming better understood; however, it is recognised that the methodologies and knowledge collective are still developing.

Similarly, monitoring plans for cultural and economic targets are not well progressed – however will be incorporated into MEPs in the future.

Conceptual models developed for the Strategy outline the various conditions needed to support these values. The Strategy used available data and models on the values and the most relevant conditions for setting both value and condition targets.

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, refinement of conceptual models and developing tools to support investment in waterway works for recreation and amenity 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 Rivers MEP since the launch of the *Healthy Waterways Strategy 2018* we have:

- Developed a discussion paper on instream monitoring and sought feedback from the MERI Science Panel which has outlined the objectives for surveillance/broad scale and intervention monitoring.
- Commenced development of a detailed monitoring plan for key values using eDNA sampling techniques, which builds on several years of research and development and is transformative to the way we monitor values.
- Commenced a research project to investigate the potential to develop predictive models of vegetation condition by combining existing field based data with remote sensing data (such as satellite data).
- Commenced a detailed field based monitoring plan for vegetation condition to be used in conjunction with remote sensing data and predictive models.
- Commenced a field based monitoring plan for fish to complement eDNA sampling approaches.
- Progressing a monitoring plan for platypus to complement eDNA sampling approaches.
- Progressing a detailed fixed site monitoring plan for macroinvertebrates and commenced evaluation of existing long term macroinvertebrate data to inform annual analysis and reporting approaches.
- Developed performance indicators for environmental water and begun development of a dash board for reporting against environmental water targets.
- Initiated a review of the existing long term water quality monitoring network.
- Undertaken a review of the environmental condition metrics used in the Strategy for setting targets and identified improvement opportunities e.g. the need for a more comprehensive physical habitat data and more refined social condition metrics.
- Commissioned research towards spatial prioritisation of management action for biodiversity outcomes in streams by extending existing spatial tools for instream biota.
- Commissioned 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.
- Commissioned research into the effectiveness of rural land interventions to improve stream flows and water quality.
- 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.
- Undertaking research into the role of small headwater streams ('zero order' streams) in urbanising catchments for supporting waterway health.
- 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 rivers 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.

Proposed approach

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

There are many values and conditions associated with our rivers. It would be inefficient to monitor everything everywhere so the framework outlined here attempts to balance what is monitored, what is modelled and what assumptions are tested. The Rivers MEP envisions a tiered approach that collects information at different spatial scales to answer different questions (see Table 1). We cannot afford to collect data everywhere and the framework outlined here attempts to balance these competing realities for our rivers. The approach in the MERI Plan is to focus monitoring on three themes – i.e. surveillance monitoring, intervention monitoring and research.

Of the key in-stream environmental values, (macroinvertebrates, fish and platypus) macroinvertebrates (which is comprised of 59 families) are the most sensitive to environmental change and management actions. As such macroinvertebrates should be a primary focus of long-term broad-scale and intervention monitoring.

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 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 Rivers MEP Tiered Information Approach

Tier (spatial scale)	Theme	Element	Method	Where/ When	Reporting	Who
I. Selected study sites	a. Intervention monitoring	Project-specific intent	Project-specific outcomes assessed using proper experimental design, e.g. replicates and control sites.	As required. Stormwater intervention s, fishways, revegetation	1 year, 2 year, 5 year, 10 year	Melbourne Water
	c. Specific values	Threatened species	targeted surveys to monitor populations	As required (TBC for specific species)	annually	Melbourne Water / DELWP
II. all 69 sub-catchments	d. Key values	Riparian Birds	1. Community-based bird surveys through Birdlife Australia with data used to generate indices 2. eDNA presence/absence	Quarterly counts at ~200 selected	4 to 5-yearly	Melbourne Water
		Frogs	1. Initially community-based data collection through Frog Census. 2. Developing into eDNA sampling to ascertain both presence and absence of species	1. Initially community selected rivers 2. TBC	4 to 5-yearly	1. Melbourne Water with Waterwatch 2. Melbourne Water
		Fishes	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
	e. Conditions/ threats	Physical Form/habitat	1. erosion potential index 2. physical habitat metrics being developed	Sub-catchment TBC	4 to 5-yearly	Melbourne Water
		Vegetation extent	Percentage or reach which has continuous vegetation canopy cover within 20m either side of the stream (based on lidar method) – ie canopy cover above 1.5 m	Sub-catchment	4 to 5-yearly	Melbourne Water
		Vegetation Quality	Assessment technique and sampling regime being developed (Dr Matt Dell)	To be confirmed	4 to 5-yearly	Melbourne Water
		Stormwater condition	Directly Connected Imperviousness	Reach and Sub-catchment	4 to 5 yearly	Melbourne Water
		Pest plants and animals	Field based as part of vegetation condition	Still under development	4 to 5-yearly	Melbourne Water

Tier (spatial scale)	Theme	Element	Method	Where/ When	Reporting	Who
Selected sites	assessments					
		Water Quality - environmental	Based on relationship between landuse and WQ levels validated with monitoring data	Sub-catchment scale	4 to 5 yearly	Melbourne Water
		Water Quality - recreational	Compliance with SEPP (Waters) recreational water quality objectives at particular locations (swimming is considered as primary contact, boating as secondary contact)	Selected high recreation locations	4 to 5 yearly	Melbourne Water
		Environmental Water	Compliance with environmental flow components identified through FLOWS method	Sub-catchment scale	4 to 5 yearly	Melbourne Water
		Instream connectivity	Based on connectivity within sub-catchment and to the outlet	Sub-catchment scale	4 to 5 yearly	Melbourne Water
		Litter	Under development	TBC	TBC	TBC
		Access	Access is based on the proportion of stream corridors that have accessible waterways (paths) on at least one side.	Sub-catchment scale	4 to 5 yearly	Melbourne Water
Port Phillip and Westernport		Participation	Percentage of population involved in grants and citizen science (related to waterways) over previous 3 years as a proportion of population within sub-catchment	Sub-catchment scale	4 to 5 yearly	Melbourne Water
	Condition/threat	Water Quality environmental	Loads of nutrient and sediment to Bays (Source	Bay scale	Annual validated at 4 and 8	Melbourne Water

Tier (spatial scale)	Theme	Element	Method	Where/ When	Reporting	Who
			catchment model)		years with monitoring data	
	b. Performance objectives	As defined in Strategy 2018	Objective specific	All sub- catchments with Performance Objectives	4 to 5-yearly	Responsible agency

References

Alluvium (2017) Final Report: Healthy Waterways Strategy Waterway Science Conceptual Models. Report prepared for Melbourne Water by Alluvium Consulting, Melbourne.

Alluvium (2019) 2018 Healthy Waterways Strategy MERI Framework. Version 1.0 prepared for Melbourne Water by Alluvium Consulting, Melbourne.

Melbourne Water (2018) Healthy Waterways Strategy 2018. Melbourne Water, Melbourne.