Project Summary
2017/18

Project 2.5
Setting hydrologic objectives from site-scale to catchment-scale

Hydrology is a primary driver of waterway health, influencing water quality, physical channel form and habitat availability. Hydrology also has implications for flooding and the safety of the public and property, particularly in the urban environment. Many of Melbourne Water's activities depend on a strong understanding of the hydrology of streams and how important aspects of flow regimes can be managed to protect environmental values, the community from flooding, and public assets from damage.

Research aims

This project aims to deliver an integrated suite of research to help Melbourne Water to protect and restore flow regimes to support healthy streams and communities.

Research methods

This project is based on answering three underpinning research questions (see Figure 1):

What should the flow regime look like in a given stream? To answer this, the project is i) developing a way to predict stream flows without a gauge and ii) identifying the appropriate low-flow regime for a given stream and necessary management actions required to establish that regime. For 2017/18, the project will focus on:

- Testing different rainfall-runoff models for Australian running waters and undertake predictions.
- Developing metric of flow-stress and apply it across region (including density of farm dams); connecting to work by Jacobs (with Nick Bond & Rory Nathan).
- Publishing a paper & industry report for MW.
- Developing a simple user-friendly tool for interrogating data, to provide Melbourne Water and other stakeholders.

How can we best manage flows in the urban context? In answering this question, the project is exploring i) the effect of SCMs on flows, flooding and geomorphology; ii) how to manage the flow regime in the context of a super-abundance of water; iii) the fate of infiltrated water in urban catchments and its effect on flows and water quality in receiving waters; and iV) the impact of diffuse groundwater on the quality of baseflow in urban waterways within Melbourne. Priorities for 2017/18include:

- Finalising guidance to Flood Mitigation & Mapping Team on flow monitoring.
- Development of incision thresholds at development scale, development of tools.
- Production of hydrographs from the super-abundant flow models to illustrate the "return" or "protection" of important aspects of the flow regime.
- assessing the ability of the modelled stormwater approaches in delivering commonly used environmental flow aspects.
- Publish paper on contributions to urban baseflow & fate of infiltrated stormwater.
- Development of clear communication material.

What are the ecological and geomorphic responses to alternative flow regimes? To answer this, the project will: 1) use reach mapping and hydraulic models to model the hydraulic environment resulting from the various stormwater management strategies proposed in the super-abundant flows work , allowing

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the calculation of hydraulic metrics, and 2) use the proposed "Sunbury Project" to test the ecological consequences of different flow regimes in different tributaries.

Progress to date

Over the last 4 years, project 2.5 has delivered significant new insights into the hydrology of urban waterways. Therefore, a significant focus in 2017/18 on converting these research findings into practical tools for policy and implementation, both by Melbourne Water and its partners.

Development of Practical Tools

The project will seek to develop a "Catchment-Scale Framework for Protecting and Restoring Flow Regimes". This framework, to be developed in 2018/19, will allow for the prediction of optimal scales and arrangements of SCMs. The framework will outline how to model SCMs in a way that takes into account their location in the catchment.

Project team

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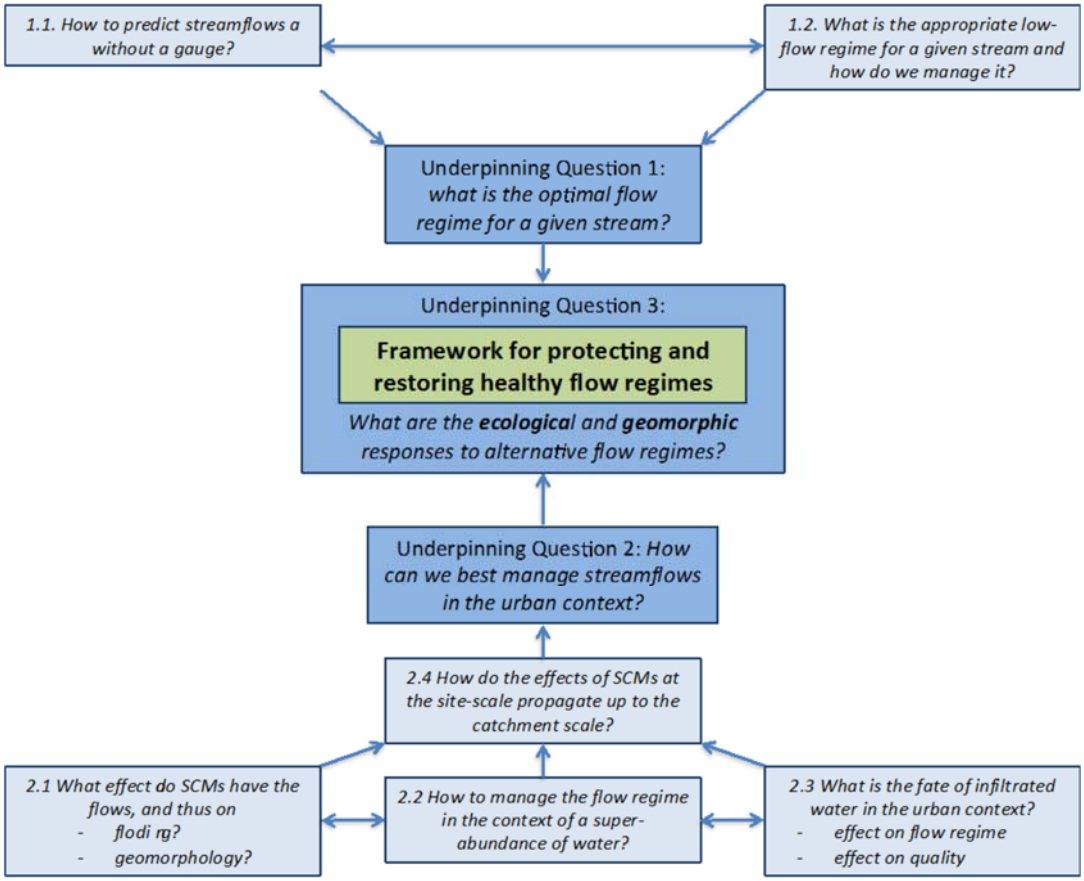

Figure 1. Conceptual representation of Project 2.5. The ultimate outcome is a framework for "Optimal flow regime management", which is underpinned by three fundamental research questions (mid-blue). In turn, the fundamental research questions will be answered by the individual research activities (light blue).