

Urban flow ecology: Investigating relationships between flow, channel form, vegetation and ecosystem function

Project B1:
Stream Flows

This project will improve Melbourne Water's understanding of how alterations to catchment hydrology effect the ecological and social values urban streams provide.

This research will investigate how key aspects of the urban flow regime influence channel form and ecosystem values and services; and in turn how catchment runoff can be best managed to protect and restore streams in the urban environment.

This project will build on previous research undertaken as part of the Melbourne Waterways Research Practice Partnership (Project 2.5), which sought to define the key flow metrics of a natural flow regime and the catchment-scale management actions required to achieve them.

While that research was successful, it stopped short of investigating the linkages between these flow metrics and the ecosystem values and services Melbourne Water seeks to protect and restore. While environmental flows research and the FLOWS methodology is rapidly addressing these knowledge gaps in rural environments; research in urban ecosystems is lacking

Methods

This research will use multiple approaches to answer the questions outlined in Figure 1. Using a broad range of streams located across Melbourne's urban gradient the project will survey and characterise relationships between flow and hydraulic complexity, sediment and organic matter dynamics, in-stream vegetation abundance and diversity, habitat complexity, macroinvertebrate communities and stream metabolism.

To test key relationships identified via the surveys, the project will experimentally

assess: A) sediment, organic matter and propagule retention in response to varying flow events to determine the sensitivity to altered flows across a backdrop of varying catchment disturbance; and B) the recovery of sediment, organic matter, in-stream vegetation, biota and function (metabolism) in experimentally cleared patches and recently 'restored' urban stream reaches.

Outcomes

- 1) Identify key urban flow metrics & hydraulic conditions which influence microhabitat,
- 2) Determine the sensitivity of microhabitat to alterations in hydrology and hydraulic conditions, and
- 3) Investigate relationships between sediment, organic matter and vegetation and how they ultimately influence physical form and habitat complexity and how this in turn drives macroinvertebrate communities and ecosystem function.

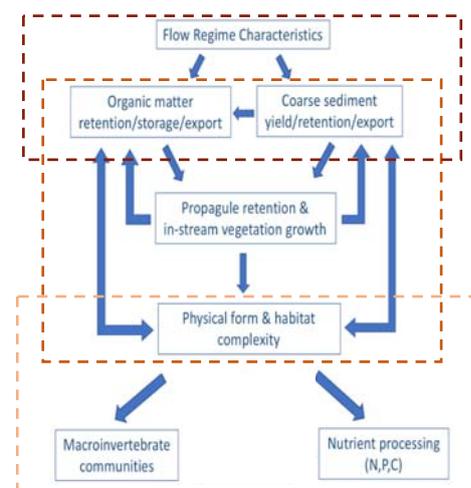


Figure 1. Hypothesised conceptual model of interest, showing mapped research questions.

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