

Melbourne Waterway Research-Practice Partnership Honours/Masters Project Ideas

Project title	Project description	Project length	Suited to:	Environment focus	Value/taxa focus	Key personnel (including Melbourne Water contacts)	Status	Comments
How does land use and land cover variation drive leaf litter decomposition in Melbourne Streams?	Leaf litter decomposition by microbes and macroinvertebrates is an important ecosystem function in streams. However, we currently do not know how the relative importance of these two pathways vary across the landscape in Melbourne. This project will involve the deployment of coarse-mesh (measuring total decomposition rates including those driven by macroinvertebrates) and fine-mesh (measuring microbial-driven decomposition rates) leaf packs in Melbourne streams to understand how different decomposition pathways respond to land use impacts. The results would enhance our understanding on land use impacts on aquatic food web as well as inform the design and interpretation of stream health indicators.	<1 year	OEP Masters/ Honours/ Masters	Streams and rivers	Ecosystem processes / macroinvertebrates	Ryan Burrows (UoM/MW), Moss Imberger (UoM), Elaine Yuen (UoM)	Proposed	
Variation in nutrient limitation of microbial biofilms in the Melbourne region	This project will uncover variability in spatial patterns of nutrient limitation (nitrogen, phosphorus, carbon) of microbial biofilms in major rivers of the Melbourne region. It will do this by deploying nutrient-diffusing substrates which experimentally elevate nutrient supply to microbial biofilms.	<1 year	OEP Masters/ Honours/ Masters	Streams and rivers	Ecosystem ecology / water quality	Ryan Burrows (UoM/MW), Moss Imberger (UoM), Elaine Yuen (UoM)	Proposed	
Optimising measurements of billabong ecosystem metabolism	Efforts are being made to reconnect billabongs with the Birrarung (Yarra River) following more than a century of altered flow regimes. Billabong reconnection can, however, impact water quality. Of most concern is a drop in dissolved oxygen concentrations due to elevated microbial respiration. This project will aim to optimise how we measure and monitor ecosystem metabolism (autotrophic production and microbial respiration). This will be done by comparing different methods, including whole ecosystem versus light/dark bottles, and gaining a better understanding spatial variation.	0.5-2 years	OEP Masters/ Honours/ Masters	Billabongs/Rivers	Ecosystem metabolism / water quality	Ryan Burrows (UoM/MW)	Proposed	
Understanding key habitat requirements of Pseudophryne toadlets	Creating artificial habitat for Pseudophryne toadlets may be a core focus of their conservation in coming years. To enable this, we require a basic understanding of the core environmental conditions (vegetation, water chemistry, aspect, altitude, etc) that are associated with their existing habitat.	1 year	Honours	Wetlands	Frogs	Ryan Burrows (UoM/MW) William Steele (MW) Rhys Coleman (MW)	Proposed	
Does high salinity suppress chytrid fungus for Growing Grass Frogs but inhibit breeding success?	Growing Grass Frogs inhabit waterbodies with 3x the salinity recommended in the ANZACC guidelines. This high salinity appears to suppress chytrid fungus. However, no breeding has been observed from these ponds. This project will answer the question: does high salinity suppress chytrid fungus but inhibit breeding success?		Honours/Masters	Wetlands	Frogs	Ryan Burrows (UoM/MW) William Steele (MW) Others...TBD	Proposed	
Optimising eDNA sampling for particular aquatic species	Melbourne Water has an extensive eDNA (environmental DNA) database and monitoring program for aquatic taxa in its waterways. However, detection probability is affected by changing environmental conditions. This project will use existing eDNA data to determine how particular environmental conditions, such as dry versus wet conditions, influence the detectability of taxa via eDNA.	0.5-2 years	OEP Masters/ Honours/ Masters	Waterways	eDNA	Ryan Burrows (UoM/MW) Rhys Coleman (MW) AI Danger Others...TBD	Proposed	
How successful have Melbourne's fishways been?	Melbourne Water has constructed fishways to overcome in-stream barriers for the movement of fish species. However, we are still to understand how successful these fishways have been. We can now assess this using Melbourne Water's extensive eDNA database and monitoring program.	<1 year	OEP Masters/ Honours/ Masters	Streams and rivers	eDNA	Ryan Burrows (UoM/MW) Rhys Coleman (MW) AI Danger (MW) Others...TBD	Proposed	
The impact of introduced trout on native fish populations above barriers to movement	Anecdotal observations suggest introduced trout may not populate waterways above drinking water offtakes that present total barriers to migration for most fish species. MW have plans to mitigate several of these barriers but the positive or negative impacts to native and introduced fish populations are relatively unknown.	1-2 years	OEP Masters/ Honours/ Masters	Streams and rivers	eDNA, sampling	AI Danger (MW) Others TBD	Proposed	
What is causing low detection of platypus within Plenty Gorge.	Super low detections of Platypus in Plenty Gorge. What are the drivers? What could be done to improve distribution? Lots of eDNA detections below and several above Whittlesea, but super low detections through the Gorge.	<1 year	OEP Masters/ Honours/ Masters	Streams and rivers	eDNA, sampling	Ryan Burrows (UoM/MW), AI Danger (MW), Melody Serena (APC)	Proposed	
Characterising isolated and suspicious platypus eDNA detections.	e.g. Toorourrong Res, Whittlesea, middle & upper Dandenong CK etc. eDNA detections	<1 year	OEP Masters/ Honours/ Masters	streams and rivers	eDNA, sampling	Ryan Burrows (UoM/MW), AI Danger (MW), Melody Serena (APC)	Proposed	
Modelling the streamflow impacts of shifts in the temporal distribution of Victorian rainfall	Climate model projections indicate that the seasonal distribution of Victorian rainfall will change over coming decades. Although the precise future impacts of climate change on Victorian rainfall remain unclear, the analysis of likely scenarios of changes to the temporal distribution of rainfall can give practitioners much needed lead time to implement adaptation measures. This project uses climate model projections, stochastic simulations and rainfall-runoff models to produce bookends of future streamflow for critical catchments in Victoria.	0.5-2 years	OEP Masters/ Honours/ Masters	Streams and rivers	(whole ecosystem and water resources)	Ben Henley (UoM)	Proposed	Proposed project, collaborators needed and contributions invited!
Understanding existing condition and key threats to estuary vegetation in Port Phillip and Westernport Bay	This project would assess the rapid and detailed estuarine vegetation data from Port Phillip and Westernport that Melbourne Water has collected (2023 and different data from 2011). It would look at the condition of estuarine vegetation and the potential weed threats to these areas. It would identify the best areas, worst areas, and management actions that may increase estuarine vegetation in these areas. Could assess changes against aerial imagery	0.5-2 years	OEP Masters/ Honours/ Masters	Estuary vegetation	Vegetation	Sacha Jellinek (UoM/MW), Ryan Burrows (UoM/MW)	Proposed	
Geomorphic change detection to understand stream channel erosion and recovery in Westernport streams	Bank erosion has been identified as a key source of sediment to Western Port, threatening the bay's significant environmental values. Estimates of bank erosion are based on sediment budget modelling for which key assumptions still need to be validated. This project will compare two sets of lidar data captured ~10 years apart using state-of-the-art Geomorphic Change Detection techniques, to identify hotspots of geomorphic change in Westernport's rivers, providing valuable information to improve future modelling.	1 year	OEP Masters/ Honours/ Masters	Streams and rivers	Geomorphology	Kathy Russell (UoM), Rhys Coleman (MW)	Proposed	requires GIS experience. advertised on OEP website
Sediment fingerprinting to disentangle fine sediment sources in urbanising catchments	Sediment fingerprinting study in Officer, to identify key sources of sediment in complex urbanising landscapes. This project will involve sampling, sample preparation and statistical analysis to identify important geochemical properties (i.e. fingerprints) of sediment sources found in urbanising areas.	1 year	OEP Masters/ Honours/ Masters	Streams and rivers	Water quality, geomorphology	Kathy Russell (UoM), Rhys Coleman (MW), Allison Kemp (MW),	Ongoing	OEP student, S1/S2 2025

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Assessing satellite data sources and products to provide real-time information on urban construction processes	Urban construction processes (e.g. bulk earthworks, house construction) can be readily identified from aerial imagery. This project will investigate the usefulness of satellite data (Sentinel, Planet) for identifying these processes in near-real-time. This project could lead to better remote surveillance practices to reduce environmental risks presented by construction (e.g to trigger ground inspections during high-risk construction activities).	1 year	Masters/internship	Streams and rivers	Water quality, geomorphology	Kathy Russell (UoM), Tim Coggan (EPA)	Ongoing	Master of Environmental Science Industry Project team, S2 2024 to S1 2025
Geomorphic unit mapping from lidar data to calculate river physical diversity metrics	River physical diversity creates habitat niches that supports biodiversity. This project will compare measures of geomorphic diversity from lidar data (e.g. geomorphic units mapping) to what is observed on the ground. This project could lead to methods to assess physical diversity at much larger scales than before.	1 year	OEP Masters/Honours/Masters	Streams and rivers	Geomorphology	Kathy Russell (UoM), Amy Grayson (MW)	Ongoing	OEP student, S1/S2 2025
Unravelling patterns of ecosystem metabolism (primary production and ecosystem respiration) within urban billabongs and the Birrarung-Yarra River	This project will make use of existing and new data to estimate rates of primary production and ecosystem respiration within urban billabongs adjacent to the Birrarung-Yarra River and potentially in the river itself. A key objective will be to determine the key environmental factors driving changes in ecosystem metabolism with a key focus on the effects of environmental flow releases and traditional TO-led vegetation burning.	1-2 years	Honours/Masters	Billabongs/Rivers	Ecosystem metabolism / water quality	Ryan Burrows (UoM/MW)	Proposed	
Managing feral deer impacts	Populations of feral deer and their impacts are increasing across Australia. We have several opportunities for students to research the impacts caused by introduced deer and how best to manage them. Projects may include field-based surveys, analyses of existing datasets and working with land managers such as Melbourne Water, Parks Victoria and community groups.	0.5-2 years	Honours/Masters/OEP project	Catchment-scale	Ecosystems/vegetation	Joe Greet (UoM), Ami Bennett (UoM)	Ongoing	
Making rivers great again! Assessing the potential of environmental flows to restore native plant communities	In partnership with the Arthur Rylah Institute for Environmental Research, we are seeking student/s to investigate the potential for environmental flows to restore native riparian vegetation. Increasingly, water is being returned to rivers as "environmental flows" to improve their health, including the native riparian vegetation. Better knowledge of the relationships between river flows and riparian vegetation dynamics is required to best target environmental flows.	0.5-2 years	Honours/Masters/OEP project	Streams and rivers	Riparian ecosystems/vegetation	Joe Greet (UoM), Chris Jones (ARI)	Ongoing	
Assessing the impacts of vegetation cover and structure on macroinvertebrates	Survey a proportion of Macroinvertebrate sites using the vegetation vision surveys across the 6km zone upstream of the macroinvertebrate sites.	1-2 years	Honours/Masters	Streams and river vegetation	Vegetation and macroinverts	Sacha Jellinek (UoM/MW), Ryan Burrows (UoM/MW)	Proposed	
Developing stream dimensions data across the Greater Melbourne region	This internship will involve applying and testing automated stream mapping tools to develop a dataset of stream channel dimensions. For a region of Melbourne, the intern will (a) check and correct stream line data; (b) run tools to detect channel extents from lidar data; and (c) validate outputs against other data sources, and (d) investigate performance of different tools in different stream types.	1 year	Internship	Streams and rivers	Geomorphology	Kathy Russell (UoM), Amy Grayson (MW), Rhys Coleman (MW)	Proposed	
Monitoring impacts of changes in unsealed road management, and sealing of roads on sediment production.	This project will investigate the extent to which improving unsealed road management, and sealing roads, can reduce sediment production. This will combine literature review and field monitoring of paired sites with different properties (e.g. sealed vs unsealed).	1 year	Honours/Masters	Catchment management	Geomorphology	Rhys Coleman (MW), Briony Norton (MW), Micah Pendergast (MW), Kathy Russell (UoM), Council personnel	Proposed	advertised on OEP website
Assessing macroinvertebrate populations in relation to vegetation, physical form and other variables	This is a potential student project where data from Physical Form assessments, instream vegetation, vegetation vision data and other measures including density on instream debris (M. Carew) could be collated and then assessed against macroinvertebrate populations. This will show if and how macroinvertebrates are influenced by catchment scale variables, and potentially provide insights into how macroinvertebrate populations could be enhanced by altering management activities.	1 year	Honours/Masters	Streams and river vegetation	Vegetation and macroinverts	Sacha Jellinek (UoM/MW), Ryan Burrows (UoM/MW)	Proposed	
Caring for Birrarung's (the Yarra's) billabongs. Determining appropriate environmental watering in partnership with Wurundjeri Woi-wurrung's Narrap ('Country') Team	This project involves working with Wurundjeri's Narrap team to determine appropriate environmental management regimes to improve billabong health and restore Country.	0.5-2 years	Honours/Masters/OEP project	Billabongs/Rivers	Wetland ecosystems/vegetation	Joe Greet (UoM), Narrap Rangers	Ongoing	
Factors influencing Yarra Pygmy Perch re-introductions	The student will work alongside MW practitioners on a broader YPP translocation project. YPP are a threatened species and this project will monitor their re-introduction to waterbodies on private land. It will involve monitoring via eDNA and traditional surveys as well as understanding their habitat requirements.	0.5-2 years	OEP Masters/Honours/Masters	Wetlands (small dams)	Fish	Ryan Burrows (UoM/MW), Rhys Coleman (MW)	Proposed	
Historic and contemporary loss of headwater streams	How can we estimate and track loss of physical character in headwater streams (e.g. piping, constructed waterways) in urban areas, both from historical and contemporary data (e.g. lidar data, aerial photos)? How commonly are streams being lost or totally reconstructed in new development areas?	0.5-1 year	OEP Masters/Honours/Masters	Streams and rivers	Geomorphology, ecosystem function	Kathy Russell (UoM), Moss Imberger (UoM), Rhys Coleman (MW)	Proposed	