



Photo: Doug Gimesy

Fish Tracking

Coastal Vic

Understanding the role of river flows in governing downstream spawning migrations of eels

Aim

To investigate the effect of river discharge, including environmental flows, on the downstream migrations of adult eels in coastal rivers in Victoria.

Background

The Short-finned Eel (*Anguilla australis*) is a diadromous species found in coastal rivers and wetlands in eastern Australia. The species supports commercial and recreational fisheries in Australia and has a particular cultural significance to First Nations people.

A critical life history phase for eels is downstream migration from freshwater or estuarine habitats to oceans, ending in their single life-time spawning event. Downstream migrations of mature eels are potentially influenced by a range of factors, including river flows, water temperature, time of year and moon phase. Determining the factors that lead to adults migrating downstream to spawn is vital for the management of this species. Previous research in Darlots Creek in western Victoria found evidence of downstream migrations of eels in response to increased flows in summer. Subsequently, environmental flows to stimulate adult eels to migrate downstream in summer have been incorporated into streamflow management plans for regulated coastal river systems across Victoria, including the Barwon-Moorabool, Yarra, Bunyip-Tarago, and Thomson-Macalister River systems. The linkages between river flow, including environmental watering events, and migration of adult eels however have not been comprehensively tested or validated spatially or temporally. Such information is needed to provide evidence to validate and support refinement and implementation of environmental flows to assist the management and conservation of eel populations.

Victorian Environmental Flows Monitoring and Assessment Program

Downstream migration of Eels

Research questions

1. What are the key environmental drivers (e.g. changes in flows, temperature, moon phase) of downstream migration of adult eels?
2. Does the timing of environmental flow delivery for migration need to incorporate other environmental considerations, such as temperature or moon phase?
3. Are migratory behaviours (e.g. timing, cues) consistent or varied in different rivers, and thus are findings from one system transferable or applicable to other systems?

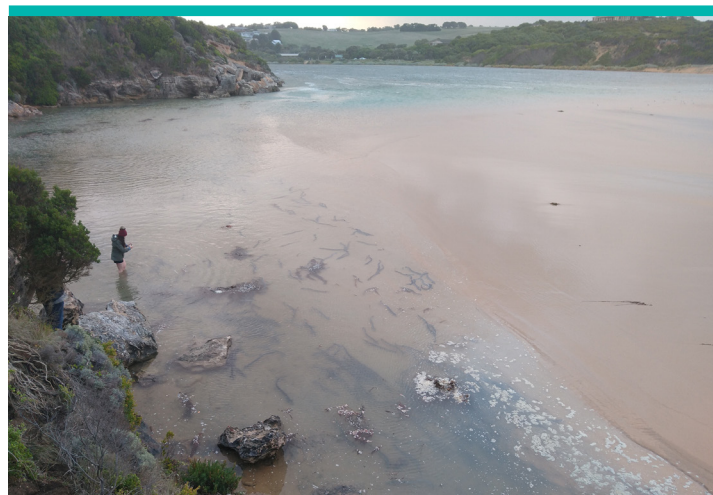
Approach

- Capture and tag adult eels with acoustic transmitters to investigate their downstream migrations in rivers. Eels will be targeted for collection from the Barwon-Moorabool and Thomson-Macalister river systems, and the Yarra River which have environmental water plans and fish objectives. Approximately 25 eels will be collected from each river. The tags can record data for up to three years.
- Use data collected on eel migrations in Lake Condah-Darlots Creek over the past few years (as part of a collaboration with Gunditj Mirring Traditional Owner Aboriginal Corporation) to explore movement patterns.
- Develop statistical models of eel migration. These models will examine the probability of eels commencing their migrations downstream in freshwater, and migration out of estuaries and into the sea in relation to:
 - o flow conditions (e.g. current flows, changes in flow)
 - o other factors (e.g. moon phases, temperature, time of year)
- Explore partnerships with Traditional Owners regarding this eel research in selected areas, including with:
 - o the Narrap Team in the Wurundjeri Woi Wurrung Cultural Heritage Aboriginal Corporation (Yarra River) together with Melbourne Water
 - o the Gunaikurnai Land and Waters Aboriginal Corporation (Thomson-Macalister rivers)
 - o the Wathaurung Aboriginal Corporation (Barwon-Moorabool rivers)

Timeline January 2022 to June 2024

Outputs

- **Annual reports** outlining progress and preliminary findings.
- **Final report** providing an assessment of downstream spawning migrations in response to targeted flow and natural flow events, the role of potential drivers and whether migratory behaviours in different parts of the species' range are consistent or variable.



Eels moving downstream from freshwater into an estuary and out to sea.

Outcomes

- Assessment of the outcomes of environmental water management for adult eel migration across Victoria.
- Assessment of the responses of eels to targeted managed flow events, as well as natural flow events.
- Specific advice to inform seasonal and annual watering decisions to assist in the management and conservation of eel populations. This includes potentially predicting eel responses to different flow and climate scenarios in different rivers.
- Enhancement of partnerships with Traditional Owners relating to eel research and management.
- A basis to inform future efforts to assess and prioritize conservation measures for eel populations.

Key Contact Dr Wayne Koster, Arthur Rylah Institute.

Wayne.Koster@delwp.vic.gov.au



Wayne Koster and Shay from Gunaikurnai Land and Waters Aboriginal Corporation place a tag in an eel