

MMCP Collaboration

Impacts of hydrology and climate on the growth dynamics of Murray cod and Golden perch

Background

Fish are recognised as a critical indicator of flow outcomes under the Murray-Darling Basin Plan. A key objective within the Basin-Wide Watering Strategy is to manage flows to improve survival rates of fishes with medium to long life-spans.

Individual growth rate has a strong influence on critical population processes including survival. However, our understanding of how managed and natural flows affect growth of the Basin's fishes is rudimentary. In this project, fish otoliths (ear bones) will be used to determine the effects of flows and temperature on growth histories of Murray cod and Golden perch at six sites throughout the Basin (Gwydir, Lachlan, Murrumbidgee, Edward-Wakool, Goulburn and lower Murray Rivers).

Management implications

Improved capacity to evaluate outcomes from managed flows.

By using otoliths collected from CEWO's LTIM (Long Term Intervention monitoring) key monitoring areas throughout the Basin, we will back-calculate the growth of fishes that have been exposed to environmental water in recent years. Once this is done we will be estimating the parameters of models that can then be used for inferring the likely range of managed flow impacts on fish growth in unmonitored areas, where good hydrology data exist, using 'predictive inference'.

Increases effectiveness of flow delivery.

The models generated will facilitate decision making within and across years, specifically with respect to how hydrograph features (e.g. timing, magnitude etc.) affect growth. The spatial scale of the analysis (whole-of-Basin) greatly broadens the generality of any inferences we make, hence its utility within the Basin.

Improved capacity to anticipate emerging risks.

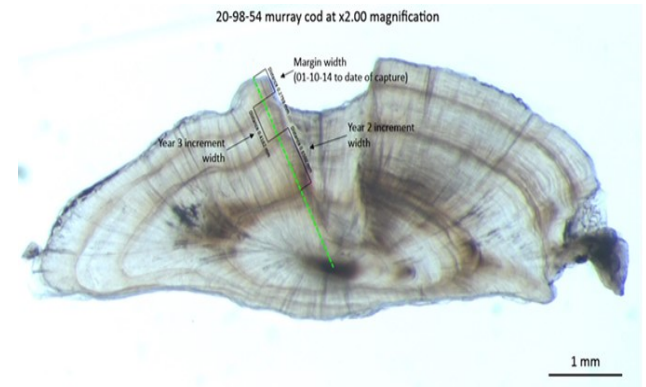
As the Basin-Wide Watering Strategy evolves, we must improve our capacity to predict how changing climate will interact with flows to affect Basin Plan objectives (MDBA 2014). This study specifically aims to improve our understanding of climate-flow interactions, and generates models that enable us to forecast hence anticipate emerging threats to fish growth.

Objectives

Using otoliths obtained as part of LTIM back-calculate the growth rates of individual fish at sites across the Basin, and to then model those growth rates as a function of flow & temperature. This will provide an empirical test of some of the conceptual models that have already been developed that hypothesize how flows & temperature affect growth of different fish species.

Outcomes

- Improved capacity to both predict and evaluate the impacts of environmental water on fish;
- Improved capacity to predict the effects on fish growth of the timing & magnitude of water delivery.
- Improved knowledge of fish-flow ecology



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