



Going with the Flow

WELCOME to Edition #3 (December 2020) of *Going with the Flow*.

In this edition we provide updates on Selected Area additional monitoring activities (i.e. not core M&E) being undertaken and planned for 2021, and give an update on Basin-scale evaluation.

Overall Update from CEWO Science Section:

Independent review of the Environmental Water Knowledge and Research (EWKR) project and Long-Term Intervention Monitoring (LTIM) project is well underway:

- Stage 1 (evaluation) is due to be completed in December, the final report will be published in early 2021. Thank you to all those that contributed
- Stage 2 (consultation) to commence in early 2021. Stage 2 consultation will focus on reaching out to groups that were not engaged in Stage 1.

LTIM Project

- The LTIM project has now been completed with all final milestones delivered.

CEWO Annual Water Management Planning 2021–22

- The internal CEWO Water Management Planning process kicks-off in January 2021.
- Annual [Water Management Plan](#) for catchments are available on the CEWO webpage ([Water Management Plans](#)) and for a snapshot, check out the [Water Management Plan Summary Brochures](#)
- Up-to-date information on watering actions can be found at '[Water Use in Catchments](#)'.

Flow-MER

- [Recent highlights](#) from Issue 5 of the Selected Area Quarterly Outcomes Newsletters (Jul-Sep 2020) is now available.

Basin-scale Evaluation

- Basin-scale evaluation is well underway. The Theme and Evaluation Leaders are as per the table below. If you have any questions, please get in touch with the relevant person.

Flow-MER Evaluation	Theme Leader	Evaluation Leader
Ecosystem Diversity	Heather McGinness	Shane Brooks
Species Diversity		Skye Wassens
Vegetation	Tanya Doody	Fiona Dyer
Fish	Ivor Stuart	Sally Hladyz
Water Quality and Foodwebs	Paul McInerney and Darren Ryder	Darren Ryder
Hydrology	Ashmita Sengupta	Ashmita Sengupta

- Basin-scale Evaluation Reports are due 30 June 2021. The [Basin-scale Foundation Reports](#) were recently published on the CEWO webpage.
- If you haven't done so recently, check out the [Stories on the Flow-MER website](#), where you will find updates from around the Basin. You can also [subscribe to Flow-MER updates](#).

What's happening next?

- Flow-MER Steering Committee (early February 2021), date to be confirmed.
- The CEWO Science Section has started conversations with Delivery Teams to organise another round of 'Learning by Doing' workshops to feed into the CEWO planning process. Tentative dates for these workshops are mid- to late-March 2021. Selected Area and Basin-scale teams will be invited.



Table 1: Summary of Flow-MER Selected Area additional/contingency monitoring projects – as at 24 November 2020

Selected Area	Project	Summary
Goulburn	Turf mat for sediment and seed propagules	Project aim is to better understand the extent to which environmental water can restore hydrochory. Key evaluation questions are: 1) what does Commonwealth environmental water contribute to sediment transport and deposition in the lower Goulburn River relative to IVT events and natural high flows generated via tributary inflows? 2) What does Commonwealth environmental water contribute to plant propagule transport and subsequent deposition in the lower Goulburn River relative to IVT events and natural high flows generated via tributary inflows?
	Fish larvae	This project aims to address the following questions: <u>Long-term Basin-scale</u> questions: 1) What did CEW contribute to native fish populations? 2) What did CEW contribute to species diversity? <u>Short-term Basin-scale</u> questions: 3) What did CEW contribute to fish community resilience? 4) What did CEW contribute to native fish survival? 5) What did CEW contribute to native fish reproduction? <u>Long-term Selected Area</u> questions: 6) What did CEW contribute to the recruitment of golden perch in the adult population in the lower Goulburn River? <u>Short-term Selected Area</u> questions: 7) What did CEW contribute to golden perch spawning and in particular what magnitude, timing and duration of flow is required to trigger spawning? 8) What did CEW contribute to the survival of golden perch larvae in the lower Goulburn River?
	Fish tracking	The aim of this project is to investigate the movement behaviours and habitat use of juvenile Murray cod and/or trout cod in the Goulburn River using telemetry.
Murrumbidgee	Native fish movement, spawning and food webs dynamics in floodplain wetlands.	The objective of the project is to determine the daily age of juvenile fish to establish spawning times to resolve the timing of spawning of the anticipated (TOT) cohort in Tala Creek, and relate to prevailing flow conditions: 1) Determine the age of YOY 2) Infer spawning time 3) Relate to flow conditions 4) Provide environmental water management recommendations based on findings
	Vegetation and wetland assets benchmark	Project aims to collect baseline data on the condition of priority wetland sites that receive Commonwealth environmental water or have the potential to receive Commonwealth environmental water in the future, with a focus on aquatic vegetation. The baseline data will serve as a quantitative reference point against which future evaluation of CEWO watering actions can be evaluated, support water planning, assist watering objectives and recovery targets and identify habitat suitability for other water dependent fauna. The key evaluation questions are: 1) What did Commonwealth environmental water contribute to vegetation species diversity? 2) What did Commonwealth environmental water contribute to vegetation community diversity? 3) What did Commonwealth environmental water contribute to tree condition?

		<p>4) What is the potential for Commonwealth environmental water to improve vegetation condition against the measured baseline ecological condition?</p> <p>5) What is the potential capacity of Commonwealth environmental water to increase or maintain habitat suitability for water dependent taxa?</p>
	<p>Waterbird breeding monitoring (WO#5) (WO#6 GNC) (WO#7 GNC)</p>	<p>The objective of the project is to determine:</p> <p>1) What did Commonwealth environmental water contribute to colonial waterbird breeding in the Murrumbidgee selected area?</p> <p>2) What did Commonwealth environmental water contribute to waterbird fledging and survival?</p>
Lower Murray	Lamprey monitoring	<p>Project aims to contribute to the collection of essential data on the migration of pouched and short-headed lamprey at the Murray barrages and more broadly in the lower River Murray in association with CEW delivery in winter-spring 2019. Key evaluation question is:</p> <p>1) What did Commonwealth environmental water contributions to connectivity and the migration of lamprey at the Murray Barrages in winter-spring 2019?</p>
	Monitoring of the spawning and recruitment of golden and silver perch	<p>The objectives of the project are to:</p> <p>1) Quantify the abundance of golden perch and silver perch larvae and eggs as an indicator of spawning magnitude.</p> <p>2) Identify timing of spawning and the source (i.e. natal origin) of larvae and YOY to enable association of ecological response with hydrology, and to explore population connectivity between regions of the Southern connected MDB.</p> <p>3) Evaluate the contribution of Commonwealth environmental water delivery to the spawning and recruitment of flow-cued spawning fish i.e. What did Commonwealth environmental water contribute to the spawning of golden perch and silver perch?</p>
Edward/Kooley-Wakool	Water quality and primary productivity monitoring	<p>This project will undertake additional water quality monitoring at 10 sites in early 2020. The aim of the stream metabolism component is to assess the effect of environmental water on rates of primary productivity and overall ecosystem production and respiration in Yallakool Creek, the upper Wakool River and the Niemur River over the period of this project. The key evaluation questions are:</p> <p>1) What did Commonwealth environmental water contribute to reducing the impact of hypoxic blackwater or other adverse water quality events in the system?</p> <p>2) What was the effect of Commonwealth environmental water on rates of Gross Primary Production (GPP), Ecosystem Respiration (ER) and Net Primary Production (NPP)? What did Commonwealth environmental water contribute to total GPP, ER and NPP?</p>
Lachlan	Waterbird breeding	<p>This project will collect quantitative data on the breeding success of colonial waterbirds is essential for future understanding, real-time monitoring and predictions of conditions for management. The key evaluation questions are:</p> <p><u>Basin-scale evaluation questions:</u></p> <p>1) What did Commonwealth environmental water contribute to waterbird populations?</p> <p>2) Water contribution did the Lachlan Selected Area make to Basin wide colonial waterbird breeding?</p> <p><u>Selected Area Evaluation</u></p> <p><u>Long-term questions:</u></p> <p>1) How did CEW contribute to colonial waterbird breeding in the Lachlan Selected Area?</p> <p>2) What contribution did the Lachlan Selected Area make to Basin wide colonial waterbird breeding?</p> <p><u>Short-term, watering action specific questions:</u></p> <p>1) What did CEW contribute to colonial waterbird breeding in the Lachlan Selected Area?</p>

		<p>2) How did CEW contribute to colonial waterbird breeding in the Lachlan Selected Area?</p> <p>3) What were the colonial waterbird responses to Commonwealth environmental watering?</p>
Warrego-Darling	Connectivity events	Contingency monitoring of multiple indicators before, during and after flow events will provide information on flows needed to influence channel habitats; improve water quality; and provide for longitudinal connectivity (particularly important for fish) in the Warrego-Darling Selected Area. This will improve understanding of short-term environmental outcomes from flow management in the Warrego-Darling, including trade-offs between connecting the Warrego channel to the Darling River and/or the inundation of the Western floodplain by Commonwealth water for the environment.
	Western floodplain biodiversity	This contingency monitoring element will monitor abundance of key faunal groups on the Western floodplain not captured through current monitoring programs (e.g. small bodied fish, frogs, snakes and turtles) and how their response changes with inundation timing, frequency, spatial extent and duration of watering. This information will allow the CEWO to better target environmental water to the Warrego Channel or Western floodplain.
	Waterbird recruitment	The Western Floodplain has extensive lignum and macrophyte communities that may be important habitat for waterbird breeding. These rookery areas will be the target of event-driven survey effort. Surveys of colonial bird breeding events and fledging success are proposed using standard methods. Surveys will be initiated by confirmed commencement of bird breeding events.
	Fish recruitment	Monitoring of fish recruitment could occur in any year. Additional fish methods and evaluation over and above standard methods will target event-based fish recruitment in the Warrego-Darling (including the Western Floodplain, connection of Warrego channel with the Darling and the role of refuge habitats). Monitoring will track inundation events and the potential for breeding and potential recruitment of native fish (with a focus on Golden Perch). Monitoring will include length, weight, condition and otolith (age and chemistry – research linked to MER Basin Scale) to link to flow triggers in the upstream Darling or Warrego reaches.
	Low flow refuges in the Warrego and Darling Rivers	The focus of this monitoring of refuges will be in drier years. This monitoring will consider the duration of cease to flow events at waterholes in the Warrego and Darling, and monitor how the habitat and food changes (focus on native fish such as golden perch and Murray cod). This project will contribute to the evidence base for the CEWO to better target environmental water to the Warrego Channel or Western Floodplain.
	Incident response monitoring	This monitoring could happen in any year. Opportunistic monitoring can be undertaken for water quality (spot measures and samples) or ecological indicators (fish, frogs, turtles, birds, mussels, other) as agreed between UNE and the CEWO.
Gwydir	Connectivity events	Opportunities to monitor connectivity events are expected in drier years following a wetter year (to replenish water availability). The monitoring would track water quality and fish responses to connectivity events released from Copeton Dam along the length of the Gwydir River, and in the Mehi River and/or Carole Creek. Outcomes will help better understand the response of water quality and fish to 'first flush' flows through to monitoring fish recruitment from connection events.
	Waterbird recruitment	Opportunities to monitor waterbird recruitment are expected in wetter years. The well-known colonial bird rookeries within the Gingham-Gwydir Watercourse rookery areas will be the target of event-driven survey effort. Surveys of colonial bird breeding events and fledging success will be assessed using standard methods. Surveys will be initiated by confirmed commencement of bird breeding events and continue to fledgling.
	Fish recruitment	Monitoring of fish recruitment could occur in any year. Additional fish methods and evaluation over and above standard methods will be target event-based fish recruitment in the lower Gwydir, and follow spawning through time to successful recruitment. This monitoring would focus specific flow releases with targeted fish objectives, monitoring the hydrology, habitat and food resources and otoliths to tie to flows that are supporting recruitment events in the lower Gwydir.
	Low flow refuges	The focus of this monitoring of refuges will be in drier years. This monitoring will consider the duration of cease to flow events at waterholes, and monitor how the habitat and food changes.

	Watercourse biodiversity	This monitoring could occur in all years. The monitoring will help to develop a holistic biodiversity response to specific environmental watering events.
	Incident response monitoring	This monitoring could happen in any year. Opportunistic monitoring can be undertaken for water quality (spot measures and samples) or ecological indicators (fish, frogs, turtles, birds, mussels, platypus, other) as agreed between UNE and the CEWO.