Figure 1: Entrance to the Gwydir State Conservation Area near the Bunnor Waterbird Lagoon (5 April). Credit - Jane Humphries (CEWO)

Where does It come from- where does It go?

A look at the March 21, Gwydir Flows

The northern parts of the Murray Darling Basin have seen some of the driest conditions on record over the last four years. Floods that hit the Gwydir catchment in late March, 2021, brought a mixture of devastation and life to the communities and ecosystems that depend on the catchment's rivers. As the entire Gwydir catchment was doused with heavy rainfall between March 22 and March 24, downpours quickly translated into a significant, widespread flooding event.

The rains were heavy and far reaching across this region of the state. The Bureau of Meteorology recorded that Gravesend, Pallamallawa, and Moree each received their March highest daily records ranging between 119 and 150 mm. Peaking at the Gravesend gauging station, the Gwydir River saw a whopping 173,727 ML/day flow through its banks. To visualise this volume of water, just think of 69,490 Olympic swimming pools worth of water flowing past this point in just one day! Downstream at Pallamallawa 154,110 ML/day was recorded classifying this flood as a 1 in 83-year flood.

We tracked this flood as it continued downstream through the Lower Gwydir to reaches including the Gingham Watercourse, the Mehi River and Moomin Creek. The inundation extent of this event is shown in Figure 2 that shows floodwater travelling west from Moree to meet the Barwon River, which flows south-west from Mungindi.

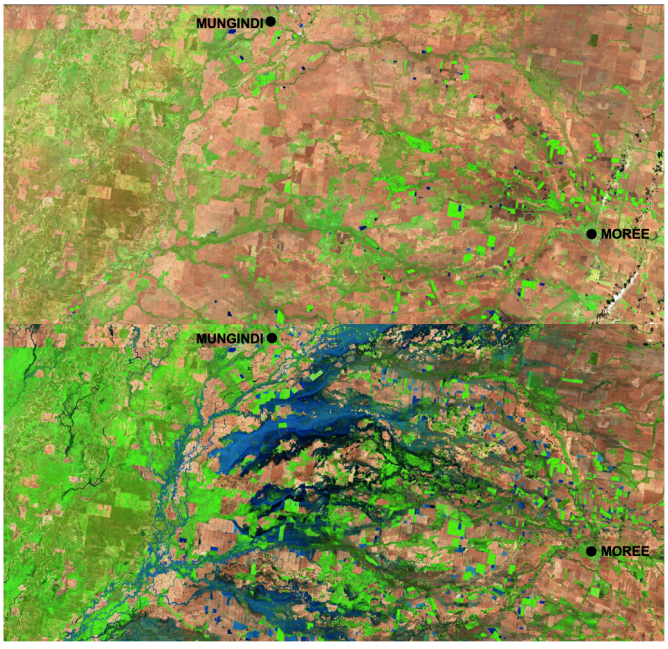

Figure 2: Imagery comparing inundation extent before (top image, 25 Feb) and after (bottom Image, 2 April) peak floods across the Gwydir (Centre of the image).Flows In the top of Image are from the Border Rivers

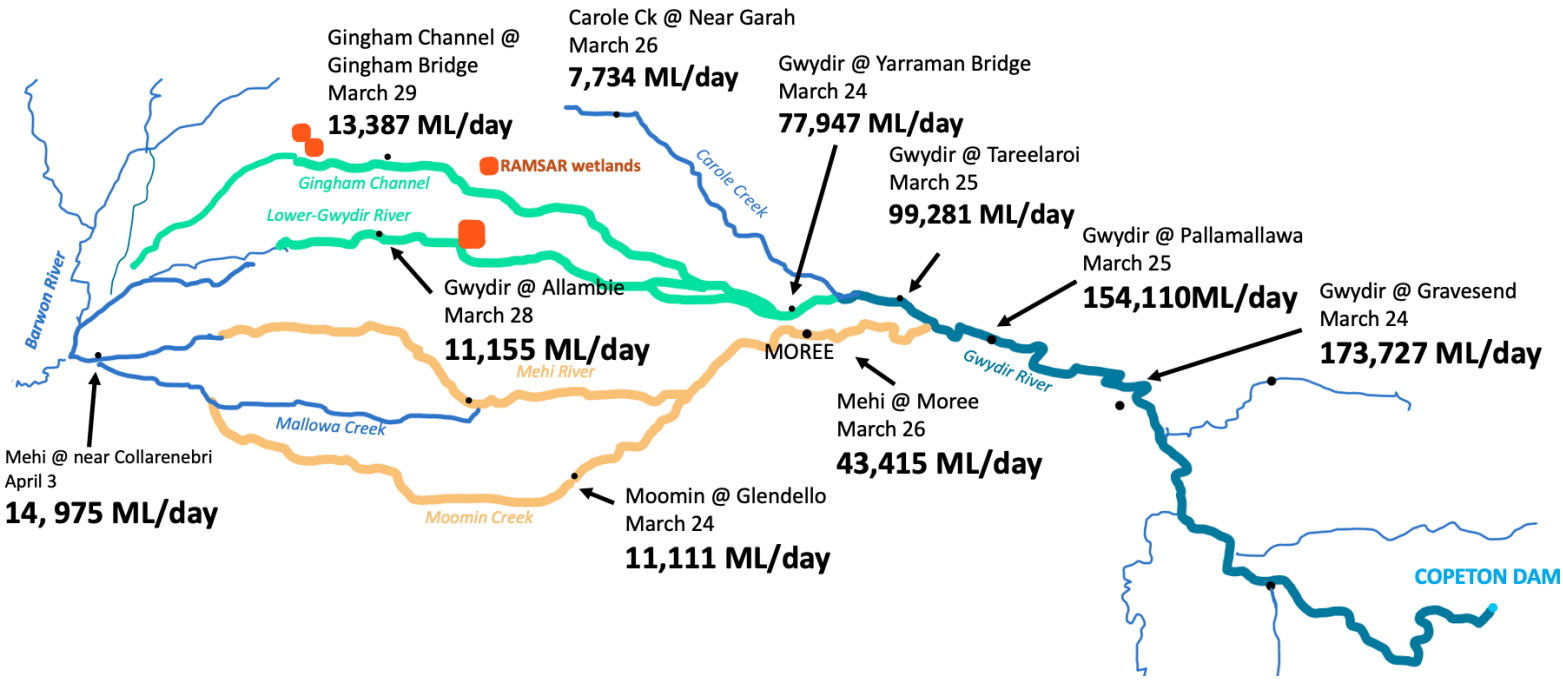

Figure 3: Map showing flow peaks at various locations as the flood event progressed throughout the Gwydir system. Note the overall pattern of peak sizes reducing from east to west as the floodwaters slowed and spread down various channels. Flood runners to the North and South (not represented above) also carried large amounts of water downstream.

Beyond the Gwydir

Figures 2 and 3 show the Gwydir joining into the Barwon River, near Collarenebri. Flows from each of these systems combine, travelling downstream to the township of Walgett. At Walgett, the Barwon and Namoi rivers join, which is where flows peaked at 74,764 ML/day on April 8. It took this peak 11 days to flow downstream to Brewarrina where it measured in at 35,591 ML/day. Downstream of Brewarrina, the Culgoa and Warrego river channels connect into the Barwon-Darling, contributing additional flow. Discharge gauge readings on the Darling River at Bourke, Louth, and Wilcannia as of April 26 are all still increasing, meaning that the peak of the March flood is still en-route (Figure 4).

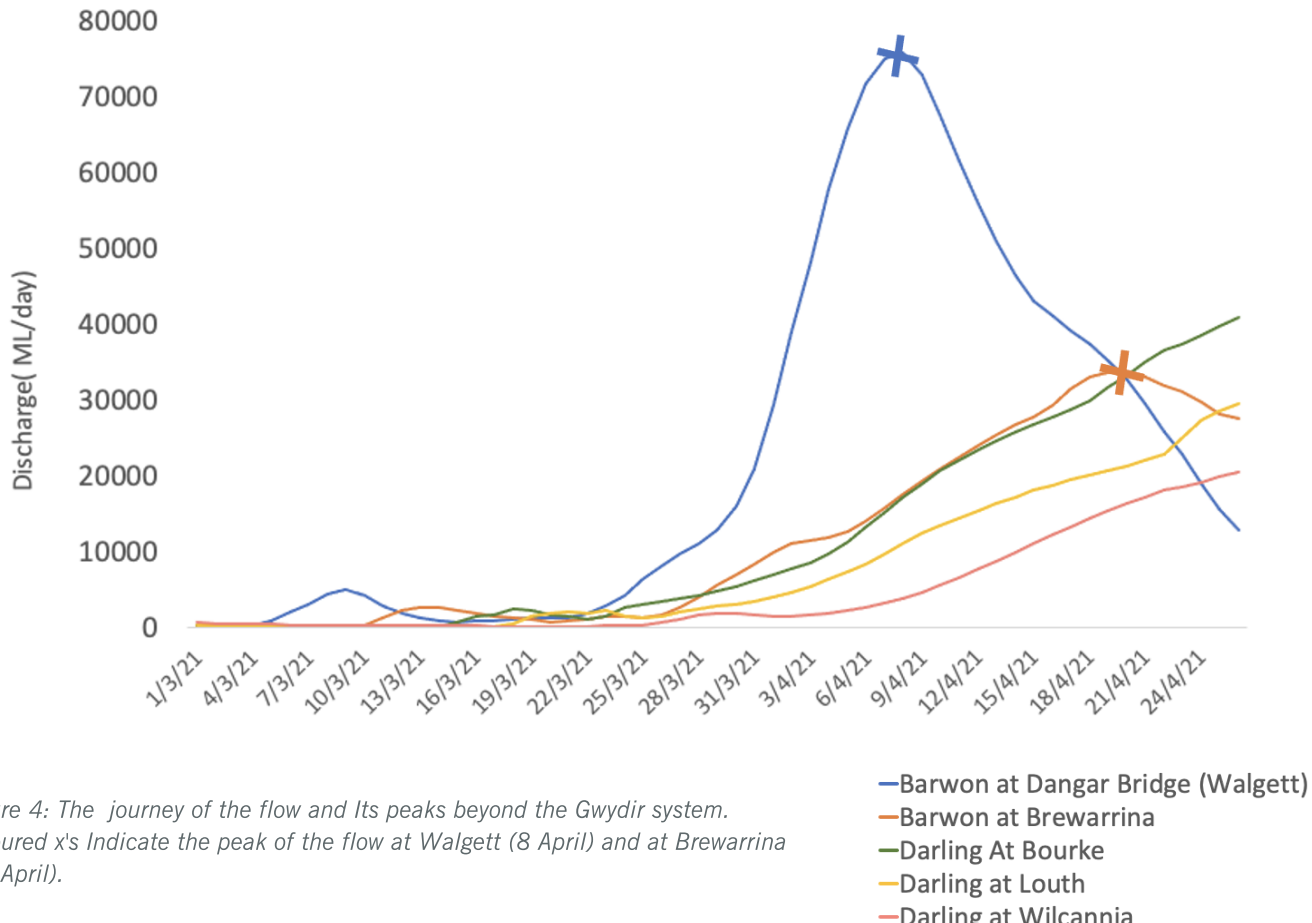

Figure 4: The journey of the flow and Its peaks beyond the Gwydir system. Coloured x's Indicate the peak of the flow at Walgett (8 April) and at Brewarrina (19 April).

Figure 5: A spoonbill (Platalea) spotted at the Bunnor Waterhole in late February 2021. Credit: Sam Lewis (UNE)

The Effect of a Flood

Floods are a naturally occurring process that play an important role in maintaining key ecosystem functions and biodiversity. When a river floods, it links to the surrounding land (this is called 'lateral connectivity'), recharging groundwater systems, filling wetlands, replenishing refuge pools, increasing habitat connectivity and shifting sediment and nutrients around the landscape. The arrival of this water sets off dynamic ecological processes and interactions. Bacteria and algae are highly responsive to inflows and drive complex food webs, organic matter is delivered which microbes consume, zooplankton emerge and graze on the microbes, aquatic macrophytes germinate from seedbanks, fish and fish larvae migrate and their breeding cycles get a kickstart. The in-water processes provide food for waterbirds who colonise the wetlands (Figure 5) alongside other terrestrial species who want in on this freshly flourishing ecosystem.

In aquatic systems where natural wetting and drying cycles are altered by regulatory structures, abruptly arriving floodwaters can lead to blackwater events- a short-term decline in water quality. Issues such as low oxygen events can arise which negatively impact aquatic life. After floods have receded, releasing environmental water into the system may help to restore ecosystem health, creating refuge flows and improving water quality.

Our team eagerly awaits the chance to get back into the Gwydir Wetlands State Conservation Area (SCA) and the broader Gwydir wetlands once the flood waters recede- an opportunity to scientifically assess just what ecological impacts have and are continuing to occur.

Click here for more on Flow-MER

Managing water for the environment is a collective and collaborative effort, working in partnership with communities, private landholders, scientists and government agencies - these contributions are gratefully acknowledged.

We acknowledge the Traditional Owners of the land on which we live, work and play. We also pay our respects to Elders past, present and emerging.