Figure 1. Boera Dam on Toorale National Park / the Warrego-Darling Selected Area, June 2020. Credit - Shjarn Winkle

A Guide: Monitoring River Systems During a Global Pandemic

The year that was 2020 put a lot of things out of whack for the majority of us. While the fish, frogs and birds of the Warrego-Darling river systems were seemingly unaware, the Flow-MER team came across a few challenges in keeping a close eye on our study locations. Early 2020 saw the greatest flows through the Warrego-Darling since ages (or at least the commencement of our monitoring in 2014). Due to COVID-19 restrictions we couldn't get on the ground to see this inundation and its ecological impact in person, therefore, we had to adapt. Thanks to modern technology, there were a few ways that our team continued to gather data to help inform important management decisions, ensuring the health of these systems- the fish, frogs and birds didn't suspect a thing!

Without our boots on the ground, we still have access to a multitude of daily data to inform us about the system at the time. Pairing these data with what we already know about our study sites gave us a reasonable idea of how everything was tracking– a sense of how aquatic flora and fauna might be doing.

Detailed below is how we analysed the largest flow through the Warrego River and Western Floodplain since 2012 and its impacts on local aquatic ecosystems.

Hydrological discharge data

Hydrology gauging stations are located along various rivers around NSW and Australia, including the Warrego and Darling rivers we study. These stations provide data on various characteristics of the water in which they're deployed including: water level (m), discharge (ML/day), dissolved oxygen (DO% and mg/L), electrical conductivity and water temperature. They also enable us to check the volume, timing and duration of water that is flowing via the gauge sites throughout the Warrego-Darling systems. We measure the volume of water in a flow in megalitres per day (ML/day). We collate these data and produce figures called hydrographs (Figure 2). Tracking the volume and timing of water allows us to identify which aquatic ecosystems in our study area may benefit from these flows.

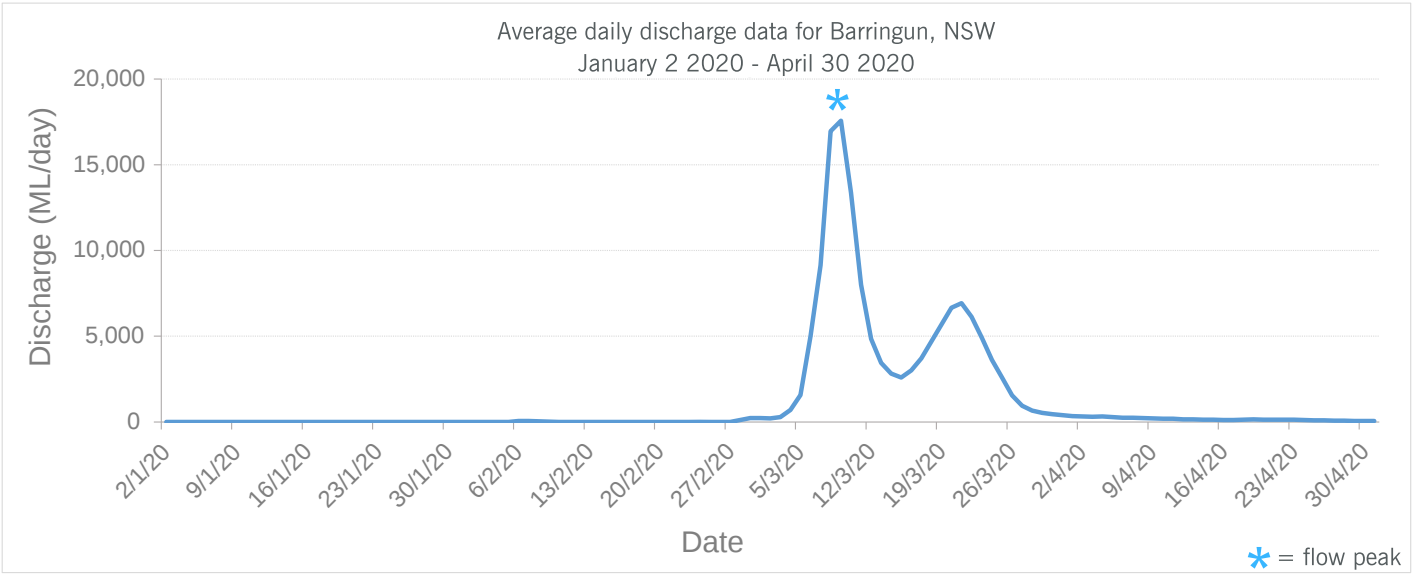


Figure 2. A hydrograph illustrating the largest flow through the Warrego River and into the Warrego-Darling Selected Area since 2012. This hydrological data was captured by a gauge on the Warrego River at Barringun, NSW. The horizontal axis represents the date while the vertical axis represents the volume of water passing the gauge in megalitres per day (ML/day). The blue line indicates the the timing, duration and volume of this flow event. The flow peak can be measured as approximately 17,500 ML/day on March 10 2020.

Satellite Imagery

Using satellite imagery, we can see the extent of inundation and use mapping techniques to calculate the area of inundation. Figure 3 shows us the inundation of the Warrego River's Western Floodplain on April 7 2020. In March-April 2020, such imagery indicated to us that the Western Floodplain connected to the Darling River, which was then verified by local landowners via email communications. As mentioned, this flow was the biggest we have seen since our monitoring began, inundating 11,500 hectares of floodplain and channel habitat inundation.

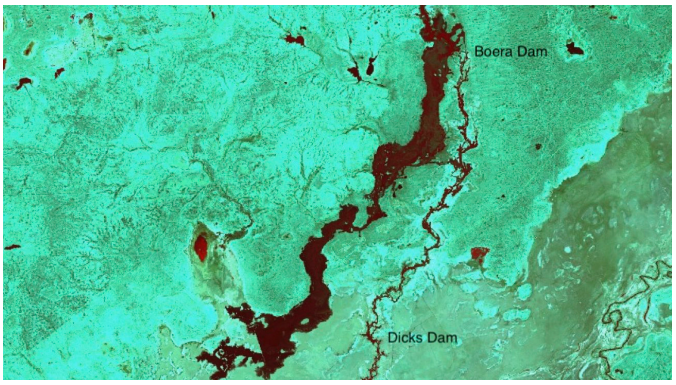
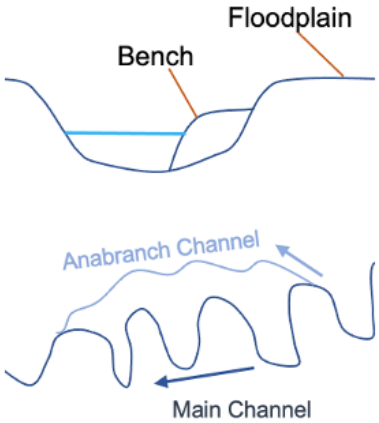


Figure 3. Sentinel image of the Warrego River's biggest flows since 2012, connecting it to the Darling and inundating the Western floodplain. Darker shades show inundation. Accessed by Sentinel-Hub 7/4/20.

Snags and benches

The NSW Department of Primary Industries - Fisheries collects data on in-stream habitat and other features such as benches and anabranches within a given river (Figure 4). With these data we can deduce that when stream level is at a specific known height and when these features and benches are inundated and that anabranches are flowing. During 2020 we were able to pair current inundation and discharge data with previous studies to estimate total habitat availability and nutrient flow as result of these flows.

Figure 4. Top: cross-section of a river showing formation of a bench. Bottom: Main and Anabranch channel geology.



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.

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