



Test lowering of Mereway Weir November 2017 to November 2018

Executive Summary, December 2019

The lower River Crane frequently runs dry for weeks or months at a time downstream of the tilting weir at Mereway Road. We have been investigating a solution to this low flow issue since 2013.



Figure 1. Before and after photos of Reach A on the River Crane. (Picture on left taken 04/10/2017, and picture on right taken 02/10/2018).

This investigation is closely integrated with two related projects:

First, the replacement of Mereway Weir, scheduled for delivery in 2019/20. The weir dates from the 1930s and is nearing the end of its lifespan. The results of this investigation have informed the design of a replacement weir to ensure that flows are regulated more sensitively than the existing structure.

Second, the Crane Valley Partnership (CVP) Landscape Vision for the Lower River Crane, published in 2017. This ambitious vision aims to restore and enhance 3km of the lower River Crane running through Richmond and Hounslow. It is a major restoration project, with potential to deliver great benefits for the community. The feasibility study for the restoration project was completed early in 2019. Without improved flow, the restoration of the river channel will not be viable.

The flow in the lower Crane can be increased by altering the settings of Mereway Weir, which diverts flow along the lower arm of the Duke of Northumberland's River (DNR). Constructed in the 16th century, this artificial channel splits off from the River Crane upstream of Mereway Weir.

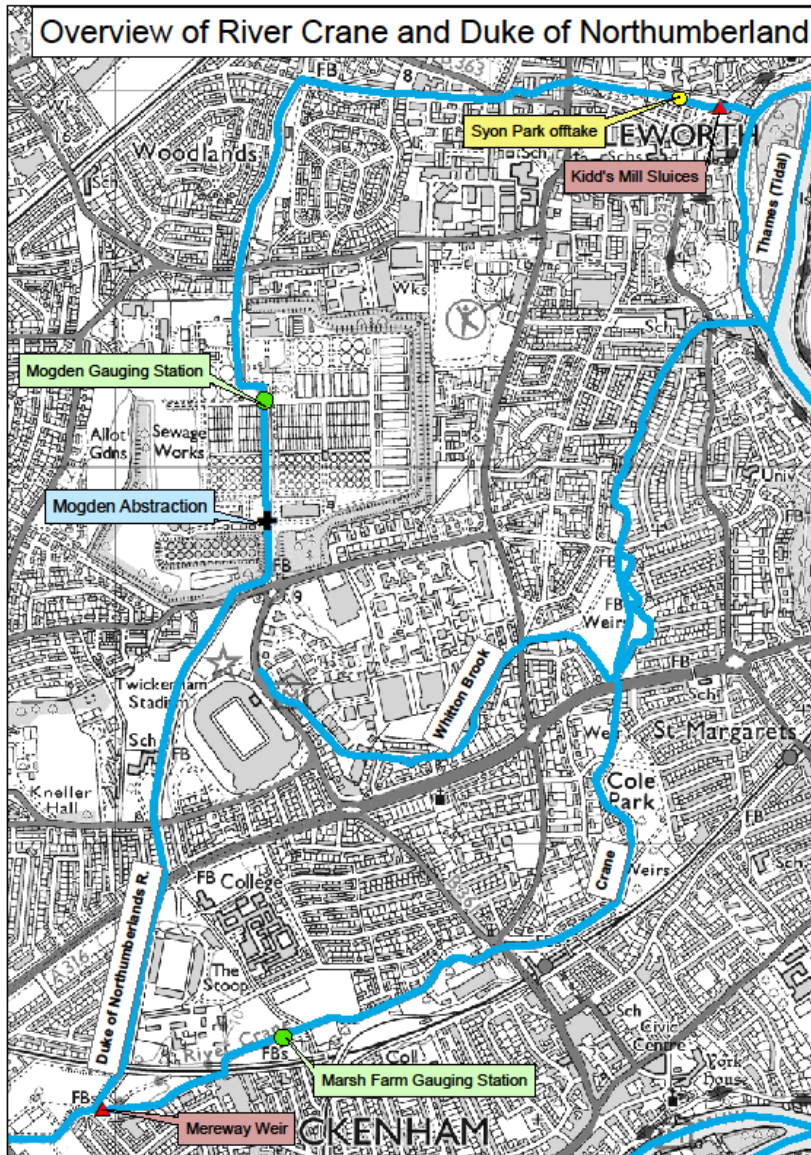


Figure 2. Map of River Crane and Duke of Northumberland's River showing sites being discussed.

The weir is designed to regulate the water level in the DNR. When water levels upstream of the weir rise above a certain upper threshold limit, the weir will tilt and send more water down the lower River Crane. When water levels drop below a lower threshold limit, the weir will rise and stop water flowing down the River Crane. Historically, the settings of the weir have resulted in a very uneven split of flow between the two rivers.

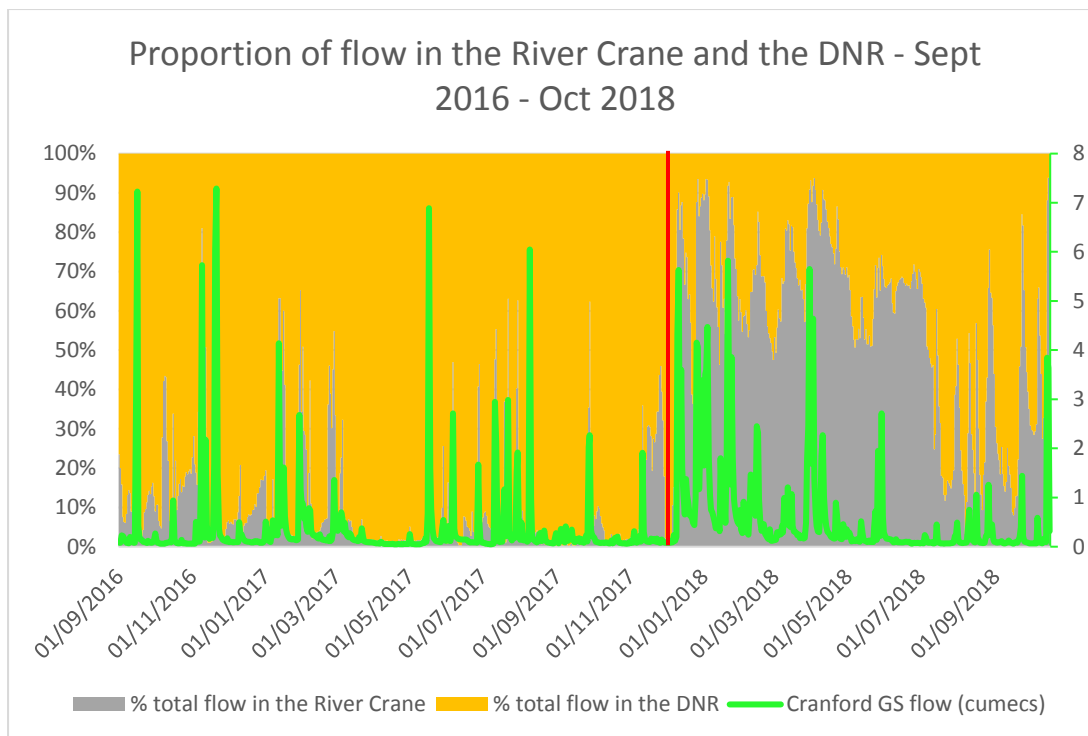


Figure 3. The split in flow between the River Crane and the DNR from September 2016 to September 2018. The red line marks the start of the test, when the weir was first lowered. The green line shows the flow as measured at Cranford gauging station upstream of the weir.

The aim of this investigation was to determine if these upper and lower thresholds could be adjusted to allow more water down the lower River Crane, while protecting the ecology, and abstractions on the DNR.

To determine the impacts on the DNR and the River Crane, water quality, ecology, fish, and flow were monitored on both rivers throughout the one year test period.

Duke of Northumberland River

We had to ensure that permitted abstractions on the DNR were protected. A low flow alarm was installed at Mogden Gauging Station to alert the Environment Agency when flows in the DNR fell below a certain level. Flow never reached the low flow alarm level of 0.05 m³/s, and reached the early warning level of 0.1 m³/s only a small number of times. In total, river flow was below the early warning alarm level for 1% of the test period. This shows that the chosen settings protected the required quantities of water for abstraction across the flow regime.

Rainfall data shows that summer 2018 was the 6th driest summer on record for North London, and the driest since 2003. Testing during such a dry summer gives us good confidence that the results from this test are suitable to assess hydrological and ecological conditions in future dry years.

Monitoring carried out on the DNR for fish, ecology and water quality determined that the DNR was not negatively impacted by the lowering of the weir.

River Crane

Despite the dry summer in 2018, the Crane never ran dry throughout the test. As a result the Crane showed signs of improvement throughout the year. Baseflow in the river was significantly increased in winter, whilst in summer the increase in baseflow is smaller, yet is still a very significant increase compared to summer 2017.

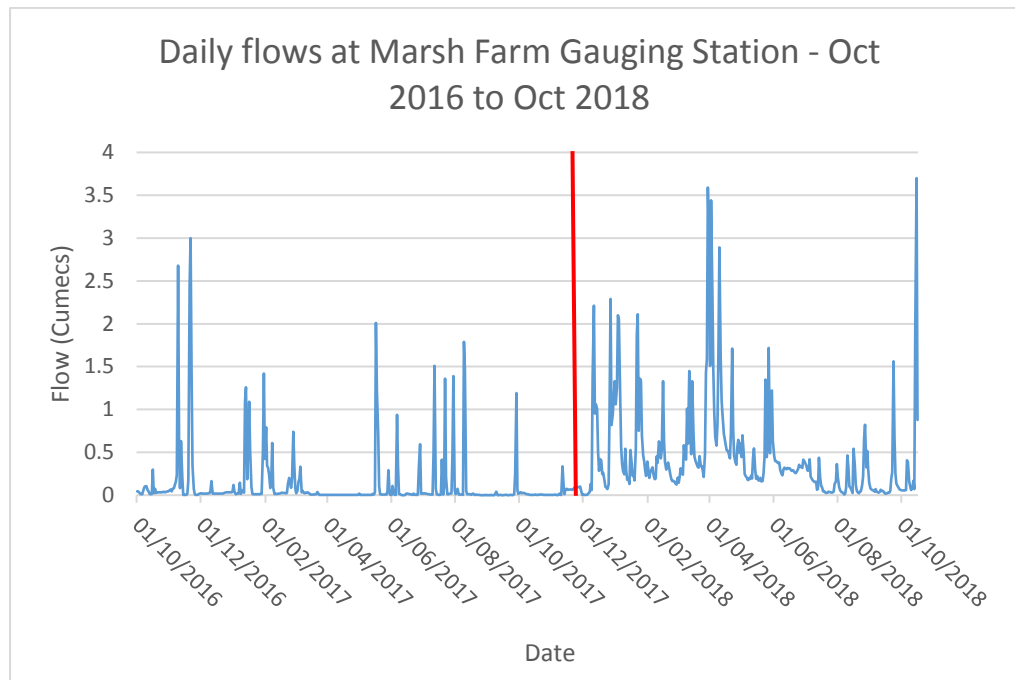


Figure 4. Daily flows measured at Marsh Farm gauging station before and after the lowering of Mereway Weir. The red line represent the start of the test period.

Monitoring on the River Crane showed a clear improvement in fish populations, with a rise in species diversity, overall fish density, and overall fish mass. Macroinvertebrate monitoring showed that the low habitat diversity and quality are negatively impacting species diversity. The intermittent nature of the flow in the Crane before the test period means that there is limited ecology data prior to lowering of the weir.

Overall the investigation confirmed that changing the split of water down the DNR and River Crane has not adversely impacted the DNR while significantly improving the River Crane. Based on this success, it is recommended that the current flow split between the two rivers is maintained. A minimum flow of 0.14 m³/s in the DNR is recommended to protect the environment and the abstractions. A weir replacement is due for delivery in 2019/20 which will be designed using this recommended minimum flow. Habitat enhancements and morphological works along the lower River Crane are also recommended through the Crane Valley Partnership's Lower River Crane Restoration Project.