CASE STUDY 4

Beavers living in and around a water-supply reservoir

KEY THEMES OF INTEREST

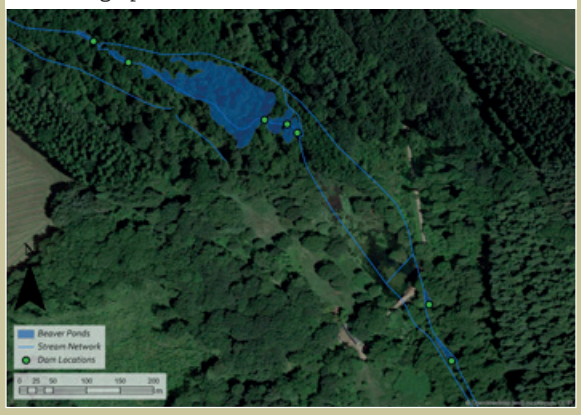
Water supply infrastructure

Use of volunteers/management

Overview of site and beaver behaviour

- At the source of the main River Otter, Otterhead Lakes are situated within the grounds of an old Victorian estate and former landscaped garden. The site is dominated by two extant lakes and includes a range of semi-natural habitats. The site is now a water supply reservoir and a Local Nature Reserve.
- A young pair of beavers established a territory in the upper lake in 2017 and have now constructed 11 dams, transforming the area above the upper lake into a complex wetland with 0.52 ha of new open water. As well as the ecological benefits of beaver presence, this was identified as a suitable site to monitor the impacts of beaver dams on hydrological function and water quality.

Extent of open water created by beavers as a result of damming upstream of Otterhead Lakes.



Beaver population

Signs of beaver activity were first confirmed in March 2016, although initially it was sporadic. Video confirmation was obtained of a 1-year-old female beaver making its way to the site in early summer 2017 where it paired up with a young male and bred successfully in 2018 and 2019.

Ear tags were able to demonstrate that a kit born near Otterton in 2016 and given orange ear tags in March 2017 made the 50 km journey to Otterhead lakes as a 1-year-old, where it paired up and gave birth to a single kit in 2018.

Water supply infrastructure

The beavers are living in an engineered lake with a dam and stepped spillway with a second discharge point via a wooden drop-board sluice and culvert. The activity of the beavers on these structures is carefully monitored and managed, to avoid issues with water management.

A number of beaver dams have been built upstream of the reservoirs, storing water and trapping sediment.

Adult feeding at Otterhead (Nick Upton)

The beavers are feeding extensively on the vegetation growing in the shallow water in the lake, and are dredging canals and pools in it, creating areas of open water in amongst the silt and emergent vegetation.

This site represented the perfect opportunity to understand the potential benefits of beaver dams upstream of a fresh water supply reservoir. With funding from the Environment Agency and Wessex Water, in-stream monitoring stations above and below the area of beaver activity and downstream of the abstraction point have been established. Monitoring stations continuously record the rate and amount of water travelling through the site, to investigate whether beaver activity has an attenuating impact upon flow regimes. Additionally, turbidity sensors monitor whether beaver dams are trapping sediment resulting in cleaner water downstream.

Conflict management / support from volunteers

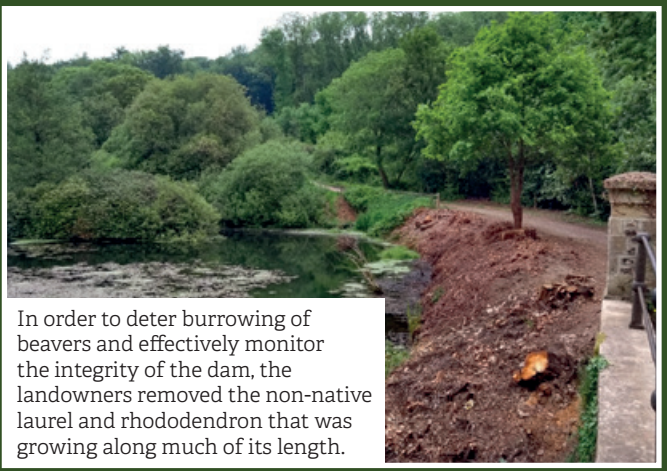
The beavers are having a regular impact at the crest of the main spillway where shallow water passes through a wide culvert. Here beavers are regularly adding material to dam the spillway. In order to retain the design level of water in the reservoir, it was deemed necessary to keep this spillway clear, via regular removal of beaver sticks.

The site is also used by a local Forest School, who were keen to assist with monitoring the beavers and removing the debris from the spillway. With training and supervision this was seen as a very effective solution, although options for installing an engineered structure could be investigated in future if necessary.

The crest of a spillway within a culvert has been the focus of damming activity by beavers. The ROBT was supported by local volunteers who inspect and remove the build-up of beaver sticks.

The sound of flowing water is one of the triggers for beavers to build dams and raise water levels. The two outflow points from the reservoir attracted the attention of the beavers. Initially the wooden drop-boards were chewed and sticks were used by beavers in an attempt to stop flows at this point. This was not a recurrent issue however.

Where beaver dams have washed through, clean gravels are left behind.



In order to deter burrowing of beavers and effectively monitor the integrity of the dam, the landowners removed the non-native laurel and rhododendron that was growing along much of its length.

Initial results

Time series data illustrate the fast response times of flow into the site, above the beaver dams and upper reservoir. Monitoring will continue to quantify whether beaver dams attenuate flow through this drinking water reservoir system and also to establish what level of sediment retention beaver dams may (or may not) deliver. Reducing sediment loading on drinking water reservoirs is a priority, and in this example is also desirable to reduce siltation of the reservoir which is stocked by a local fishing syndicate with brown trout.

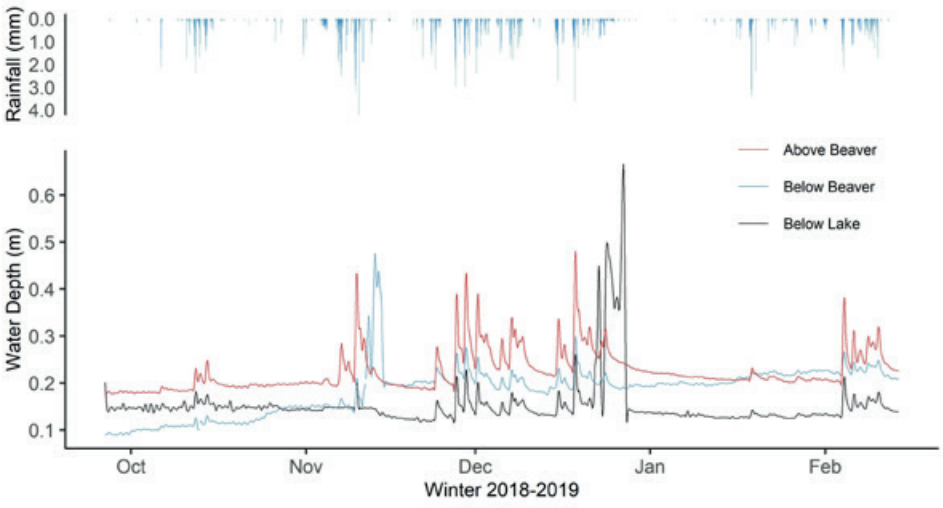


Figure 6.8 An early example of the continuous hydrological (channel depth) data being collected. Monitoring began in September 2018.