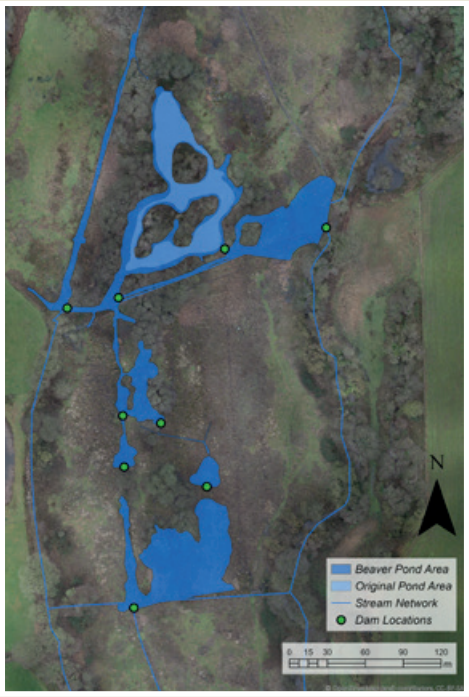
CASE STUDY 5

Release of beavers into a County Wildlife Site

KEY THEMES OF INTEREST

Techniques for release and monitoring of beavers
Restoration of dynamic natural processes
Changes to vegetation structure
Conflict management



Overview of site and beaver behaviour

- The ROBT licence allowed for an additional five beavers to be released to enhance the genetic diversity of the population, and in 2016 a pair of captive bred beavers were identified as being suitable.
- Experience suggested that offline ponds are the ideal locations for introducing beavers into new areas as they provide refuge from high flows and from any beavers already present in the watercourse.
- The 19 ha Clyst William Cross County Wildlife Site is designated for its tall herb fen and wet grassland communities. It was previously managed as a wet meadow and these features were in decline as a result of scrub-encroachment due to lack of grazing management. The presence of one large pond and associated wetland habitat on the floodplain made this site ideal for release of a pair of beavers.
- Ecological impacts arising from the beavers' presence have been dramatic with 6,880 m^2 of open water created, increasing the aquatic value of the site, benefitting wetland species like water voles, and restoring dynamic processes to the watercourse, enhancing habitats for fish.

Beaver population

Occasional beaver feeding signs were detected in this stretch of the River Tale in March 2016, with no sign of an established territory. A pair of young beavers was introduced in May 2016. They have successfully bred in every subsequent year (two kits in 2017, three in 2018, one confirmed in 2019), leading to a large family group now occupying the site.

Four fixed cameras were installed recording 12 hours each night, to capture the behaviour of these nocturnal animals and monitor the success of the release. We are indebted to volunteers led by Michelle Grist who spent many hours analysing camera footage, and the support provided by Wildlife Windows.

Techniques for release and monitoring of beavers

Prior to release of beavers into the site it was established that there were no other resident beavers in the vicinity, via feeding sign surveys and intimate knowledge of the site by the landowners.

A crucial consideration is to ensure that landowners understand and support the potential scale of changes that may result from beaver activity. One of the main reasons that this site was so suitable for beaver release is that the landowners were supportive and also actively sought a progressive, sustainable solution to management of the County Wildlife Site.

Two artificial lodges were constructed on the edge of the large pond, providing refuge and helping the animals to settle into the release location. The pair of beavers were released separately into the lodges. Transferring their bedding from the holding facility or carrying crate was used as a technique to provide the animals with a familiar scent enabling them to accept their new surroundings. Photos: Nick Upton

The beavers settled well and soon constructed their own lodge on an island in the pond, only returning to the artificial lodges to collect bedding that had been provided for them.

Restoration of dynamic natural processes

When the beavers were released, it was not clear if they would build dams in the River Tale itself. Subsequently, many of the dams that have been built in the main channel have not persisted through the winter months. However, the construction and natural erosion of the dams has reintroduced dynamic natural processes that are largely absent from our rivers and streams. Where the channel had been deepened and straightened, the beaver activity is re-meandering and raising the bed levels. Gravels and larger sediments are deposited behind the dams and are redistributed as the dams erode, enhancing gravel structures such as sediment bars and riffles, and encouraging localised areas of erosion and scour. This provides a range of important habitats for fish (such as trout and bullhead) and macroinvertebrates.

The presence of ephemeral beaver dams on the main channel has re-connected the river with the floodplain, creating new flow pathways in times of flood, depositing nutrient-rich silts back onto the floodplain, and improving water quality downstream.

Changes to vegetation structure

As with many wildlife-rich open grassland habitats (which are managed at a seral stage in succession), widespread scrub growth can negatively impact on a site's ecological interest. Scrub is in itself however not a negative feature and a proportion is highly desirable on most sites – it becomes an issue where there are not human driven or natural processes which create an ever-changing mosaic of features. The condition of the County Wildlife Site was previously categorised as 'red,' denoting that its lowland tall herb fen and wet grassland condition was 'declining or lost' due to lack of management.

Beavers are now having a marked impact on the willow scrub, restoring a more dynamic natural mosaic structure, breaking up some of the patches of scrub, creating complex succession stages and creating new areas of open water and marginal vegetation.

It was anticipated that some trees would be felled/coppiced, and under-storey vegetation would respond. Drone photogrammetry and spatial data analysis was used to capture and quantify changes to vegetation structure across the site, resulting from beaver activity. Winter feeding signs surveys recorded that 209 trees were impacted. Photogrammetry has shown beavers have strongly influenced woody vegetation structure - a reduction in canopy heights and an increase in canopy variability, with a greater range of tree shapes/sizes than before beaver reintroduction.

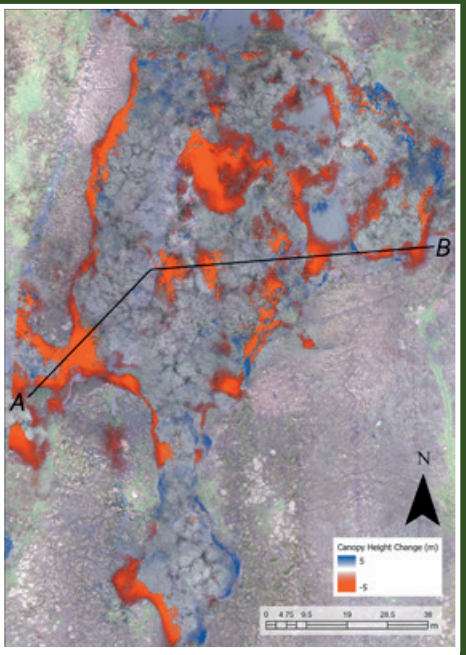


Figure 6.9 Aerial image showing where areas of the canopy have increased in height or been reduced. Numerous areas of canopy have been lowered by beavers, which has increased light penetration and canopy height variability. The cross section indicated on the map, intersects a part of the canopy which has experienced extensive felling.

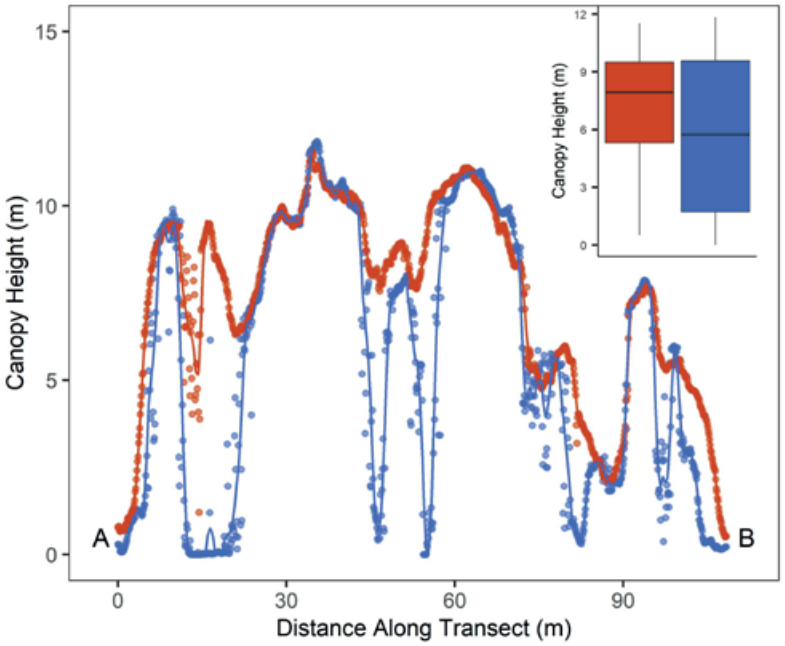


Figure 6.10 shows the canopy heights along this line which clearly illustrate how beavers open up the canopy of riparian woodland. In 2019, the condition of the County Wildlife Site was reassessed and classified as 'amber' i.e. recovering.

Beaver engineering of the watercourse has reconnected it with its floodplain enabling significant volumes of water to be stored. This has, however, impeded access across the site on-foot and for light farm machinery. The solution was to build a short section of boardwalk in 2019.

Managing local access due to flooding

Stage-board installed to demonstrate the height that a beaver dam would need to reach to back-up water to the road bridge (red line) and potentially increase risk of flooding upstream.

Figure 6.11 A basic 2D model of flood inundation for the River Tale and how this might be altered by a beaver dam.

Conflict management

Addressing perceptions of flood risk

The landowners historically cleared the main river channel downstream of their property of large woody debris, due to concerns that it increased flood risk. As a result of beaver damming activity a conversation began as to the potential increase in flood risk that might result. The construction of a 2D hydraulic model predicting the extent of flooding allowed a stage-board to be installed to show where water levels had to reach, before flooding of properties occurred. This modelling showed that, in the beaver dam's current location, there is no increased flood risk, unless the dam was built to the height of the red line (see image) i.e. 1.5 m above current bankfull depth. It was also identified that dams in the river reach adjacent to the house should be removed, as these could back-up flow in critical locations, increasing flood-risk to properties.

Presentation and clear communication of this evidence to the landowners (and indeed other audiences) illustrated how common misconceptions of flooding and river management can be addressed. In this case, woody debris is no longer actively removed from the channel, as there is no flood risk reason for doing so.

Local Landowner perspectives

"We have thoroughly enjoyed having the beavers as neighbours and they have been a constant source of delight with the frequent and rapid changes to their local ecosystem. It has been fascinating to watch their engineering projects take shape. We have also enjoyed the steady stream of expert visitors from a very diverse set of backgrounds who we have learnt so much from. The only minor issue has been the need to protect our fruit trees (mainly apple and cobnut) from the beavers' attention. Our initial concerns surrounding issues with flooding, due to the damming of the stream, have proved unfounded with some expert work by Exeter University on flood modelling. We hope that the beavers will become a permanent feature of our landscape and the positive effects of their presence can continue to ripple out."

"How big was the tree that the beavers had then?" "Quite big." "So now I got one sort of that big" [indicates much smaller] […] *"We might get two apples next year so again by the time we actually make something with an apple off that tree again, we're talking about 10 years' time aren't we at least. That's the problem we've got, as we get older everything takes a lot longer. You're a youngster […], if you put a tree in now you'll probably get 30, 40 years of apples off of it. So, you know, it's sort of a long-term plan that's been bitten off."*

Tree protection

Riverside orchards are particularly at risk from beaver activity - both from feeding on apples and coppicing of the trees. Apple trees within an orchard adjacent to the CWS were identified and protected prior to the release of the beavers. Since release the beavers have been feeding on windfall apples and have damaged one of the few unprotected trees. All remaining trees have now been protected and discussions are ongoing to reduce the visual impact of the tree guards.