

For more information and to keep updated

To find out more about the ongoing work on the River Otter and in the Enclosed Beaver Project you can visit the relevant pages on the DWT website, where you can also register to receive updates on the Trust's beaver work.

www.devonwildlifetrust.org

The Devon Wildlife Trust and the landowner have always been open to specialists of relevant disciplines conducting research work in the Enclosed Beaver Project to increase the body of evidence on the impacts of the beavers on this site. If you have a specialism that you want to apply to this site, please make contact via the email address below.

Funding is actively being sought by the partners to continue the research in the Enclosed Beaver Project and to run the River Otter Beaver Trial. To donate to the beaver appeal visit the DWT website, or to contact the project directly email:

beavers@devonwildlifetrust.org

Devon Wildlife Trust is a registered charity. No 213224

Partners and supporters

Devon Wildlife Trust is grateful to the following organisations who we are working with to carry out this research, or for their assistance with the production of this report.



CLINTON DEVON ESTATES



Adult female beaver on the River Otter in 2016
Picture: Mike Symes (DWT)

Beavers – Nature's Water Engineers

A summary of initial findings from the Devon Beaver Projects

Devon
Wildlife Trust



The Eurasian beaver (*Castor fiber*) is a native species to Britain. After an absence of around 400 years, it is now returning to the British Landscape. This report summarises the results of the research being undertaken in Devon to investigate the effects of beavers on the water environment. The ongoing research being carried out in the Enclosed Beaver Project in the western side of Devon is now being extended and applied to the free-living beavers that form part of the River Otter Beaver Trial in East Devon.



Photo of Eurasian beaver building a dam in the DWT Enclosed Beaver Project.
Niek Upton/Naturepl.com

Beavers in Devon

Enclosed Beaver Project

In 2011 a male and female beaver were introduced into a three hectare fenced enclosure in the Tamar headwaters, where their impacts are being studied in detail. Most of the results presented in this document are from this research site.

The Enclosed Beaver Project is situated on private land in the headwaters of the River Tamar and upstream of Roadford Lake.

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The 900 m perimeter fence has electric strands to prevent beavers climbing and a weldmesh apron on the inside to prevent them burrowing underneath. This fencing cost approximately £35/m to construct.



The beavers live in a large lodge situated on the banks of a pond. The lodge has increased in size every winter as more sticks and silt are built on top by the beavers, and willow sticks and branches are placed in the water to create a nearby winter food cache.

Since 2011, 13 ponds of varying sizes have been constructed by the beavers. The dramatic engineering of the watercourse in this site has provided a perfect opportunity to study the impacts of beaver dams on a wide range of different subjects.

Partners and funders



The Enclosed Beaver Project site is owned by John and Elaine Morgan who have kindly allowed this wetland area within their farm to be managed by the beavers. Additional funding has come from Natural England through Higher Level Stewardship (HLS).



The beavers are owned and managed by the Derek Gow Consultancy. The initial fencing and other infrastructure was funded by Viridor Credits Environmental Company and the Truell Charitable Foundation.

In 2012, Westland Countryside Stewards began funding the project allowing the University of Exeter to carry out detailed research work on the hydrological and water quality implications of the beaver dams.

Funding is currently being sought to continue this project.

River Otter Beaver Trial

In March 2015 two families of wild-living beavers of unknown origin were captured from the River Otter and proven to be healthy before being released back into the river as part of a five year licensed trial.

The River Otter Beaver Trial area covers the entire 250 km² of the Otter catchment containing 594 km of watercourse. The river rises in the predominately pastoral landscape of the Blackdown Hills, before flowing through highly productive agricultural land in its middle and lower reaches. The River Otter enters the sea at Budleigh Salterton.



In February 2015 five beavers were captured by the Animal and Plant Health Agency (APHA). They were given detailed health examinations by beaver experts from the Royal Zoological Society of Scotland (RZSS), who confirmed they were healthy Eurasian beavers and fit for re-release.

Photo:
Nick Upton / Naturepl.com



The beavers were released back into their territories in March 2015. At the start of the trial approximately nine beavers were identified, living in two family groups.

Photo:
Nick Upton / Naturepl.com



In the early stages, beaver activity was concentrated in the lower reaches of the river where there is sufficient deep water, and so they have not needed to build dams. As their numbers have increased and they have moved into sub-optimal areas, they are beginning to build dams in the ditches and headwater streams. These are now the subject of detailed research work.

Partners and funders

The River Otter Beaver Trial is led by Devon Wildlife Trust working in partnership with The University of Exeter, the Derek Gow Consultancy, and Clinton Devon Estates. Expert independent advice is also provided by the Royal Zoological Society of Scotland, Roisin Campbell-Palmer, Professor Alastair Driver, Professor John Gurnell, and Gerhard Schwab, an international beaver expert based in Bavaria.

Funding for the ROBT comes from Devon Wildlife Trust (DWT), the Royal Society for Wildlife Trusts (RSWT), Peter de Haan Charitable Trust, Garfield Weston Foundation, University of Exeter and from the generous donations from the public.

In 2016, Devon Wildlife Trust launched a crowdfunding campaign to encourage the public to donate to the project in return for a series of unusual things such as beaver chips, guided walks or the appearance of Nora the beaver mascot at your event. www.supportdevonbeavers.org/

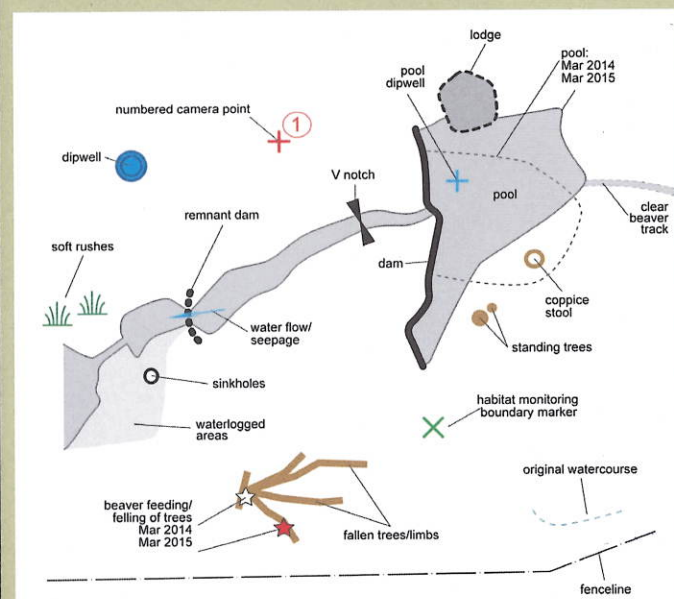


The transformation of a landscape

The effects of an aquatic engineer on the Enclosed Beaver Project site

Beavers need deep stable water (around 70 cm) to feel secure, particularly around their lodges and burrows. Where deep water does not exist, they can create it by constructing dams and digging 'canals'. In the Enclosed Beaver Project, the family of up to five beavers have gradually engineered the site since their introduction in 2011.

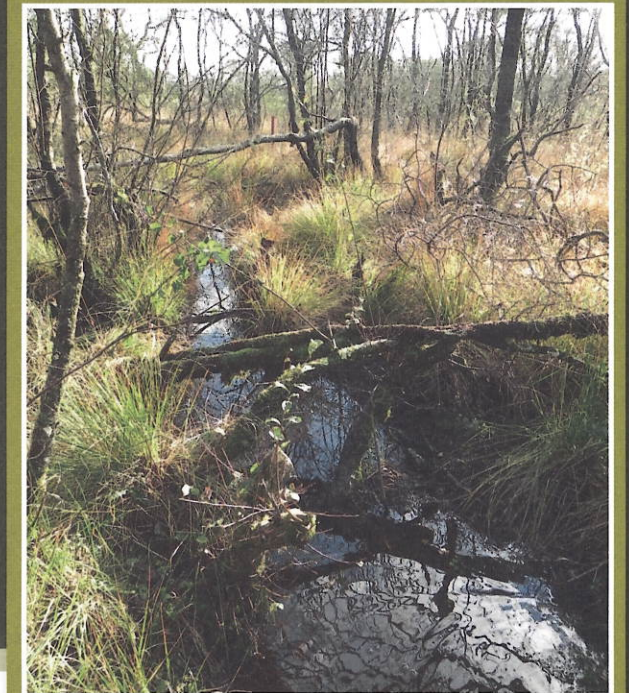
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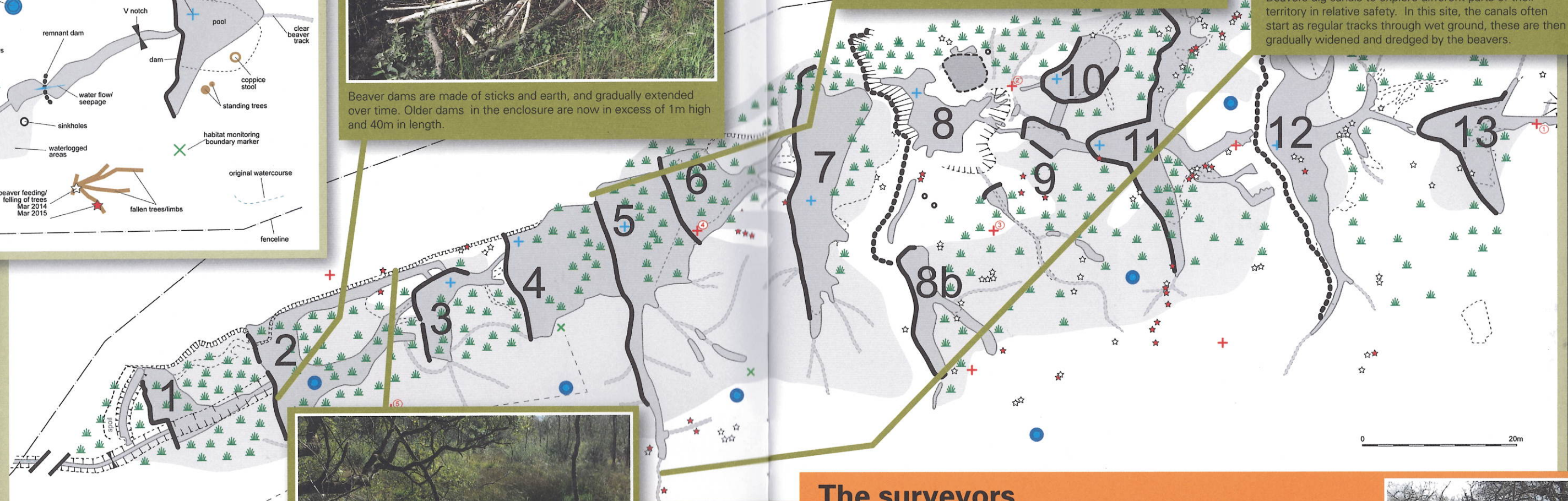
Beaver dams are made of sticks and earth, and gradually extended over time. Older dams in the enclosure are now in excess of 1m high and 40m in length.



Small dams are rapidly constructed from dredged mud and plant roots.



Beavers dig canals to explore different parts of their territory in relative safety. In this site, the canals often start as regular tracks through wet ground, these are then gradually widened and dredged by the beavers.



Ponds created in this way have a complex and varied structure and integrate seamlessly into the landscape.

The surveyors

The site has been systematically mapped by a team from South West Archaeology every year since 2011, led by Dr Bryn Morris. Bryn was introduced to the impacts of beavers long before becoming involved in this project by Dr Bryony Coles (author of "Beavers in Britain's past") who was one of the lecturers at the University of Exeter in 2006 where he gained his doctorate.



Changes to surface water



Fixed point photos taken from metal posts show how the site has changed dramatically between 2011 and 2016.



Beavers are widely referred to as ecosystem engineers. They modify river systems and surrounding riparian areas to create habitats which they can exploit and which benefit many other species. Beavers are also termed keystone species, having a disproportionately large impact upon aquatic ecosystems, relative to their abundance. The most significant hydrological impact of beavers, results from their dam building activity and the consequent inpondment of large volumes of water in ponds. Dam and pond features alter hydrology, both locally and downstream. Dams hold water, push water sideways and release water slowly, re-wetting surrounding areas and creating complex wetland environments.

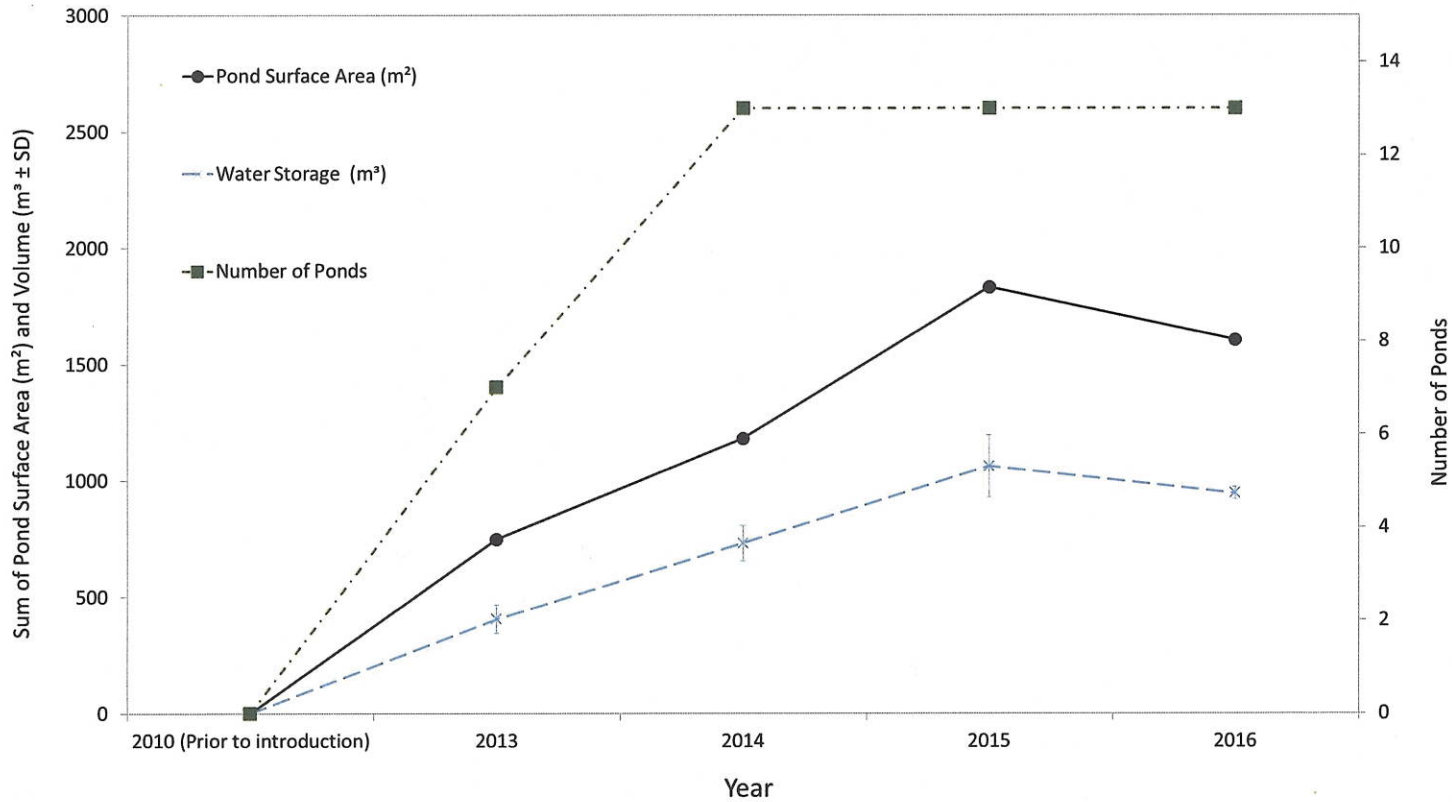


Figure 1. Changes in pond size since 2011

Impacts on water storage

As shown in figure 1, between 2011 and 2016, 13 ponds were created. The surface area of ponded water rose from 90 m² to a maximum of 1800 m², with the largest pond holding 220,000 litres of water.

Water storage is constantly changing with the inflow and outflow of water, but also as dams are maintained and enlarged by the beavers. Even though the number of ponds has stabilised since 2014, the volume of water stored has continued to rise.



Unmanned Aerial Vehicles (UAVs) were used to create high resolution maps of the site, and identify standing water.

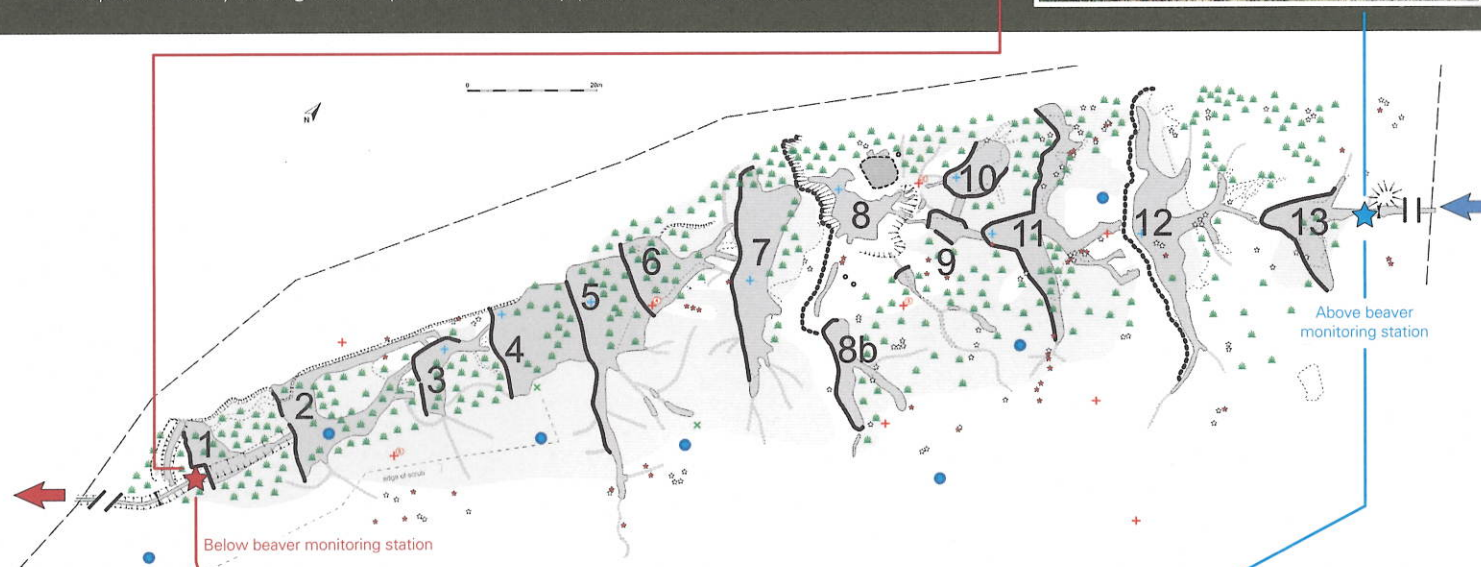


How could beavers influence stream flows and flood risk?

Beaver dams slow the flow of water. In storms more water is stored; in droughts more water is released. The potential for beavers to reduce flooding and maintain baseflows downstream is significant and will be explored further.

Experimental design

The amount of water entering, being stored within, and leaving the site has been monitored via a network of instrumented weirs and dipwells. The potential for beavers to reduce flooding and maintain baseflows downstream is significant and will be explored further. By continuously measuring flow upstream and downstream of the beaver-created wetland, it is possible to quantify the impacts of beavers on the hydrology. Recording rainfall, water table levels and pond depths allows a detailed water 'budget' to be constructed. Understanding the mechanisms of water storage to explain the hydrological responses is a key part of the research.



Flow In and Out of Beaver Site

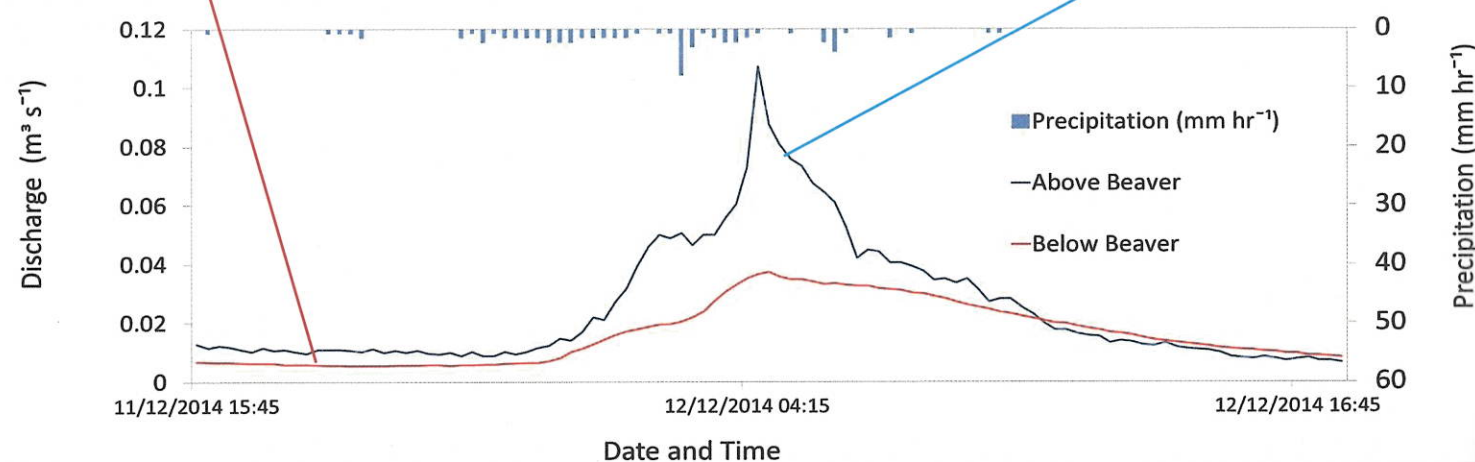


Figure 2. Water flows entering and leaving beaver enclosure during high rainfall.

Impacts on flooding

This research provides strong evidence for the role that beavers might play in reducing flooding downstream, even during prolonged wet periods. As Figure 2 shows, flow into the site (blue line) increases more rapidly in response to rainfall, peaking at a higher flow rate, and falling more rapidly than flow out of the site (red line), as water is quickly moved through the intensively-farmed landscape. The flow leaving the site is attenuated (squashed), rising less rapidly, peaking at a lower rate and falling very slowly after rainfall ceases. This flood attenuation effect is controlled by the storage of water in each beaver pond and the enhanced 'hydraulic roughness' of the landscape, together which slows the flow of the water.



These research findings are all from the enclosed beaver site where the impacts of a series of beaver ponds along 183 m of watercourse have been studied in detail. These findings have been subject to peer review and published in the journal *Science of the Total Environment* (Puttock et al, 2017).

www.sciencedirect.com/science/article/pii/S0048969716323099 (open access)



This profound impact persists even during the wettest times of the year as the leaky dams constantly drain, freeing-up storage capacity in each pond. For example, during storm Frank in December 2015, 29 mm of rain fell on the site; peak flow leaving the site was 3 times lower than into the site and the water took 30 min to travel through the site (a distance of 183 m). Holding water back and desynchronising peak flows from minor watercourses into major rivers is a key principle in flood alleviation and something that beaver dams and increased channel complexity are likely to contribute to.

Impacts on river baseflow during drought

As beaver dams are leaky, stored water drains from the site for a long time after rainfall has stopped. Figure 2 highlights this 'baseflow maintenance' where flow from the site (red line) is greater than flow into the site (blue line) after the storm event. This reversal of hydrological behaviour also relates to the leakiness of the dams, which provide a constant supply of water downstream, even as in summer 2016, when a month long drought left the incoming channel and the top two ponds completely dry, whilst baseflow leaving the site continued. Low flows cause serious environmental problems as oxygen levels are depleted and any pollutants are concentrated.

Key Facts

- Since their introduction into the enclosed site, the beavers have constructed 13 dams holding up to 1 million litres of additional water within ponds on the site.
- The area influenced is 1.8 ha equating to 56 litres of surface water storage per m² of land. During storm events, on average, peak flows were 30% lower leaving the site than entering.
- The lag time between peak flow into the site and peak flow leaving the site was, on average, 1 hour over a distance of 183m.
- Even in saturated conditions and for the largest monitored flood events since the winter of 2013, the flood peaks are still reduced due to the hydraulic roughness of the dams and felled trees and the leaky nature of the dams.
- The water storage and gentle release effect resulted in significant and constant baseflow from the site, even when periods of drought eliminated flows into the site.

The scientists

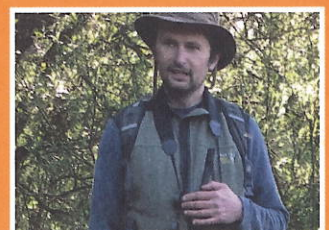
Richard Brazier is Professor of Earth Surface Processes at the University of Exeter. His transdisciplinary approach to research brings together understanding of hydrology, ecology, geomorphology and soil science to pioneer the emerging field of landscape restoration science. His research group address issues of direct relevance to society; including natural flood management, diffuse pollution from agriculture and soil degradation across a wide range of ecosystems in temperate and drylands globally.

More information on Richard's research can be found at:

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Impacts on water quality?



©Alan Puttock, University of Exeter

As well as affecting the storage and flow of water, impoundment behind dams can affect the quality of water leaving beaver-engineered sites and the amount of diffuse pollutants being transported downstream. By slowing and filtering the water, beaver dams cause sediment and nutrients to be deposited in ponds. In this case, the source of the material is the intensively managed farmland upstream, which provides elevated levels of not only sediment (from soil erosion), but also nitrogen and phosphorus, from manures, slurries and fertilisers that are added to the land. By the time the water has flowed through the sequence of beaver dams, a high proportion of these diffuse pollutants have been removed from the water, settling out in the ponds.

Impacts on sediment

During storm events, each litre of surface water leaving the beaver-modified site has 3x less sediment than the water entering the site. On average 112 mg l⁻¹ of sediment enters the site, but under 40 mg l⁻¹ of sediment leaves the site.

Nitrogen

During storm events, each litre of surface water leaving the beaver-modified site has 0.7x less nitrogen. On average each litre of water draining from agricultural land and entering the channel contains 3.35 mg of total oxidised nitrogen, but only 2.19 mg when it leaves the site.

Phosphorus

During storm events, each litre of surface water leaving the beaver-modified site has 5x less phosphate than the water entering the site from agricultural land upstream. On average each litre of water draining from agricultural land and entering the channel contains 0.10 mg of phosphate, but only 0.02 mg when it leaves the site.

Carbon

Dissolved organic carbon concentrations were significantly lower entering the site, compared to those leaving the site (5.11 mg l⁻¹ versus 11.87mg l⁻¹). This difference reflects the fact that intensively managed grasslands are depleted of soil organic carbon. In contrast, fully functioning wetlands are carbon rich environments, which both store and release more carbon to water than their agricultural counterparts.

Figure 3. Results of sampling the watercourse above and below the beaver enclosure.

Experimental design

Each instrumented weir above and below the site was also equipped with an automated water sampler. These 'pump samplers' allowed researchers to collect one litre of water every time water depth changed by 2 cm, during storm events. Sampling storms is important as this is when the water has most energy and most erosion and diffuse pollution occurs, leading to losses of soil and nutrients from land to water. Collected samples were analysed in University of Exeter laboratories for suspended sediment, nitrogen, phosphate, and dissolved organic carbon.

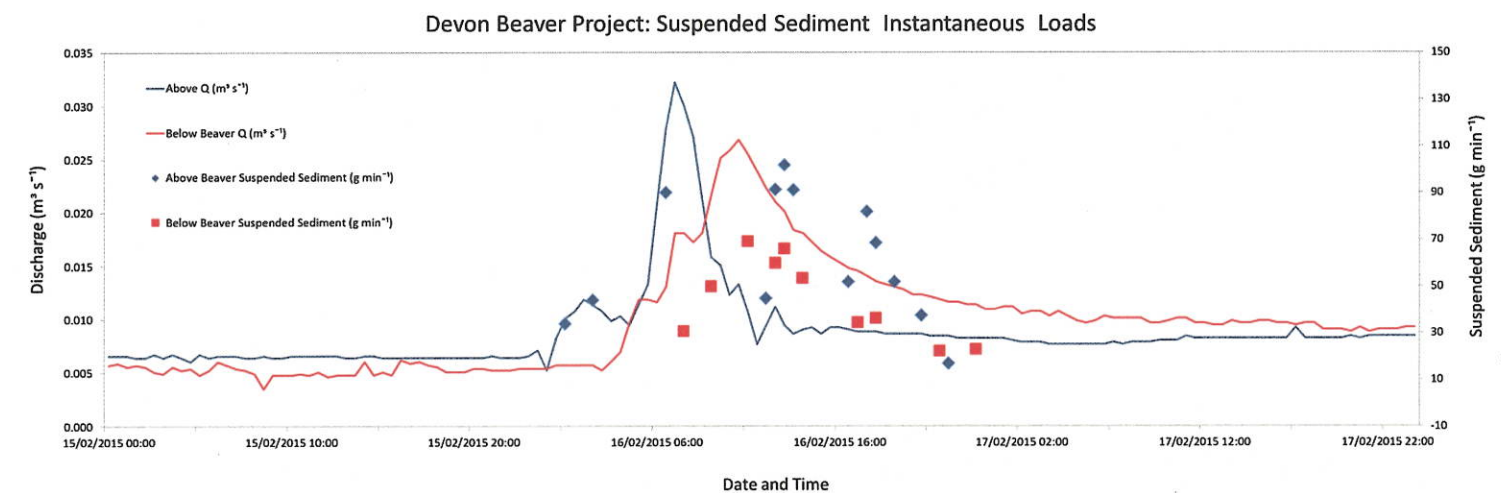


Figure 4. Suspended sediment recorded upstream and downstream of the beaver enclosure during high flows.

Mitigating diffuse pollution from agriculture

Loss of sediment and nutrients from our farmed landscapes can cause problems with land becoming depleted of nutrients and requiring greater fertiliser use and can also cause downstream water quality problems such as eutrophication. For sediment, nitrogen and phosphate, variables which contribute directly to poor ecological status and water quality downstream, the presence of beavers at the Enclosed Beaver Project has led to significant improvement in water quality.

Key Facts

- During the 11 storm events monitored, 1.6 t of sediment was lost from the 20 ha of grassland upstream of the beaver site but only 0.4 t of sediment left the bottom of the site during these same 11 storms. The beaver activity therefore led to a fourfold decrease in sediment yields downstream.
- During monitored storm events there was also a twofold decrease in nitrogen yields and a fourfold decrease in phosphate yields downstream.
- However there was an almost two fold increase in dissolved organic carbon loads downstream leading to some discolouration of water.



One of the more unusual challenges of working within a beaver enclosure is that water trickling through v-notch weirs triggers this instinctive behaviour by the beavers.

The scientists

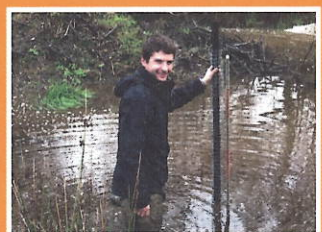
Dr Alan Puttock is an associate research fellow working with Professor Richard Brazier at the University of Exeter. Alan's research specialises in understanding the relationship between land use or vegetation change and the quality and quantity of water leaving our landscapes. Alan has been working on the Enclosed Beaver Project since 2014 and is a member of the River Otter Beaver Trial Science and Evidence Forum.

More information on Alan's research can be found at:

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Impacts on ecology

Biodiversity Quality Calculator Assessment

Detailed ecological surveys have been undertaken at the enclosure site, and the Biodiversity Quality Calculator (BQC), developed by Ecosulis, has been used to understand how beavers affect biodiversity. This includes assessing not just species richness, but also biomass, species rarity, evenness and dominance. This means that changes in biodiversity can be reviewed over time, following the introduction of beavers. Three taxa were chosen to assess changes in biodiversity:

Bats indicate changes in terrestrial and aquatic habitat structure and by association invertebrate prey availability.

The BQC indicated that the number of bat species at the site has increased. In addition, rarer bat species are now using the site, including natterer's and barbastelle bats, and there is a more even spread of species. In comparison, the results recorded outside the enclosure indicate dominance by a few common species. Based on the findings, it can be inferred that the site has had an initial increase in invertebrate prey compared to the baseline, providing a higher abundance of food for bats.

Bryophytes adapt to environmental changes quickly and show changes in conditions and habitat quality.

Bryophyte surveys carried out in 2012 and 2015 show an increase from 43 to 55 species, indicating an increase in species richness. A comparison of the environmental attributes of the bryophyte species recorded in 2015 indicated more species associated with well-lit habitats, and associated with acidic soils.

Aquatic invertebrates indicate changes in water quality, aquatic habitat structure and geomorphology.

Aquatic invertebrates responded very quickly to the increase in wetland habitats created in the first year of the project. Between 2011 and 2012, the number of aquatic invertebrate species increased from 14 to 41. Most of the taxa recorded in 2012 were highly mobile species that disperse widely in search of new habitats. These were colonising the ponds once they had become stable but it appears that new water bodies were unattractive to these taxa, probably due to the high levels of suspended material in the water column from the activities of the beavers.



The results of the 2015 survey recorded a diverse community of bryophytes within the beaver enclosure, with ground-dwellers and epiphytes particularly well represented. One of these was *Colura calyptrifolia*, a tiny epiphytic liverwort; it is a humidity-demanding species and one of very few records in north Devon.



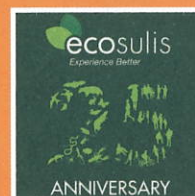
Figure 5. Heat map showing Species Conservation Value Index (SVCI) scores of bat activity and bryophyte surveys undertaken in 2015

The scientists

Cain Blythe is Managing Director at Ecosulis and has almost 20 years' experience in biodiversity research, consultancy and habitat creation. Sara King, Senior Ecological Consultant, has worked with Ecosulis for 8 years and specialises in biodiversity assessment. Cain and Sara have applied the Biodiversity Quality Calculator to a variety of projects including those relating to land management, rewinding projects, No Net Loss Assessment and comparison between sites.

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Wetland beetles

The number of beetle species has increased dramatically since the beavers were introduced into the enclosure, from eight in 2011 to 26 species recorded in 2015. There has been increased complexity and subtle change to the water flow through the enclosure and this has created increased habitat diversity for a number of species. Water beetles have long been accepted as indicators of aquatic diversity and illustrate the overall change in aquatic conditions following the beaver introduction. Beetle communities have become more diverse within beaver influenced habitats and have steadily progressed from a community of seasonal stream generalists to a much more complex community associated with natural heathland streams and seasonal flushes.

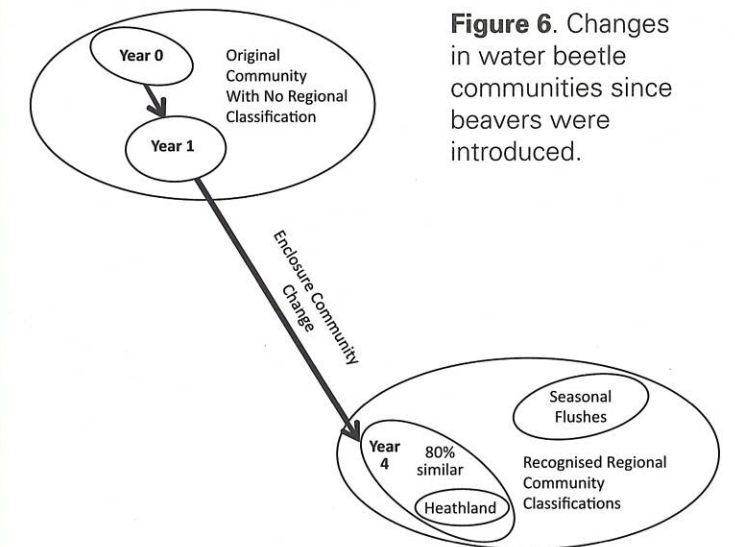


Figure 6. Changes in water beetle communities since beavers were introduced.



Hydroporus longicornis – This is the first time this nationally scarce beetle has been recorded in restored habitat. It is usually associated with natural watershed mires where water emerges from the ground, and is being recorded here in the surface flowing water between the ponds and from groundwater seepages. It has not previously responded to more conventional management, and appears to be benefitting from the diverse mosaic of wetland habitats created naturally by the beavers.

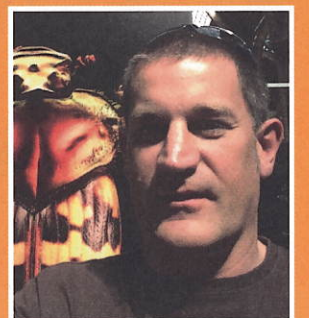
Picture: www.biopix.com

Key Facts

- The engineering activities of beavers results in a heterogeneous habitat structure, increasing botanical and invertebrate diversity. This provides an increase in feeding opportunities for bats, allowing the site to support a higher biomass of bats, as well as attracting rarer species.
- Bryophyte species indicate that beaver habitat offers improved environmental conditions and habitat quality, resulting in an increase in the total number, evenness and rarity of the species present.
- Beavers create a variety of aquatic habitats, encouraging the colonisation of a wide range of aquatic invertebrates, including species associated with pond habitats.

The scientists

Clive Turner was born to be an entomologist and started fieldwork as soon as he could crawl. He continues to enjoy contributing to our knowledge of insect conservation, taxonomy and ecology and has specialised in beetles for a number of years. His considerable list of publications includes new species descriptions, new distributional records and a wide range of other ecological studies.



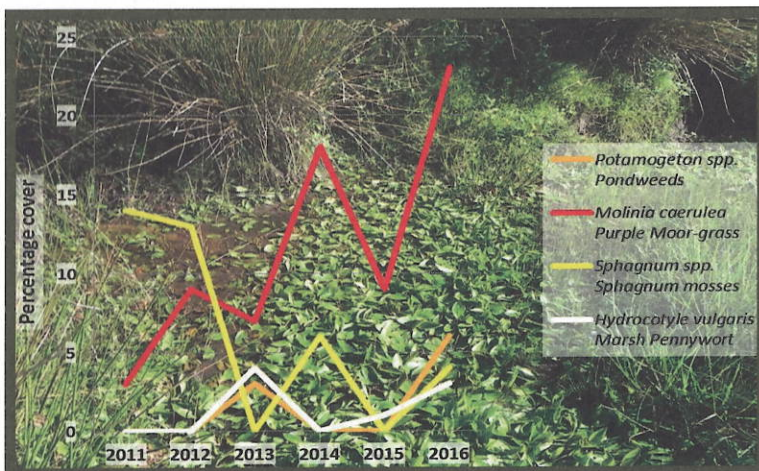


Figure 7. Selection of plant species highlighting change

Changes to vegetation communities and structure

Annual vegetation surveys have been conducted within the beaver enclosure. These have included recording botanical quadrats, vegetation height, deadwood and standing timber volumes. In the main wet willow woodland area impacted by the beavers, the National Vegetation Classification communities have shifted from W1 (*Salix cinerea* - *Galium palustre* woodland) to M24c (*Molinia caerulea* - *Cirsium dissectum* fen-meadow). The average vegetation height has increased from 17 cm in 2011 to 39 cm in 2016, highlighting how many areas dominated by *Sphagnum* have been outcompeted by *Molinia caerulea* (purple moor grass) and *Potamogetons* (pondweeds) as the canopy change has increased light levels, despite ground water levels also increasing.

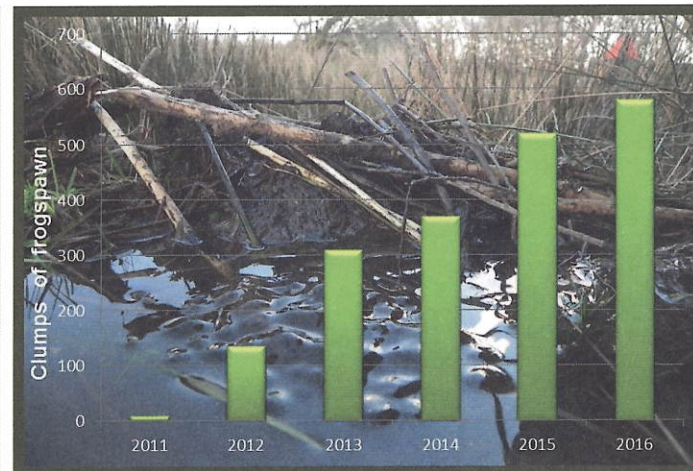


Figure 8. Common frog populations - clumps of spawn counted

Common frog populations - clumps of spawn counted

The dramatic increase in the common frog population can be attributed to the huge increase in the amount of spawning habitat now present with the beaver enclosure. In 2011 when the site was first surveyed, only 10 clumps of frogspawn were found, mainly in small pools and tractor ruts. As the ponds and other areas of shallow water have formed within the enclosure, the numbers of breeding frogs significantly increased to 580 clumps in 2016. This has now encouraged the arrival of grass snakes and herons feeding on the abundance of frogs found in the site.



Bird populations

Anecdotal observations suggest that willow tits, spotted flycatchers (pictured), woodcock, grey herons and kingfishers have particularly benefitted from the habitat changes within the enclosure.

Picture: Nick Upton / Naturepl.com

The scientists

Mark Elliott is a wetland ecologist, and now leads the beaver work for Devon Wildlife Trust. With a background in amphibians and freshwater ecosystems, and a particular interest in using wetlands to manage flood risks, a fascination with beavers has been a logical progression.

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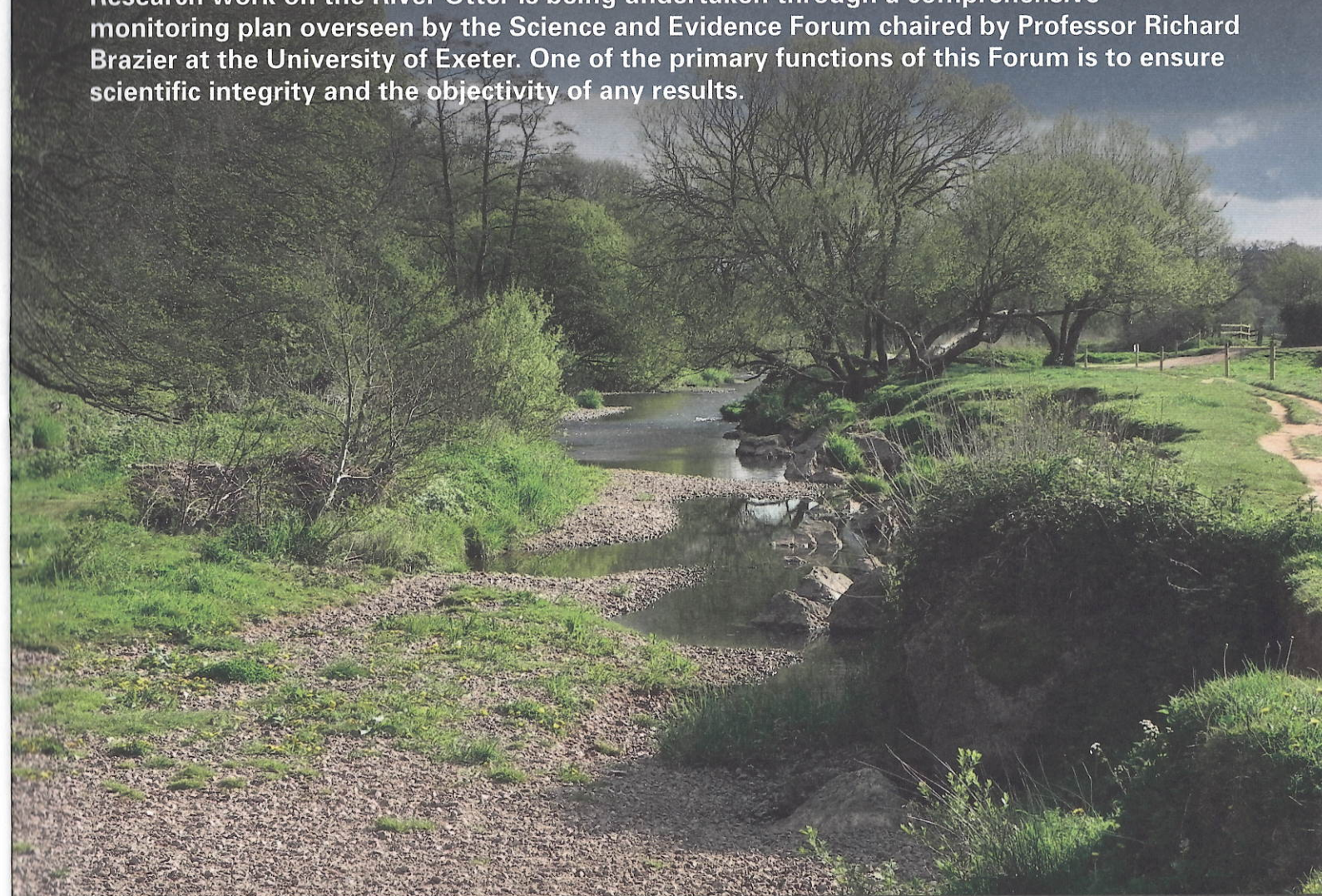


Pete Burgess is the Director of Development, Policy and Research at Devon Wildlife Trust and was responsible for initiating the Enclosed Beaver Project as well as leading on the licence application for the River Otter Beaver Trial. Pete is a habitat restoration ecologist and still enjoys carrying out the annual botanical monitoring work in the Enclosed Project.

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Research work on the River Otter is being undertaken through a comprehensive monitoring plan overseen by the Science and Evidence Forum chaired by Professor Richard Brazier at the University of Exeter. One of the primary functions of this Forum is to ensure scientific integrity and the objectivity of any results.



Physical and ecological changes on the River Otter

In October 2015, Hugh Graham was appointed by the University of Exeter to carry out a PhD to investigate the potential impacts of beavers on the physical characteristics of the River Otter catchment; in particular the potential changes to hydrology, water quality, geomorphology, and vegetation structure. This PhD offers a unique opportunity to study the impacts of beavers at a catchment scale in a landscape where land use is dominated by agriculture and contains three towns, situated on the banks of the river. This highly productive lowland river system experiences intense flooding and significant diffuse pollution, both of which are chronic water resources issues experienced across the UK. The reintroduction of beavers will allow us to understand how they behave in these landscapes, their use of resources within the river corridor and how their engineering behaviour can alter water resources and habitat structure within the catchment.



Impacts on fish

One of the questions that we hope to answer in the River Otter catchment will be the impacts of beaver activity on fish populations. In 2016 beavers began damming a stretch of stream in the upper catchment, and researchers from the University of Southampton have carried out detailed fish surveys to allow any impacts over the coming years to be assessed. Three 50m stretches of the river were electro-fished in October 2016, including an impounded stretch of river behind the beaver dams, and control stretches upstream and downstream of the beaver dams.



Fish were caught by electrofishing above and below a beaver dam, and recorded in detail.



The largest brown trout (approx 30 cm) captured during 2016 fisheries surveys was in the pool created by a beaver dam.

Creating habitats generates suspended sediment

The University of Exeter analysis of water quality shows how the sequence of beaver dams reduces suspended sediment loading during high flows. However, in drier periods, the water in newly created or more active ponds is often turbid due to the dredging activities of the beavers. Whilst the beavers are undoubtedly creating a complex wetland comprising numerous ponds, canals, rivulets etc, many of the more active beaver ponds do not have the invertebrate species that might be found in cleaner ponds.

As the number and size of the ponds increases over time, these negative impacts are more dispersed. In an unfenced situation where beavers were exploring a much larger territory and changing the focus of activity over time, abandoning some areas, the negative impacts on water quality are likely to be more localised and temporary.

The construction of any ponds releases sediment for a period, and the fact that the beavers are creating ponds slowly over many years just appears to prolong this effect. The University of Exeter are currently investigating the sediment storage and transport between the different beaver ponds.



Ongoing fisheries research in Scotland

PhD researcher from University of Southampton, Rob Needham, has been investigating brown trout populations in Scotland that are being influenced by beaver dams. This work is comparing channels with and without beavers, and tracking individual fish migrating through beaver ponds and over dams. This work began in July 2014 under the supervision of Professor Paul Kemp, Professor David Sears and Dr Gerald Müller.

The preliminary results from these Scottish studies suggest trout are larger and more abundant in beaver modified habitats compared to trout in non-beaver modified habitats. Passive Integrated Transponder (PIT) tag telemetry has also been used to assess the impact of beaver dams on upstream and downstream movement of trout. Preliminary results have shown trout passing both upstream and downstream of beaver dams, particularly in high flows in the autumn during spawning. Analysis of these data is still on going.

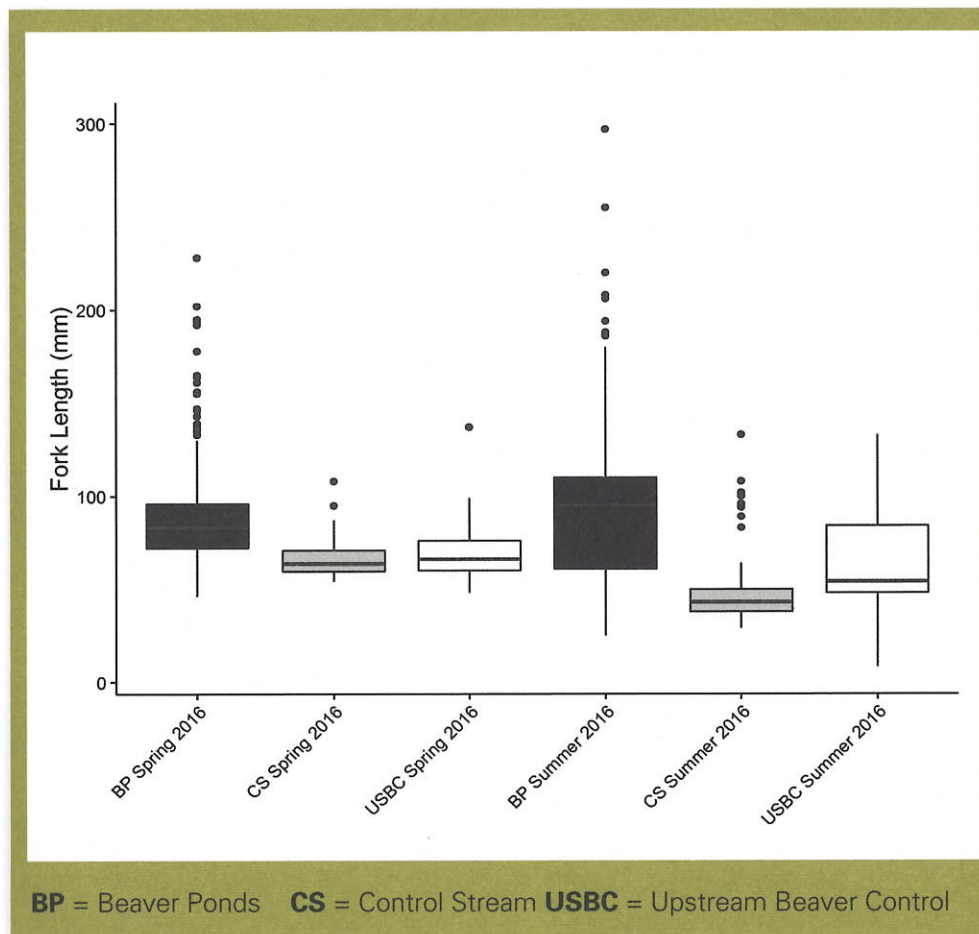
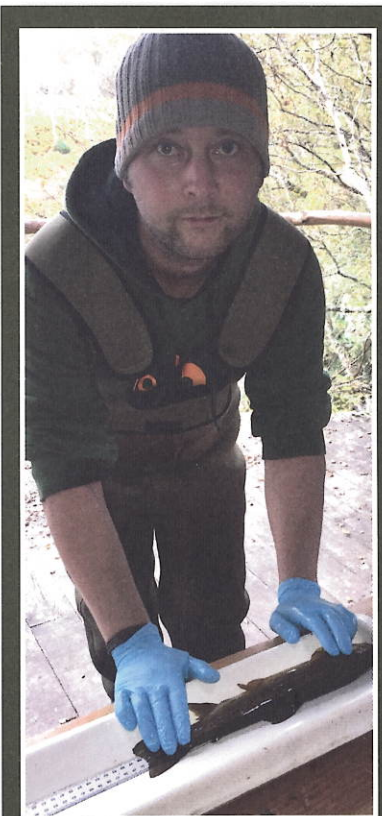


Figure 9. Brown Trout length in spring and summer 2016 in the Scottish study site



Rob Needham is conducting a PhD on the impacts of beaver dams on trout in Scotland.

The scientists

The University of Southampton is leading research into the impacts of beaver dams on fish populations. Under the supervision of Professor Paul Kemp, a team of fisheries and engineering specialists is seeking to understand the effects of changes to the structure of watercourses as a result of beaver dams on fish populations, and any impacts on migration of salmonids.

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Beaver kits born on the River Otter in 2016
Picture: Mike Symes (DWT)

Facts for those considering beaver projects elsewhere

- Beavers are highly effective for managing and creating wetland habitats. They will often create new wetland habitats by damming watercourses in those areas where deep water doesn't exist, and their willow coppicing activities maintain open mosaic habitats.
- Reintroduction of this species should be considered at a catchment scale rather than at a site scale, with the species often only moving into headwaters and sub-optimal habitats as part of the colonisation of the wider catchment.
- Deep water should always be present on a release site. Beavers are very mobile animals, and are likely to move out into the wider catchment if they are released into sub-optimal sites, unless constrained by fencing or other occupied beaver territories.
- Beavers have the potential to significantly contribute to sustainable water and flood management, although targeted projects are complicated by this mobile behaviour. Management of conflicts would also need to be considered as part of any unfenced project, and early engagement with local stakeholders is critical.
- Release into the wild currently requires a licence from the relevant national authority.
- Keeping beavers in large enclosures for a number of years can be achieved with high-specification purpose-built fencing. The fencing at the DWT enclosure cost around £35/m of fence with associated infrastructure.

To find out more about beavers and their management, the Eurasian Beaver Handbook (Pelagic Publishing) was produced in 2016. Written by a team of beaver experts from Britain and other European Countries, led by Roisin Campbell-Palmer, this comprehensive new book includes information on the ecology and practical management of the species.

Publications and references associated with this research

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