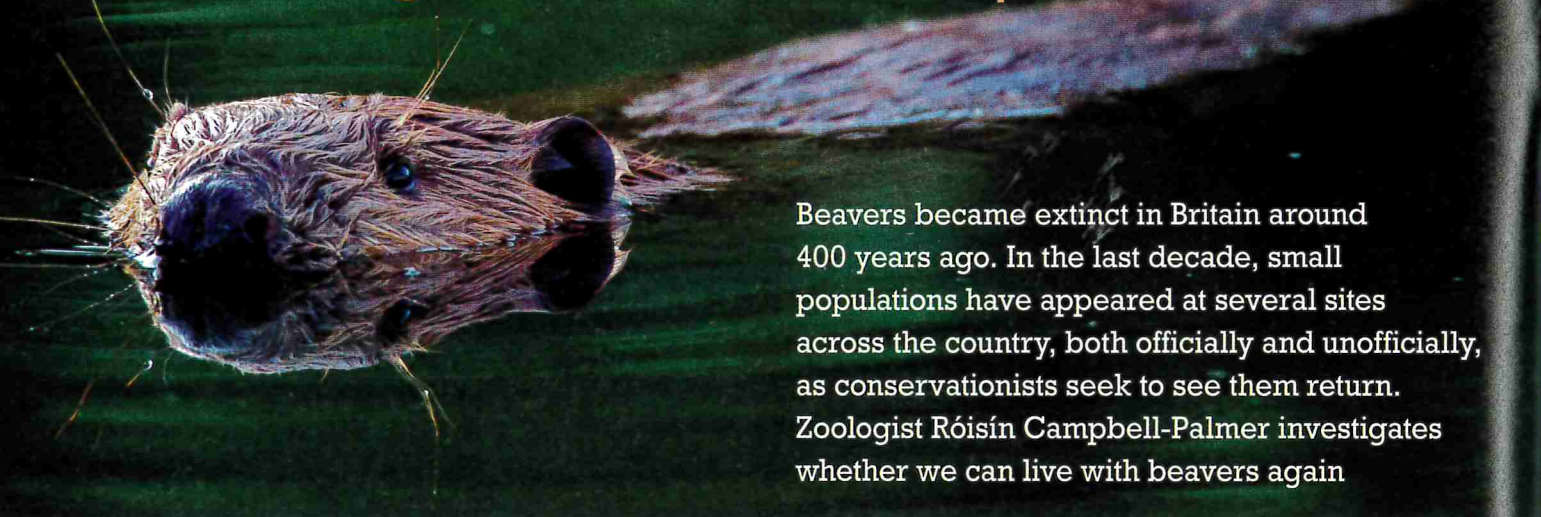




# Beavers are back!

## Restoring a lost native species



Beavers became extinct in Britain around 400 years ago. In the last decade, small populations have appeared at several sites across the country, both officially and unofficially, as conservationists seek to see them return. Zoologist Róisín Campbell-Palmer investigates whether we can live with beavers again

**B**eavers play a critically important role as freshwater ecological engineers. As the second largest rodent in the world, next only to the capybara of South America, adult beavers can weigh 15–26 kg. As complete vegetarians, they consume a wide variety of plants. Beavers are strong. They are one of the few species that can fell and process mature trees with ease, eating the bark, stems and leaves, while using branches to create shelters and dams.

Their semi-aquatic lifestyle means they are well adapted to a life between land and fresh water. They have one of the densest furs of all mammals. **Nictitating** membranes protect their eyes. Inner ear valves stop water entry during dives. They can hold their breath underwater for up to 15 minutes.

A high tolerance of carbon dioxide in their bloodstream allows beavers to spend much of their day in deep burrows, under frozen water bodies or in snow-covered banks if their movements become restricted during severe winters. They do not hibernate but instead store winter food caches outside their lodge to provide them with fodder overwinter.

### Near extinction

Beavers appear in the British fossil record around 2 million years ago, during the Pleistocene period.

Palaeontological and archaeological evidence, historical records, place names and folklore indicate beavers were common throughout British freshwater habitats. They were classed as fish-like animals by the Roman Catholic church, and so could be eaten during religious fasts, including Lent. Their castoreum (a scent secretion they use in territorial defence and communication) was considered to be a remedy for a range of health issues from rheumatism to toothache. Wide-scale persecution accelerated in medieval times due to demand for beaver fur to make hats.

So relentless was beaver persecution that by the end of the nineteenth century only perhaps 1200 individuals remained across Europe, from what was once tens of millions. In western Europe, populations were very small. Although small numbers survived in isolated pockets until the early 1800s, they were largely extinguished across Britain around 400 years ago.

### Biodiversity benefits

Beaver activity and the environments they create increase levels of biodiversity. A vast range of species of plants, amphibians, birds and mammals are adapted to and actually require beaver-generated environments to prosper. The recreation, enhancement and maintenance of wetland habitats

in Europe and North America is now recognised as being of vital importance for biodiversity, water retention and purification.

While the impact of beavers is predominantly positive, there are of course some potential losers. Concerns have been expressed over how beaver activities affect rarer species. For example, beaver dams trap sediment, which could smother less mobile pearl mussels. Their foraging may remove specific trees on which rarer lichens depend. Additionally, beavers create good habitats for invasive non-native European species such as American mink and Japanese knotweed.

These perceived risks are a significant factor in the acceptance of beavers. Another common concern is that beaver dams prevent the movement of migratory fish. Dams might block fish migration, especially during periods of low water flow, but this will only be a short-term problem. Numerous studies demonstrate that beaver-created wetlands provide feeding and breeding habitat opportunities for fish. The complexity of pools, felled timber and numerous interlinking water courses provide additional protection for fish from predators. These environments result in increased fish abundance and species diversity.

Problems are more likely to result from human changes to water courses such as canalisation, removing natural vegetation, installing artificial dams or hydro schemes. The widespread leaking of pesticides, chemical fertilisers and animal wastes from intensive farming practices have also impacted fish stocks, with declining salmon a major conservation concern long before beavers made their return. Overall, the biodiversity benefits beavers bring to degraded habitats offer exciting environmental restoration opportunities at this time of a global nature crisis.

### Reintroductions as a conservation tool

**Reintroductions** of lost species are a vital conservation tool aimed at reversing biodiversity loss and restoring ecological function. Commonly, reintroductions require long-term investment and the repeated addition of animals.

Humans can be very selective about which animals they wish to restore. For example, the restoration of large carnivores is portrayed by some interest groups, including livestock farmers, as highly controversial. This can result in the persecution of released individuals, raising welfare and ethical debates. Reintroductions of invertebrates, plants and fish have happened without controversy or significant interest. In Britain,

### TERMS EXPLAINED

**Nictitating** A protective membrane that can cover the eyeball, like a third eyelid.

**Reintroduction** Restoring a species back into its former habitat following local expatriation.

**Riparian** Wetland and associated bank habitat.

**Translocation** (in this context) Intentional capture and movement of wild animals for release to establish, re-establish or augment a population.

beaver reintroduction is controversial, especially in floodplain areas with regulated water regimes, intensive agriculture and commercial forestry. An animal that has the abilities to significantly modify its environment is not always welcomed.

As Britain is geographically isolated, the British can select which species are reintroduced. The beaver is one of the most **translocated** mammals. Since the 1920s, over 200 release events have seen beavers actively reintroduced to at least 26 European countries. This, coupled with appropriate protection measures, has seen beaver numbers increase and areas colonised naturally. Another species recovering without reintroduction is the Eurasian wolf, which is now breeding in Germany, the Netherlands, Belgium and Denmark, long after hunters eradicated them centuries ago.

### Beavers in Britain

May 2009 saw the official release of beavers in Scotland. This was historically poignant as it marked the first formal reintroduction of an extinct mammal to Britain. The reintroduction was a collaborative project between two non-government

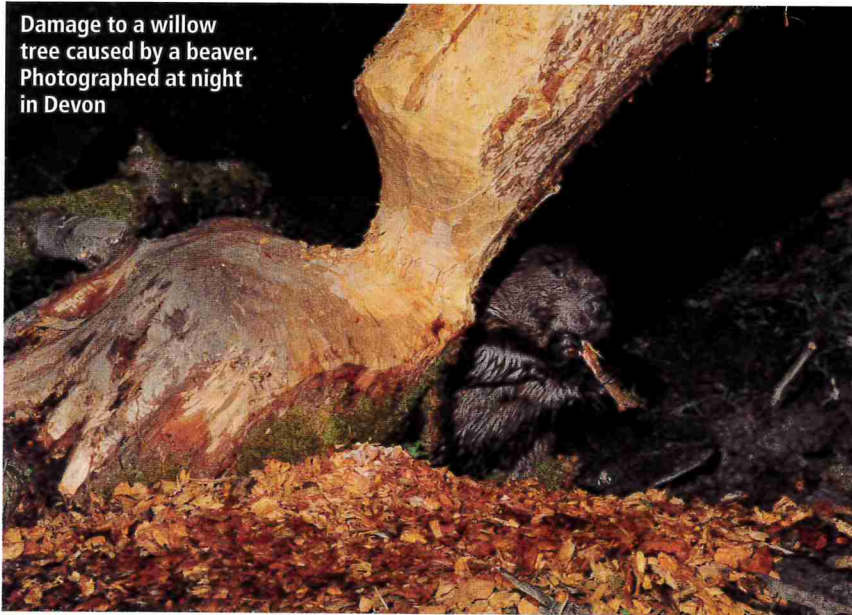
The author using callipers to take measurements of the tail of a Eurasian beaver. Health checks and ear tagging were carried out at the same time



A beaver in a Scottish river, 2018



Damage to a willow tree caused by a beaver. Photographed at night in Devon



Beavers have a powerful broad tail which they use as a rudder in the water, for balance when sitting upright and as a fat store for winter



organisations – the Scottish Wildlife Trust and the Royal Zoological Society of Scotland. These partners released and managed the animals while the conservation bodies Scottish Natural Heritage and the Forestry Commission oversaw the licensing, monitoring and release site landowners. Independent scientists analysed data collected over 5 years on a range of potential beaver impacts including woodlands, aquatic invertebrates, water quality chemistry, animal health and habitat use. Local management and conflict issues, together with socio-economic impacts, were also reviewed. This scientific information was vital to record what the return to Britain of beavers might mean.

The IUCN Reintroduction Guidelines provided a framework for much of the Scottish Beaver Trial, which sought to follow many of their recommendations. These included sourcing animals from similar existing populations (in this case Norway), health screening, quarantine, preparing the site for release, collecting baseline data, engaging with the local community to encourage acceptance and develop acceptable mitigation should conflicts arise. This meant many people, both for and against beavers, could learn about beaver activities.

Along with this official process, enclosed beaver groups developed in various parts of Britain. These were often established by people wishing to promote beaver return and demonstrate the positive impacts they produced. As a twist in the tale of the beavers' return, animals from these populations that escaped or were released began to form free-living populations in other locations. The 'unofficial' release of wildlife is often a result of frustration at the perceived inertia of official processes. In parts of Scotland, England and more recently in Wales, beavers are doing well.

On the River Otter in Devon, where beavers were filmed with juveniles from 2014 onwards, a public campaign resulted in the rejection of the government's attempts to have them trapped and removed. An application for a 5-year scientific monitoring trial by the Devon Wildlife Trust ensured that this population became the first, retrospectively, licensed trial in England. There are now an estimated 13 active territories in the river catchment.

### Unofficial releases: what's the problem?

It is estimated that more than 1000 beavers could now exist in Britain. Small, low-density and widespread populations present little issue and have been widely welcomed back. However,

## Box 1 A tale of two beavers

There are two species of beaver living today: the Eurasian *Castor fiber* and the Canadian or North American *Castor canadensis*. It is likely that speciation occurred when the land bridge between Eurasia and North America disappeared with the retreating ice sheets after the last glaciation around 12 000 years ago. Their similar appearance, biology, behaviour and ecology meant that they were once considered to be the same species. But they have a different number of chromosomes: 48 pairs in the Eurasian, 40 in the North American, and they do not interbreed or hybridise.

Before this was understood, the North American beaver was released in parts of Europe as a game species, mainly in Finland and Russia, at a time when they were easy to obtain and the native Eurasian was rare. Today, tens of thousands of North American beavers exist in Europe, presenting a huge non-native conservation management problem if elimination is sought.

populations in areas of prime agriculture, such as on Tayside, have caused conflicts with the farming community. As a result, lethal control licences have been issued by the statutory authorities where conflicts of interest now occur.

Unofficial releases did not follow IUCN guidelines and the origin and health status of the beavers was unknown. As a result, issues regarding beaver long-term acceptance and survival have been raised. To address these, the Tayside beaver population has been tested and determined to be of Eurasian origin (see Box 1), its genetic diversity has been assessed and it has been shown to generally be in good health. Efforts are being made to address socio-economic and political concerns through stake-holder forums, management strategies and resource support.

### Beavers are back: next steps

The Eurasian beaver has now returned to Britain, after centuries of absence. There is significant public support for its restoration and in Scotland beavers have been declared a European Protected Species. However, there will be negative consequences for some landowners (see Box 2). Agreeing an approach to managing beavers will be required and this may in time include culling under certain circumstances.

While the beaver story in Britain represents a need to plan and implement species restoration projects by involving a wide range of stakeholders, including biologists, vets, landowners, local communities and others, it also demonstrates that there are frustrations with the speed of

## Box 2 Divided opinions

### Arguments for beaver reintroduction

**Public desire:** rewilding is a hugely popular movement, and numerous public surveys in different parts of Britain demonstrate that a majority of people want to see beavers restored.

**Biodiversity benefits:** overall beavers have positive effects on biodiversity and could be used widely to restore wetland, woodland and riparian habitats.

**Moral grounds:** ethically some people feel that, since humans directly caused their extinction through over hunting, there is a moral obligation to effect their return.

**Socio-economic reasons:** beavers provide ecosystem services that can benefit wider society, such as water purification and flood alleviation.

**Ecotourism:** ecotourism could bring significant revenue, especially to rural areas.

**Legal obligations:** the Eurasian beaver is protected across Europe via the EU Habitats Directive, under which article 22 requires member states to 'study the desirability' of reintroducing species listed in Annex IV.

### Arguments/concerns against beaver reintroduction

**Land-use conflict:** beaver activities can lead to flooding of land, bank erosion and crop loss.

**Migratory fish:** beaver dams impede movement of migratory fish such as salmon and trout, which are species of commercial and conservation interest.

**Modern landscapes:** our landscapes have changed so much since beavers were last present – beavers are not compatible with modern land use.

**Financial costs:** reintroduction projects are expensive; this money could be better spent conserving the wildlife we have left.

**Beaver management requirements:** as significant modifiers of the environment, beavers will require robust management and mitigation, which will cost money. Who should pay for this?

these processes and perceived lack of action. Implementing a science- and evidence-based approach, involving local communities and developing high standards of animal welfare are all key to successful reintroduction programmes.

## RESOURCES

[www.scottishbeavers.org.uk](http://www.scottishbeavers.org.uk)

Beavers in Scotland: a report to Scottish Government:

<https://tinyurl.com/y2r43v1x>

'River Otter beaver trial', Devon Wildlife Trust:

<https://tinyurl.com/y5quer6c>

<https://beaversinengland.com>

**Dr Róisín Campbell-Palmer** is a field biologist who has worked with beavers for 12 years. Her work includes animal trapping and translocation, working with land managers experiencing beaver conflicts and advising a range of organisations on beaver management and restoration.