



Return of the wetland engineer

The reintroduction of large animal species to Scotland's wild places is a controversial issue, as the high-profile release of beavers at Knapdale in Argyll last year showed. Much of the concern centres around beavers' capacity to alter their environment, often quite radically. At Bamff Estate in Perthshire, beavers have been doing so for the last eight years. Here, Paul Ramsay explains how their activities create wetland habitats to benefit a host of plants and animals... and humans.

After the last Ice Age, beavers (*Castor fiber*) were present throughout Eurasia, from Britain and northern Spain in the west to Kamchatka and Mongolia in the east. A century ago, only about 2,000 survived in isolated pockets. This near extinction had been brought about by the intense persecution of the species over many hundreds of years.

From the earliest times, humans had valued beavers highly for their fur, both in its unaltered and in its felted states. Unaltered, the fur made wonderful coats, while beaver felt hats were 'de rigueur' for several hundred years to the extent that the word 'beaver' became synonymous with 'hat'. Robert Burns' song 'Cock up your Beaver' had more to do with wearing your hat jauntily than anything sexual (or perhaps not, knowing Burns?).

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Secondly, beavers possess anal glands and castor sacs, the secretions of which serve them as chemical signalling systems: the castoreum from the castor sac is rich in salicylic acid, long recognised as a febrifuge and curer of headaches, and credited with aphrodisiac qualities. As we know today, hardly a year passes without the discovery of some new medicinal application for salicylic acid (aspirin). A third reason for the trapping of beavers was for food: an 18kg beaver represents a fair amount of meat. As if this wasn't enough, their chisel-like incisors could be used as the sharp bit of adzes and for adornment.

From useful to vermin

For hunter-gatherers and other societies where hunting was important, the animal was valuable for a range of reasons as well as the ones already described. The habitats it managed were rich in fish and

wildfowl, the chips that resulted from felling trees made excellent kindling, and the pointed sticks that it left behind it so generously could be used for building huts, making stockades, and as firewood. Unfortunately for beavers, they never rated the kind of protection that was given to deer and without that protection, the species became part of the Tragedy of the Commons.

The scarcity of beavers in Eurasia led to the exploration of northern North America when cod fishers realised that a North American version of the animal (*Castor canadensis*) existed there. In Britain, agricultural intensification and the enclosure movement meant that beavers moved from being seen as useful to being classed as vermin in the official eye. The animals figured in the extraordinary lists of creatures that were persecuted in England in Tudor times, and for which bounty could be paid.

It is thanks to the recording of the payment of bounties that we owe an extraordinary piece of evidence suggesting that beavers survived as late as 1789 in England. An entry in the records of the parish of Bolton

Percy in Yorkshire describes a bounty of two pence paid for a beaver in 1789 (Coles 2007). The survival of the species in Scotland can be put no later than the early 16th century, but archaeological evidence from Loch Tay and elsewhere confirms that beavers were widely distributed throughout this country.

In the last 100 years, individuals and organisations have persuaded their countries and the European Union that beavers should be restored to our continent and protected. Beavers have returned to much of their old range throughout Eurasia and have now reached a population of around 600,000. It is astonishing that we in Scotland and Great Britain as a whole have been so slow to bring these wonderful creatures back.

Beavers shape their environment

Beavers are well known for their capacity to change landscapes, but this depends very much on the habitat. You can go to stretches of the Rhône and its tributaries, for example, and many other places and hardly be aware of their presence. On the other hand, particularly where the habitat does not suit them exactly, impacts can be dramatic, as beavers take on the task of converting the existing landscape to their tastes. We have witnessed this capacity for change here at Bamff, where beavers have lived for the last eight years.

In that first spring of 2002, they started by cutting saplings and trees, and built little plug dams to block the main ditch. Gradually, they built on to their first dams and by the end of that summer had cleared much of the willow within about 50m of their lodge. This was an unusually heavy impact and probably due to the artificial, post-agricultural nature of the woodland. As the years have passed, the dams have stretched (I think our longest dam is about 60m so far) and canals have been dug.

We expected the coppice regrowth to be abundant and that perhaps the biomass of the 'after beaver' state would be greater than that before the beavers came. The position eight years later, however, is not so straightforward: roe deer have benefited from the beavers' presence, browsing much of the new coppice

regrowth, but hindering its recovery. Regrowth near the bigger of the two ponds in the original enclosure has almost stopped, possibly because heavy browsing pressure has been coupled with the rise in the water table that has resulted from the dams the beavers have built, and continue to build. Further away from that pond, the coppice regrowth is luxuriant and often hard for roe deer to reach. Where the willows have not recovered the ground is now very wet and tussocky. I was delighted to see a group of six snipe fly off one afternoon in January this year.

Creating niches for other creatures

Much of the appeal of beavers lies in their capacity to change their habitat. Give beavers a bit of ditch and some vegetation, preferably with some willow, and the animals will do amazing things. They will often build a dam, and a pond may form behind the dam. They may dredge the sides of the new pond. Then they will cut nearby trees and the surviving bases of the trunks will soon begin to throw out fresh young coppice shoots. Depending on the species (aspen is a great example) suckering

may happen. Some of a felled tree may be removed for building a dam or repairing a lodge, some may be left behind. Such of the tree as is left behind may have its bark eaten off through the winter and then be left to rot. Eventually, the unused dead stems of fallen trees will sprout fungi and become the home of lichens and invertebrates.

Woodpeckers and owls will make their homes in ringed trees left standing. In a year or two, if the beavers have occupied a ditch or burn, dippers will bob on bits of exposed log that were once parts of trees the animals had felled; herons will fly off at the approach of humans; water rails may skulk among the rushes; reed buntings will appear; wood cock and snipe will be present. Otters will hunt for eels, trout and frogs, leaving their spraints as evidence. In the spring, frogs and toads will come to the pond and leave abundant quantities of spawn. Dragonflies are well-known beneficiaries of beaver activity. In

Opposite page: An infrared trail camera captures nocturnal activity. This page: Dams may use a fair amount of wood. All photos: Paul Ramsay.



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spring, white throats, black caps and chiff-chaffs will find places to nest in the touselled mass of scrub and woody detritus.

As dead wood accumulates in the pond and on the banks of the rewilding ditch, the biological productivity increases. Great quantities of invertebrate life are manifest (some of it characteristic of dead standing and some of fallen timber). This is food for birds, trout, salmon parr and bats, not to mention shrews. Around the pond the vegetation comes into flower: these damp meadow strips are wonderful habitat for bumblebees and water voles and provide beavers with their summer rations of fresh vegetation. Bernd Heinrich describes a beaver swamp in Maine as key habitat for bumblebees in his classic book *Bumblebee Economics* (1979).

Last summer I was delighted to see large numbers of sand martins hunting over one of the ponds that the beavers had created in the last few years. They had flown over from a neighbouring farm where they were nesting in drumlins from which sand had been dug. The martins had never been around before because this new source of abundant flying invertebrate life had not existed. I used to see martins over the older ponds, mainly flying over and hunting, but now they have stretched their hunting grounds to cover the new beaver pools.

Benefits of dam building

Beavers build dams whenever they consider it necessary to do so. They prefer to live in slow flowing rivers (with a gradient of not more than one

Top right: Gnawed tree trunk. Bottom left: A felled birch from which the bark is being gnawed. All photos: Paul Ramsay.

percent) with big banks and plenty of vegetation (especially aquatic) or ponds. Riparian woodland is very important for beavers, particularly willow, birch and members of the poplar family such as aspen. In such circumstances, there is no need for the hard graft entailed in building a dam and the deep bank means that a burrow may well be enough: no need to build a lodge.

In the ideal habitat I have described, beavers do not need to build dams because one of their main needs – underwater access to their burrow – is met. However, evolution has given the animals the capacity to adapt less suitable habitats to fit their purpose. Once the availability of first class habitat is exhausted, beavers have to look for less suitable places to adapt. From the main stem of a great river such as the Rhône in France, beavers disperse and move into tributaries and from there to small streams (such as the Borne, a tributary of the Isère, where there are dams at 2,000m above sea level) and ditches.

In these places the bank is no longer deep enough for beavers to dig an underwater (or partly underwater) entrance to their burrows. How may the water level be raised? A dam, of course. But why the need for a submerged entrance? Security seems to be the answer. Underwater access makes beavers less vulnerable to their predators – mainly humans, wolves and bears. In this situation they will live in rivers with a gradient of up to around six percent.

The activities of beavers bring many benefits for humans. The water filtered by a dam is purer than the water above it. Dams slow down the current and thus give silt and other



sediments time to drop out of the water. Nitrates and phosphates that run off from arable fields are trapped in sediments at the bottom of pools, or broken down and consumed by the microflora (bacteria, bioslimes, etc.) of the dams and wetlands, as are chemical pollutants.

Beavers' dams have an important part to play in the way they moderate the flow of water down a stream in times of flood or drought, but a few problems can arise: beavers can cause flooding of fields, roads or golf courses, for example. There are, however, usually ways of solving these problems and the benefits greatly outweigh the risks. The recent Fresh Water Directive of the European Union reads like a prescription for the return of the beaver.

Let us consider in this, the International Year of Biodiversity, the plight of the UK's wetlands. England has lost 90% of its wetlands in the last 1,000 years and Scotland is likely to have lost something similar. Given its amazing capacity to shape and create wetland habitats for the benefit of biodiversity, we should welcome the return of our wetland engineer, the beaver.

<http://beaversatbamff.blogspot.com>
www.bamff.co.uk
www.scotsbeavers.org
www.scottishbeavers.org.uk

Paul Ramsay and his wife Louise are passionate about wildlife, conservation and ecological restoration. They are the current owners of the Ramsay family estate, Bamff, in Perthshire.

