

Species reintroductions

Our environment is changing all the time and species will naturally die out and become extinct. Human activity such as pollution, land use and climate change can increase the numbers of species becoming extinct beyond the rate which would naturally occur.

When a species becomes extinct this can have an effect on the whole ecosystem and the animals, plants, insects and birds which depend on that system. If a species has only become extinct from part of its range, reintroducing the species to these areas can help restore this balance.

All proposals for reintroducing species must be assessed against the International Union for the Conservation of Nature's (IUCN) Guidelines for Reintroductions and Conservation Translocations, as well as the Scottish Code for Conservation Translocations. Conservation translocations involve the movement of plants or animals from one area to another for the purpose of conservation and are usually considered as a last resort.

The necessary permissions must then be secured from the landowners and statutory licensing authority.

Here we look at two species reintroductions. The first is **water voles** which were thought to have disappeared from Loch Lomond and The Trossachs National Park.

The second is the **Eurasian beaver** which had been extinct across the UK since the 16th century.



Reintroduction of water voles in the Trossachs

Introduction

The water vole (*Arvicola amphibious*), or 'water rat' as it is often mistakenly known, was once one of our most familiar and abundant riverside mammals. It is a semi-aquatic member of the rodent family spending time in water and on land. It is very similar to the brown rat in appearance, but has a blunt nose, small ears and a hairy tail. It is the largest of the British voles and has seen a dramatic decline particularly in the latter part of the twentieth century. Most Scottish populations are now to be found in the uplands.



Water vole distribution and ecology



Water voles usually live beside bodies of water, where they feed on grasses and other vegetation such as sedges and herbs. They prefer slow moving water in burns, ditches, overgrown field drains and canals. They dig their burrows in the banks and prefer steep sided muddy banks where they can create nests above the water table. They are a prey species for a number of mammals and birds, so prefer continuous long vegetation in which they can hide!

Because of the losses of water voles in the lowlands, they are mainly restricted to smaller tributaries and headwaters of our upland rivers. Here, they are found in narrow burns and ditches and prefer gently sloping sites with a thick layer of peat. Water voles will avoid areas which are densely shaded by trees and shrubs.

Water voles live in colonies and are very territorial. Females defend a linear territory of 30–50 m, while males occupy home ranges of 60–300 m, often overlapping the territories of several females. During the breeding season (April to September) they will mark their territories with piles of droppings called latrines which have a distinct smell to keep other water voles away! Water voles have between 2–5 young per litter and can breed up to 8 times a year!

More recently water voles have been discovered in Glasgow living away from water. Large populations have been recorded in the east end of the city living in long grassland in parks, road verges, gardens and derelict land. These terrestrial water voles are termed fossorial which means adapted for digging and they spend more time underground like a mole. This adaptation to living in grasslands in such high densities in an urban environment is unique in the UK.



Threats to water voles

The total UK population of water voles was reduced by approximately 90% between 1989 and 1996. Reasons for this decline are thought to be due to two main factors:

1. Habitat that the water voles favour has either been lost or broken up into fragments.

This has reduced suitable areas where the voles can live and breed. Examples of this are draining of wetlands and the introduction of hard engineering to rivers (e.g. concrete embankments and other man-made structures). Riparian vegetation (vegetation growing at the edges of water) can change due to over grazing by wild herbivores such as deer and also domestic livestock. This reduces the abundance of vegetation for the voles to eat and enables predators to see them more easily. However, not enough grazing is equally as damaging, allowing shrubs and trees to take hold along water courses.

2. Predation by the non-native American mink.

Water voles have many native predators but none seem to threaten the survival of the species. Because they have evolved alongside these predators, they have well-balanced predator-prey relationships and effective defence systems. Water voles have developed evasive behaviours to minimise their chances of being caught. They maintain runway systems on the banks so they can move through the vegetation remaining relatively unseen and when threatened they will jump into the water creating a distinctive 'plop'! and seek out their burrows to hide. However, when the non-native American Mink was introduced to the UK, they were able to exploit the gaps in our natural food webs and became a very problematic predator. American mink are very clever and opportunistic predators, they are aggressive, good swimmers and cache kill, meaning they kill more prey than they need to store for later. Most importantly, female mink can fit into water vole burrows where they can easily catch defenceless voles that are unable to escape.



Protection of water voles

The water vole receives partial protection under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended).

In Scotland, this legal protection is currently restricted to the water vole's places of shelter or protection and doesn't include the animal itself. Full protection, to also cover the animal, is proposed. Currently it is an offence to intentionally or recklessly:

- damage, destroy or obstruct access to any structure or place that water voles use for shelter or protection.
- disturb a water vole while it is using any such place of shelter or protection.

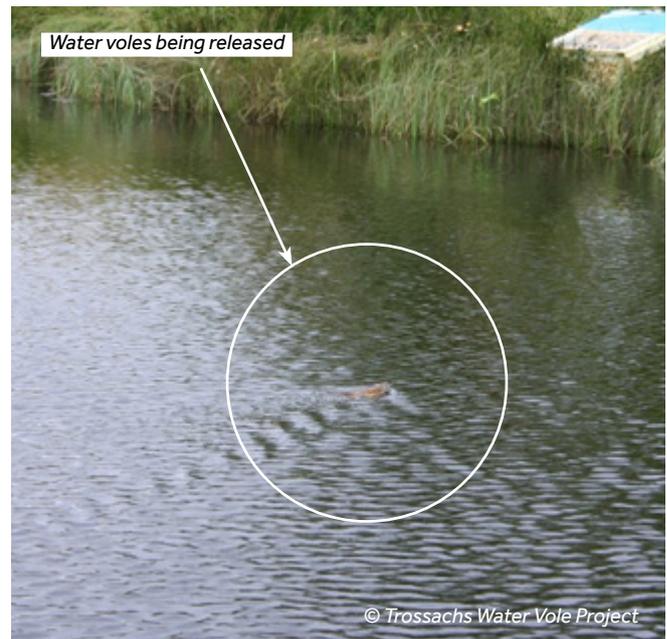
The Trossachs Water Vole Reintroduction Project

The Trossachs Water Vole Reintroduction Project began in 2008 and has been an amazing success story with signs of water voles spreading fast. Surveys across Loch Lomond and The Trossachs National Park prior to this showed that water voles had been lost from most of the National Park. Forest Enterprise Scotland (Now Forestry and Land Scotland) with help from partners had carried out a lot of work to restore wetlands and created habitats which were suitable for water voles in the Trossachs area of the National Park.

This work was part of a project to improve the habitat for wildlife in the Loch Ard Forest. Ponds were dug, tree-free buffer zones were created on river edges and riparian vegetation allowed to grow, and dams were built in ditches, all of which created good habitat for the water voles and other wildlife. Mink control was also undertaken to ensure the areas were as far as possible free from this invasive species.

The nearest known surviving water vole colonies in the National Park were in isolated upland sites too far away to re-colonise this area. Meanwhile a small population of water voles needed to be relocated from a large development site in North Lanarkshire. The displaced voles were bred in captivity to increase their numbers and, between 2008 and 2011 almost a thousand were released into fifteen small areas of good quality habitat in the Loch Ard Forest. Since the releases, mink control has continued and a buffer zone of mink monitoring activity was created, and continually expanded to allow the water vole population to naturally expand.

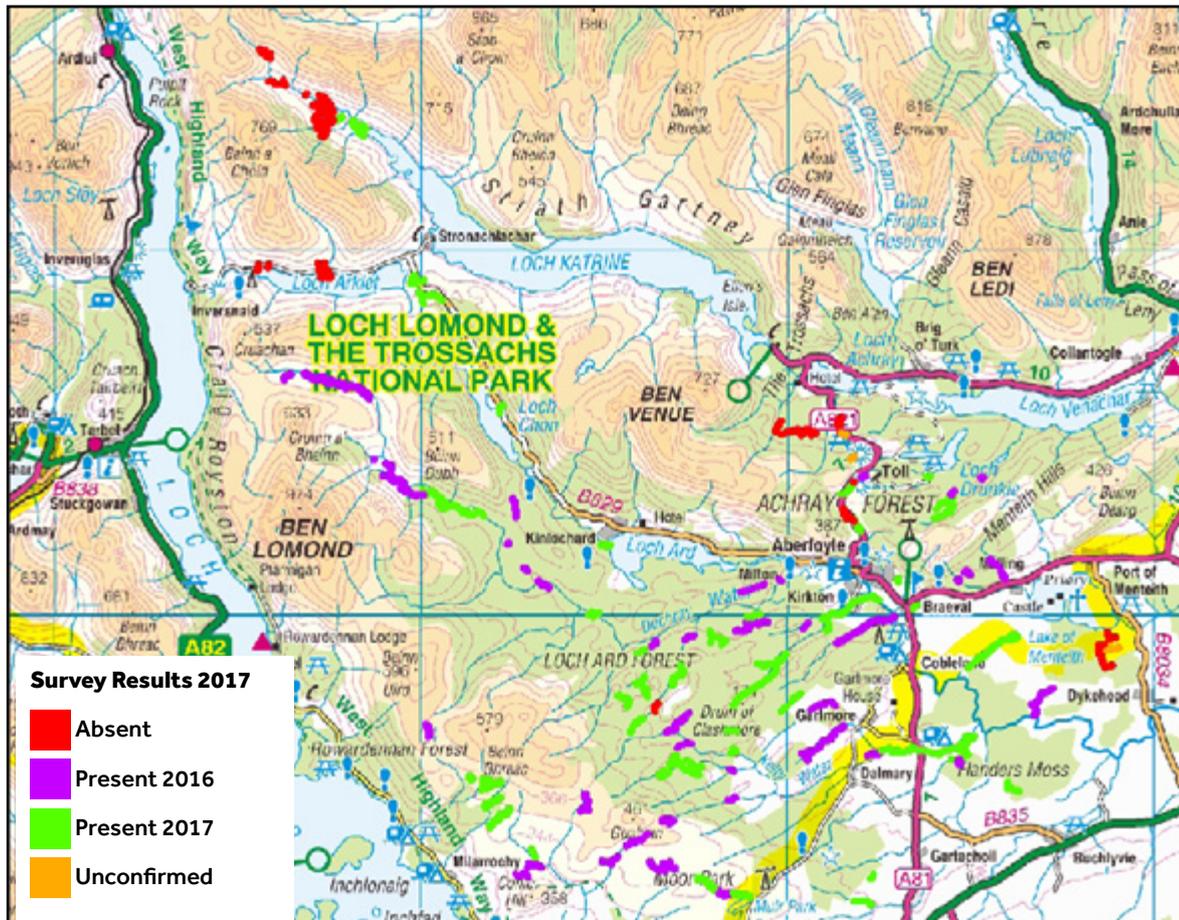
The water vole population has been monitored every year by surveys carried out by a dedicated group of volunteers coordinated and led by a Project Officer and other staff from the project partners including Loch Lomond and The Trossachs National Park Authority.



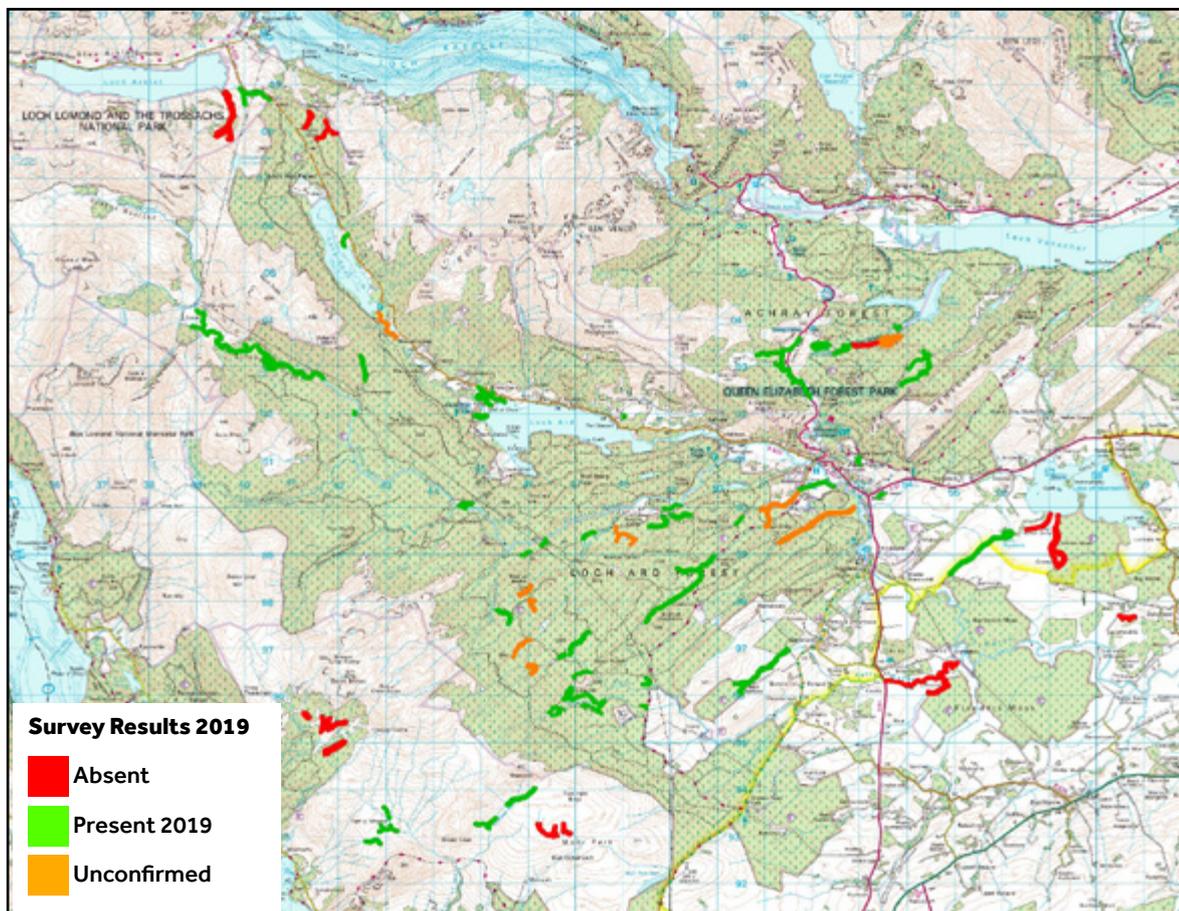
The annual surveys (see maps on next page) have shown that the water vole population now occupies over 100km squares and they have travelled as far as 12 km from the original release sites. Around 120 volunteers have taken part in surveys covering more than 200km of waterway. In 2019, 11 volunteers surveyed for a total of 231 hours. In total, more than 25 land managers are now involved in the project.

This was originally a partnership project led by Forest Enterprise Scotland with the Forth Rivers Trust, Loch Lomond & The Trossachs National Park Authority, the Royal Zoological Society of Scotland, Scottish Natural Heritage and the Derek Gow Consultancy. Since 2019 the steering group has been made up of representatives from Forestry and Land Scotland, The Forth Rivers Trust, Loch Lomond and The Trossachs National Park and Scottish Natural Heritage.

Water Vole survey results



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Reintroduction of the Eurasian Beaver

Introduction



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Beavers in Scotland are protected by law as a European Protected Species. This protection came into force on 1st May 2019 which will allow the current beaver population to spread naturally. This was a huge decision that will change wildlife and habitats in Scotland. The Eurasian beaver (*Castor fiber*) is known as a 'Keystone' species. This means that its presence has a positive effect on the environment around where it lives.

The beaver is a large semi-aquatic rodent, so is related to rats and squirrels! It is the second largest rodent after the South American Capybara. It lives in woodland or scrub on the edges of standing or slow moving freshwater. It is a herbivore and eats the leaves, buds, roots and inner bark of broadleaved trees.

It often fells the trees so it can reach the leaves and bark by gnawing through the tree with its incredibly powerful teeth. Beavers also eat grasses, water plants and other herb species. Beavers live in family groups and will burrow into banks in order to create chambers. Where this is not possible, the beaver will build 'lodges' out of piles of wood.

Beavers are well known for their amazing engineering skills! The beaver will sometimes build dams in streams to keep water levels high. It will also sometimes build canals as a way of making it easier to travel to and from feeding areas. This engineering can have benefits to a large number of species including amphibians, dragonflies and fish and impact in a positive way on the entire freshwater ecosystem. Beavers can also help reduce flooding downstream and attract tourists to areas where they are present which boosts local economies.



Adult Beaver and kit

© Steven Gardner, Scottish Beaver Trial

History of the reintroduction of beavers



Beaver

© Steven Gardner, Scottish Beaver Trial

The Eurasian beaver was present in Scotland and the UK for thousands of years, but died out around the 16th Century. It was hunted to extinction for its meat, scent glands and fur. Its fur was very prized as it is so soft and the scent glands produce a secretion which was used in perfumes and medicines.

In May 2009, the Scottish Wildlife Trust, in partnership with the Royal Zoological Society of Scotland and Forestry and Land Scotland, released the first wild beavers in Scotland in over 400 years. This took place on the west coast of Scotland in Knapdale, Argyll. It was called the Scottish Beaver Trial and the aim was to help the Scottish Government decide on the future of beavers in Scotland.

In November 2016, the Scottish Government ruled that the trial had been a success and that the beavers could stay in Knapdale for good. More beavers were subsequently released, and the population will now be allowed to expand naturally. More information about the Scottish Beaver Trial can be found on the [website](#).

The first confirmed records of beavers in the Tay Catchment in Scotland were in 2006. It is not known how they got there but it is thought that they were either accidentally or deliberately released as no licence was issued for their release in this area. The upper Tay catchment includes the Rivers Dochart and Fillan both within Loch Lomond and The Trossachs National Park. Surveys in the Tay catchment have since confirmed that there has been an increase in the number of family groups and that the beavers have spread in range, with animals now being recorded outside of the catchment. The Tayside Beaver Study Group was involved in monitoring the beavers. Beavers have been seen in the National Park and signs of beavers here are spreading.

The work of the Scottish Beaver Trial, The Tayside Beaver Study Group and a number of other organisations all contributed to the Scottish Government making the decision in 2019 to allow beavers to stay in Scotland and give them the protection they needed.

Potential issues and conflicts

Although beavers provide benefits in terms of wildlife and tourism, conflicts with other interests may arise. In some places beavers may flood farmland, gardens or roads. Although they may have potential benefits for migratory fish, there might also be localised negative effects. Sometimes this can be easily managed to prevent damage such as by fencing vulnerable areas or protecting individual trees, and in others there is the potential for more novel techniques.

Scottish Natural Heritage provide advice to help people experiencing problems and where possible will help through the beaver mitigation scheme. Information can be found on the [NatureScot website](#).



Tree gnawing

© Scottish Beaver Trial

Wild Park and key threats

Wild Park

Wild Park is the Biodiversity Action Plan for Loch Lomond and The Trossachs National Park. It details what projects and actions we would like to deliver to benefit nature in the National Park and where we would like to deliver them.

As well as highlighting objectives between 2018-23 the programme also details threats to the environment of the National Park.



Wild Park is concentrating on the following four environmental threats:



POOR CONDITION OF LOCHS & RIVERS

Negative impacts on freshwater and marine water bodies from problems such as pollution from surrounding land uses.



UNSUSTAINABLE LEVELS OF GRAZING

Unsustainable levels of wild and domesticated grazing and browsing animals in some upland and woodland areas, leading to reduced tree cover and the erosion of soils, which are important carbon stores.



INVASIVE, NON-NATIVE SPECIES

The spread of invasive non-native species, which displace our rich native wildlife.



CLIMATE CHANGE PRESSURES

The impacts of climate change leading to warmer, wetter weather patterns and a subsequent increase in flood events, major landslides and rapid shifts in natural ecosystems.

Water voles are a vital part of our freshwater ecosystem, providing a prey source for many animals and birds and creating conditions in our waterways which benefit a wide range of species.

As beavers spread in range and increase in numbers across Scotland and through the National Park, they will also become very important in the freshwater ecosystems of the National Park.

All four of these threats will impact the success of the continued spread of both the water vole and beaver populations. Conversely, the spread of beavers may have a positive impact on these threats as they are thought to be 'keystone' species.



© Scottish Beaver Trial

Poor quality of lochs and rivers

Pollution from land uses including agriculture and forestry operations will affect the water habitat which will in turn impact on the plant species which can grow in areas of wetland. The condition of the water voles' and beavers' habitat including trees, plants, and banks of burns or ditches will also have an impact on numbers. Beavers can also have a positive effect on water quality and improve entire ecosystems. Many actions in Wild Park to increase water quality by 2023 will benefit water voles and beavers.



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Unsustainable grazing impacts

Water voles eat a very wide variety of plant species and also require plants to hide in. Too much or too little grazing around sites occupied by water voles will have an impact on the quality of vegetation available to eat and the height of vegetation in which to take cover. Broadleaved trees and other herbaceous plants are important food sources for beavers and also for their engineering works to improve freshwater habitats. Sustainable grazing will improve habitats for both these species.

Invasive non-native species

American mink which is a non-native species continues to be controlled across the Trossachs Water Vole Project area and areas in which it has spread. It is important this continues and more land owners, managers and volunteers become involved in monitoring mink populations to protect the water voles. Non-native invasive plants such as Himalayan balsam and Japanese knotweed will out-compete native plants which the water voles and beavers feed on. Projects in Wild Park which prevent the spread of these plants will be important in sustaining the water vole populations and allowing beaver populations to grow. (See Case study 3 – Invasive non-native species).



Mink raft

© Linda Winskill, LLTNPA

Climate change pressures

Climate change will have an impact on the wildlife and ecosystems in the National Park including water voles and beavers. It is the single greatest threat to Scotland's habitats, some habitats will be directly affected but more often, climate change will alter the ecological balances that let plants and animals grow and thrive such as the wetland habitats where our water voles and beavers live. Beavers may help to mitigate some of the effects of climate change by reducing downstream flooding.

Objectives for mammalian INNS by 2023 are:

- Reduce the population and re-colonisation of grey squirrel in the National Park through a network of community-led groups and land managers continuing responsible trapping efforts in vulnerable areas.
- Retain effective grey squirrel control in areas where populations have declined to ensure densities do not regain.
- Involve land managers and local communities in the reporting of INNS species.
- Continue to promote recording of squirrel sightings through SWT
- Improve habitats from native species, such as better connected native woodlands and more naturalised water courses.
- Increase volunteer involvement in surveys.
- Provide information on responsible land management to encourage land managers to have good forest and riparian management that benefits native species, such as creating water bodies, reducing bank side poaching, planting the correct tree species etc.
- Collaborate with partners to deliver native mammal conservation education throughout the National Park through public events, interpretation, social media etc.
- Continue and increase collaboration with land managers to reduce the presence of mammalian INNS but also to improve habitats to favour native species.
- Increase numbers of active volunteers (monitoring and control).

For more information on freshwater ecosystems and objectives by 2023 to increase water quality of lochs and rivers see: Case study 5 - Waterbodies in the National Park.

Mitigating against climate change

It is predicted that in the future typically the summers will be hotter and drier and the winters and autumns will be milder and wetter. The hotter weather in the summer will mean water levels may fall, banks may dry out affecting burrows and vegetation growth will also be affected. In the autumn and winter, water levels may rise with flooding occurring more frequently. All these changes in the climate will affect the habitat and the ecosystem where water voles, beavers and other species have adapted to survive.

We need to ensure that ecosystems in the National Park can withstand the effects that climate change is bringing to our native biodiversity and wider environment. These ecosystems can also help mitigate climate change by maintaining carbon stores, storing carbon and surface water. The National Park's peatlands hold an estimated 20 million tonnes of carbon and our forests hold another 2.5 million tonnes.

Restoring peatlands by blocking drainage ditches and covering bare peat will not only store carbon, but will also hold onto water for longer, preventing flooding downstream in areas where there may be water voles. Planting trees upstream in our upland areas can also help reduce flooding, although we need to make sure woodlands are designed not to have a negative effect on water vole habitats. Many of the actions in Wild Park will help reduce climate change which will in turn help water voles and beavers.

Future projects

- The Trossachs Water Vole Project turns 12 in 2020 and we are as committed as ever to the protection of our water vole population and their habitats. However, in the coming years the project also hopes to build on our successes and expand the breadth of our work, helping to bring about positive changes to the health of wetland and riparian habitats throughout the wider Forth catchment.



Questions and pupil enquiry

- What may cause species to become locally and nationally extinct?
- What is a keystone species?
- List two reasons for the decline of water voles across the UK
- Where did the captive water vole population come from which were reintroduced into the Trossachs?
- When did beavers in the UK become protected by law and under what law are they protected?
- How may climate change affect water voles and beavers in Loch Lomond & The Trossachs National Park?



FURTHER READING

Online

- [Read more about Wild Park and the 4 key threats to wildlife.](#)
- [NatureScot information about beavers and their protected status](#)
- [NatureScot information about a shared approach to wildlife management](#)
- [Read more about the Scottish Beaver Trial and Scottish Beaver Reinforcement Project](#)
- [Read about species management in Scotland in the Species Action Framework Handbook](#)
- [Read more about the Reintroduction of water voles in the Trossachs](#)
- [Read more about the protected status of water voles and beavers](#)

Video clips

- [Video clip of water voles on mink raft](#)
- [Video clip of beavers](#)

Site visits

- Water voles are very difficult to see. Loch Ard Forest in Aberfoyle has populations of water voles. For more information contact the Trossachs Water Vole Project Project Officer Emily Marshall emily.marshall@forestryandland.gov.scot
- Beavers are nocturnal, so you very unlikely to see them. They are beginning to move into Loch Lomond & The Trossachs National Park so keep your eyes open for signs that beavers are present such as gnawed wood and felled trees.