

# Using CCTV cameras for Mammal Monitoring

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Camera 01

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**Ecology and the natural sciences have not tended to be technology-oriented subjects, as many monitoring techniques depend on human skills. Bat detector development and radio transmitter-tracking have been the exceptions, with the former no doubt being developed as a result of the increase in bat surveying as required by planning applications.**

However, technology not only follows from a need, as with bat detection, it can also suggest applications, as the increasing use of camera traps has shown, with more and more researchers realising their value. CCTV, I believe, is the next logical step.

At present CCTV, or webcams as they are generally known, are mainly used by large organisations – wildlife trusts, wildlife parks and gardens, for example, and are generally installed by CCTV 'experts'. However, much of the technology and many of the applications do not require as much technical knowledge as it might at first appear.

This depends, however, on the necessary details being readily available. This is not the case at present, something I hope to rectify, as usage will only develop if it can be implemented by CCTV 'non-experts'. Coming from a physics and engineering background I am more familiar with the use of technology and have, for example, used camera traps for many years. Personally I feel that technology can open doors previously closed or, perhaps, never even seen before. For this reason, I have been developing the use of CCTV techniques for wildlife monitoring and am also working with Natural England on Dartmoor on various topics related to CCTV.

Below I describe the various types of CCTV,

together with suggestions for its use. CCTV in its various forms can enrich the experience of the amateur enthusiast and can also increase the repertoire of the ecological consultant and the researcher.

I am happy to give the necessary practical details of the techniques in the form of notes to download from The Mammal Society website and plan to run courses, should you be interested in adding them to your training programme. I will also be happy to report on the monitoring work I carry out.

We are all familiar with the use of CCTV in security monitoring, but fewer are aware of its applications in wildlife monitoring, although CCTV cameras are often used in television wildlife programmes (e.g. *Springwatch*). The

most common use is in bird boxes, where one can watch the nesting process as it unfolds.

**The applications depend to some extent on the facilities available:**

**Mains power and internet connectivity available**

These facilities can be used by IP (Internet Protocol) cameras – cameras which produce digital signals and which use internet technology. They are basically high class webcams which can give broadcast quality images, provided that an internet router/hub is available.



IP cameras give high quality images.



## What are the differences between trail cameras and CCTV? A question often asked.

This lists a few differences:

Trail cameras	CCTV
Film and record videos for short periods	Film continuously, record independently
Inbuilt recorder	Separate recorder (DVR) or PC plus software
Heat changes trigger recording (usually from a moving animal)	Recorder can be scheduled to record at certain times or can record when triggered by motion (not heat)
Require batteries	Can use mains or batteries
Limited camera choice	A wide range of cameras, many with broadcast quality video
Cannot view in real time	Can view in real time
Cannot view videos remotely	Can view remotely as it happens if internet available
Cannot use underwater without special housings	Submersible cameras readily available
Can be triggered by moving foliage	Can mask unwanted areas (e.g. moving foliage)
Limited flexibility in lenses	Can get cameras with variable focal length
Cannot use in small spaces	Can use in small places
Cannot use close to subjects	Can film subjects a few inches away
Plus many more	

A still taken from a standard analogue CCTV camera.



Software for management and motion detection recording is available, often bundled with the camera, which greatly enhances the flexibility of recording. (This is different from trail camera motion detection, which is based on heat changes.) Remote access to the videos can be set up, which means one can monitor wildlife without being present and watch it live on a smartphone, tablet, etc.

**Uses:** Bird boxes, small mammal monitoring at feeding stations, monitoring of any wildlife within cable range (100 m and much more with boosters).

### Mains power only available

This area encompasses the commonest camera type used for CCTV. These are analogue cameras – digital signals are converted to analogue signals by the camera then transmitted along wires. (Also possible in wireless mode for line of sight, but not recommended as subject to interference.)

HD cameras are also available in this range and can give broadcast quality images, although they cannot be monitored remotely without an internet connection being available.

**Uses:** All of the uses above but with

lower quality images with the common analogue camera.

### Mobile CCTV – no mains power or internet connectivity available (competes with trail cameras)

This is an area that is probably the most useful for the researcher, as many wildlife areas are remote from power and internet. It is also more technology-heavy and competes with trail cameras. However, there are many situations where CCTV may be an advantage.

### Situations where mobile CCTV may have advantages over trail cameras

(There will be many more as yet unresearched.)

- To monitor constant activity of any kind – trail cameras generally do not do this.
- Fitting into small spaces – trail cameras are large and cannot focus on objects that are very close:
  - o nesting in bird boxes
  - o bat boxes
  - o mammal feeding stations, etc.
- Observing ground-nesting birds – a small

CCTV camera is much less obtrusive than a trail camera, provided the cable is hidden. They can also get much closer. Batteries and recorders can be kept some distance away.

- Can be pushed into holes to monitor if wildlife present (e.g. to monitor animals in burrows), although licences may be required in some cases.
- Observation of bats in roosts and possibly hibernacula, provided that infrared lighting is unobtrusive and any necessary licences have been obtained.
- Fast-moving subjects. With constant monitoring or using a DVR with pre-record, all fast-moving subjects will be captured (e.g. bats flying, running mammals).
- 'Cold' subjects (e.g. wet otters). These may not trigger a trail camera if passing by, or may trigger it too slowly, especially in summer. CCTV detects actual motion whereas trail cameras detect motion by way of changes in heat.
- When time schedules are required (e.g. between certain hours). For example, when monitoring birds, recording can be switched off at night or when little action is expected.
- Underwater cameras – this is one area where trail cameras cannot operate easily.

**Relative costs** – this depends on the quality of equipment required. I have only considered low-cost equipment generally available. If funds are available, very high quality equipment can be used which will remove most disadvantages.

**Trail cameras:** £100–£600 (camera and batteries)

**Analogue CCTV:** £100–£400 (camera, cables, recorder and monitor)

**IP CCTV:** £250–£500 (camera, POE switch, cables and PC software)

**Mobile CCTV:** £300–£1,000 (camera,



recorder, short cables, monitor, battery and waterproof box)

## Some possible applications for CCTV monitoring of mammals

### Badgers

Badgers are good subjects for CCTV. If given peanuts regularly they are very predictable on timing. CCTV set to record continually over a given time period (decided by previous monitoring by trail camera) will give long unbroken sequences. The ability of the (correct) CCTV camera to adapt focal length and field of view, will allow long range shots (with appropriate illumination either on the camera or at the site) or closer views.

Artificial setts could be designed to allow camera access for research (and 'natural' setts, assuming correctly licensed).

If within cable reach, they can be watched live on a monitor, or if within reach of the internet (or in a few cases a mobile signal area) images can be seen over the internet on smartphones, etc.

### Foxes

Foxes are another good subject, with their predatory nature being displayed. Cameras could be placed near dens, provided this can be achieved without causing disturbance.

### Otters

Due to the fact that they move quickly and/or are often wet and hence cold as far as the trail camera is concerned, otters can be elusive on the trail camera in warmer weather. CCTV removes this disadvantage.

### Bats

As bats come under the heading of fast-moving mammals and movements are unpredictable in their foraging flights, trail cameras can have little success in capturing bat movements. A mobile CCTV setup with



a hand-held camera attached to the monitor and/or recorder could be used to assist with bat detection while surveying. As they are not dependent on heat changes from nearby subjects, fixed CCTV cameras can monitor a greater range, limited only by the power of the inbuilt or external illumination.

### Small mammals

Voles, mice, shrews, stoats and weasels are under-recorded and under-studied according to The Mammal Society. Small mammals can be studied with the use of feeding stations with a camera hidden inside. If power and the internet are within reach, high quality videos can be obtained and can be used to study behaviour.

For example, this shrew (above) demonstrated a great passion for peanuts and rushed in and out at intervals throughout the day collecting peanuts and running off with them, presumably to store them. Once the peanuts had finished it

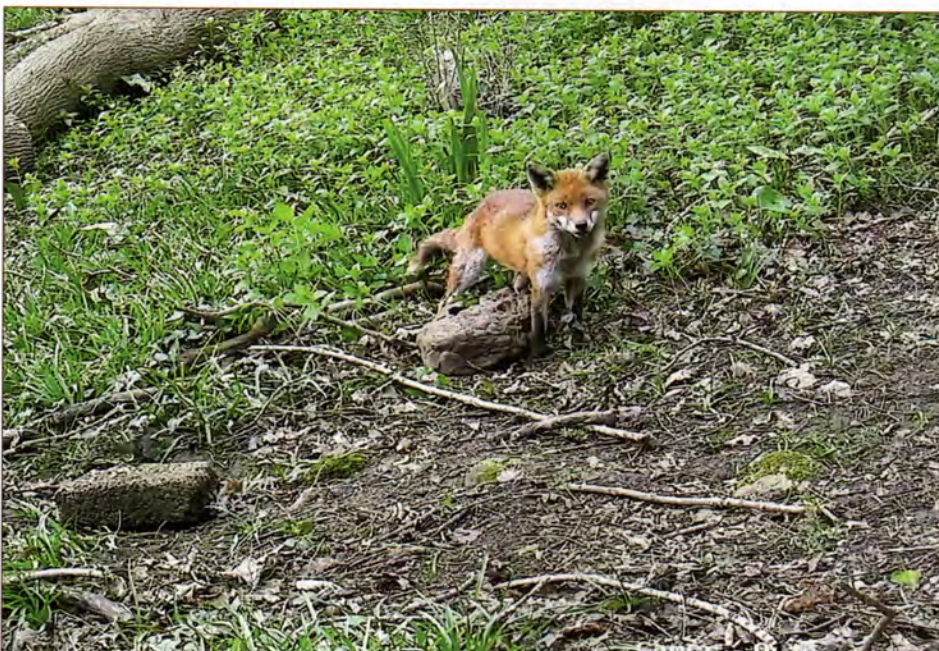
spent a much more leisurely few minutes examining every inch of the mammal 'house', apparently looking for insects.

Voles have shown a similar passion for peanuts and in each case rushed off with them to storage, yet sat for long periods eating seeds. They have been seen standing at the entrance to the box, literally boxing the competition to keep it out of the box.

With meat as a bait and with the hole small enough to keep rats out, it should be possible to attract weasels.

## Underwater cameras

Underwater CCTV has the potential to open up new areas for research by filming otters, beavers, water voles, etc. The main problem is water clarity. If the water is cloudy, vision is impaired. Clear water can be found in rock pools and in rivers in rural areas.



### About Susan Young

Susan has a background in physics and engineering, and is now a professional wildlife photographer, a writer and a naturalist. She is the author of *Wildlife Photography Fieldcraft*. At present she is researching the use of CCTV cameras for monitoring wildlife, including some projects with Natural England on Dartmoor.

