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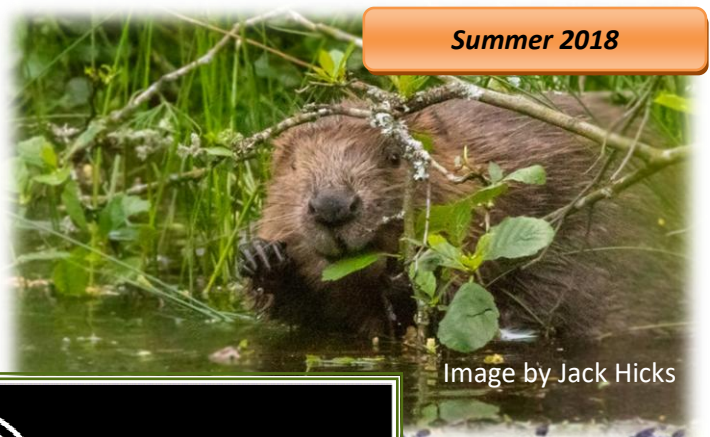

Image by Jack Hicks

Cornwall Mammal Group

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Have you seen pine marten in Cornwall?

A silly question if you believe all the distribution maps, which shows them firmly wedged in the Scottish hills and the central mountains of Wales.

However, we have received several credible records over the last couple of years including photographic evidence from North Cornwall and more recently from the Camel Valley. I have also been told of two separate sightings in the Camel Valley area on the opposite side of the river to the photographic record.

Pine marten. Image: JB&S Bottomley

Keep your eyes peeled for this elusive and charismatic mustelid – they are cat-size, with chestnut brown fur, a creamy yellow or orange throat patch and with a long bushy tail. The large ears and the long muzzle are also distinctive. The legs are relatively long for a mustelid and they are mostly active in the evening or night time. Possible confusion species are the recently arrived polecat which is smaller and lower to the ground and which has a darker coat, Mink are smaller again with small heads. Don't overlook the possibility that a cat-sized animal may also be – a cat!

- Dave Groves

Events for Autumn/Winter 2018:

- **September**

Wildlife Photography Workshop with Jack Hicks.
Tehidy Woods

- **October 17th**

CMG **AGM** with guest speaker Dr Johnny Birks talking about pine martens. Also a great opportunity for you to have your say on CMG events.
Lanhydrock Memorial Centre

- **November**

Talk by Professor Naomi Sykes (TBC), about Archeological aspects of Conservation.
Falmouth

- **December 6th**

CMG **Christmas Quiz**. Always a fun night out and great to bring your friends along to.
Hawkins Arms, Zelah.

Keep a look out on our website, Facebook page and for any emails for further details of these and other CMG events.

Notes from the chair: Dave Groves

It's been a long hot summer as the Style Council would have said – and its only July (just). I hope it means that everyone has been able to get out into the countryside or the garden and enjoy the weather and the wildlife. Although there are obviously some issues with our mammals when there is such a long dry spell, I think in Cornwall we are relatively fortunate in that ground water levels seem to have remained fairly high – the up-side to all that rain over the winter and spring! After a slow start many animals seem to be taking advantage of the warm weather and there seem to be more records of hedgehogs, dormice and possibly mustelids than last year. There is some indication that the hot weather may have led some bats to abandon their roosts so it will be interesting to hear how the roost counts go later in the season. There have also been some concerns over moles in the dry weather but they tend to burrow deeper during dry periods and therefore are less likely to leave evidence on the surface and I don't believe there is any reason to worry yet.

A couple of exciting pieces of news for Cornish mammalogists – firstly the birth of Cornwall's first beaver kits for 400 years at the Woodland Valley site – excellent work by Chris and all of the team (with a little contribution by the beaver parents….). Secondly, we have had a couple more possible sightings of pine marten in mid-Cornwall so do bear the possibility in mind if you see a large mustelid scampering through the woods.

I hope that by the end of the year we will have made some progress on the organisation of the Coastal Otter Project – we have identified target sites and are trying to get the logistics in place to collect spraint. Our other ambitions – to run hedgehog and dormouse events are somewhat dependent on the committee finding enough time. The AGM is a great opportunity if you feel you can help out or push forward your particular favourite mammal. It will also be another chance to hear one of our favourite speakers – Dr Johnny Birks – talk about pine martens.

I'd like to say thanks to everyone who helped with the CMG stall at the Penrhyn Bioblitz in May and also at the Seal Sanctuary. We have managed several survey events so far this year, publicising some of them on the social media as they have been organised at short notice. Turn out for these short-notice events has been a bit disappointing (although plenty of mammals turned up!), so we may have to re-think the idea of pop-up surveys or how we get the information to you. Let me know how you think we can improve collaboration in the Group for surveys as I am keen that this is something worth pursuing.

- Dave Groves

Historic Cornish 'Vermin' Records

We, at CMG, are always interested in hearing news or articles from members of the CMG and the following is a really interesting and thought provoking piece of research sent to us by Alan Rowland. Incidentally, if any of our readers/ members can confirm the Cornish term of Myrtle Cat is synonymous with Pine Marten then please let us know.

My interest in history encompasses both Natural History and Local History. A few years ago when I was transcribing 17th Century Morwenstow Parish Records, serendipitously both interests coincided.

These records comprised income from local taxes levied on landowners and expenditure on all sorts of parochial disbursements ranging from church repairs and refurbishment to relief of the poor. I began to read of the occasional expenditure for killing a fox and other birds and animals.

Figure 1 shows an example, transcribed below:-

	£	s	d
To William Cottle for killing hoopes	0	00	08
To William Lendon for killing hoopes	0	00	08
To John Hill for killing 5 ffichoe	0	00	10
To John Chawner for one ffitchoe	0	00	02

When I read further entries I just had to find out what these things were. My research identified that Hoopes is a dialect word for Bullfinches and ffitchoe (spelled variously) is an archaic term for Polecat. This led me to research further and I found the book "Silent Fields" which explained it all in much detail. (Lovegrove 2007)

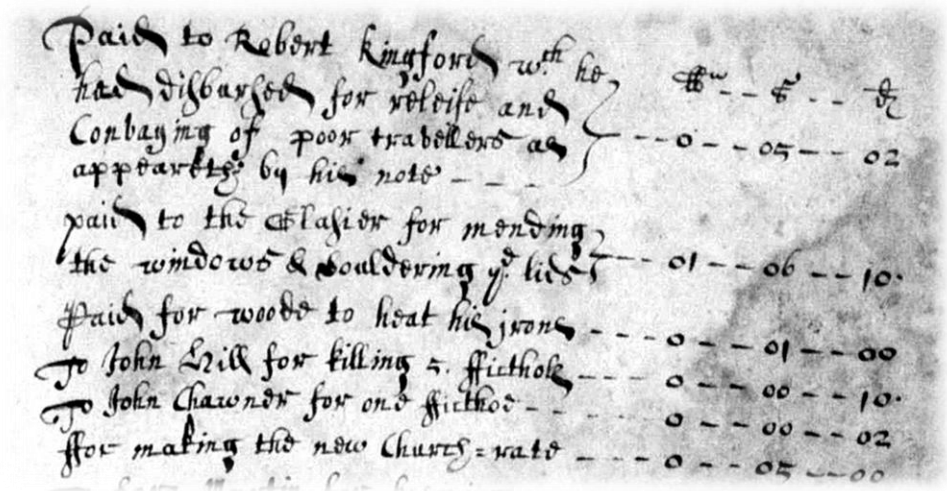


Figure 1 –Morwenstow Church Rates 1666. Reproduced by kind permission of Cornwall Record Office Ref P 158/5/1

Tudor Vermin Acts

In 1532, as a consequence of failing harvest, famine, epidemics and a rising population, Henry VIII enacted "*an Act made and ordeyned to dystroye Choughes, Crows and Rooks*". This was to be administered through the Courts Leet and each parish had to equip itself with nets to comply.

Chough was a generic name for Jackdaws as well as, in Cornwall, Choughs. Despite this act it did not rectify matters and, in the second half of the 16th Century, there was the Little Ice Age which had yet more impact on supplies of basic foods. Consequently, in 1566, Henry's daughter Queen Elizabeth I further developed the legislation and increased the number of vermin in "*An Acte for the Preservation of Grayne*". Despite the name of the Act, a wide range of birds and animals that did not subsist on grain were targeted each with a price on its head. Responsibility for administration was moved from the Courts Leet to the Parish Officers and from the mid 17th Century payments were recorded in the Parish Churchwardens' Accounts.

The Act details the following species and payments shown in table 1

Crowes	Crows	3 heads = 1d 6 juveniles or unbroken eggs = 1d
Choughs	Jackdaws	
Pyes	Magpies	
Rooks		
Stares	Starling	12 = 1d
Martyn Hawkes		1 head = 2d 2 eggs = 1d
Furskytte	Stoat	
Moldeytte	Weasel	
Busarde	Buzzard	
Shagge	Shag	
Cormorante	Cormorant	
Ryngtale	Harrier	
Iron	Sea Eagle	1 head = 4d
Ospreye	Osprey	
Woodwall	Woodpecker	1 head = 1d
Pye	Magpie	
Jaye	Jay	
Raven		
Kyte	Kite	
King Fyssher	Kingfisher	1 head = 1d
Bullfynche/Hoop	Bullfinche	
Fox		1 head = 12d
Graye	Badger	
Fitchou or Polecatte	Polecat	1 head = 1d
Wessel	Weasel	
Stott, Statt, Stote	Stoat	
Fayrebade or Wild Catte	Wild Cat	
Otter		1 head = 2d
Hedgehog		
Rattes	Black Rats before 1720 and Water Vole	3 rats or 12 mice = 1d
Myse	Mice	
Moldewarpe or Wante	Mole	1 head ½d

Table 1

In Cornwall there are 225 parishes of which 45 were researched by Lovegrove and 40 contained Vermin accounts.

Morwenstow has a remarkably complete series of Parish Registers and Parish Chest documents dating in some cases from 1558. Vermin records are recorded in detail from 1666 to 1688 and again from 1833 to 1849.

These records throw a light on what species inhabited Cornwall 350 years ago, many of which were hunted to extinction or displaced by changing agricultural practices. It is interesting to note not only those species that occurred in the parish but also those that although on the list do not feature in the accounts. There were no Weasels. It is difficult to believe that these country people could not tell the difference between Stoats and Weasels so as to lump them together. Similarly no Rats, Mice or Moles. I suspect that there was a Rat and/or Mole catcher who would have been paid to exterminate them so separate payments would not be made.

The list of species recorded in Morwenstow comprises eight mammals and nine birds some of which have names which are no longer in common use. The prices paid had, in some cases, risen a hundred years on.

The mammals recorded in Morwenstow were :-

Fox , Gray or Badger, Fichoe or Polecat, Stot/Statt or Stoat, Outer or Otter, Hedgehog , Myrtle Cat – (Pine Martin?), Wille Cat or Wild Cat

The category of Myrtle Cat was introduced in the 1830s when five were paid for at 1s per head. Considering the difference between the bounty placed on Wild Cats as opposed to Myrtle Cats they cannot be the same species, perhaps it was a synonym for Pine Martin.

Whether the prices represented the size of the threat or the relative ease with which they were caught is unclear. The price on the head of a fox was increased from 1s in 1666 to 2/6 in 1674 and 5/s in 1833. Had they become more wily or were there fewer of them? Badgers, Polecat remained at 1/s and 2d respectively throughout 1666 to 1849 although the price on the head of a stoat doubled from 1d to 2d.

Considering the number of animals killed it is surprising that any survived. However, what were caught and killed can only have been a small proportion of what existed. In the 22 years between 1666 and 1687 for example, 1600 hedgehogs were killed. We know they survived. What is really interesting is the number of animals that declined - Polecat 721 killed and Wild Cat 49 killed during the same period both of which did have not yet recovered.

That the slaughter continued is not in doubt, but the complete records did not survive and in later years more emphasis was placed on killing birds which were extended from Rooks, Bullfinch and Kites to include Sparrows, Tits, Magpies, Hawks, Ravens and Crows. It is known that Sparrow clubs continue into the early 20th Century. Foxes, Badgers and Stoats still being killed in the 1830s and 40s is not surprising, but that payments were still being made for Fitchys (Polecats) and, from 1833 on Myrtle Cat perhaps is.

Table 2 details the types and number of mammals killed in Morwenstow.

Modern	Fox	Badger	Polecat	Stoat	Otter	Hedgehog	Wild Cat
Original	*Fox*	*Gray Badger*	*Fitchoe Ffitcholl*	*Stot Statt*	*Outer (Otter)*	*Hedgehog*	*Catt Wille Catt*
1666	2		6				
1667	7		12			6	1
1668	1	1	2			2	
1669	5	4	9			16	1
1670	3	5	11			7	5
1671	3	5	33			18	1
1672	1		3			36	
1673		6	22			65	7
1674	4		16	6		62	1
1675	6	5	43	3	1	73	
1676	6	1	79	29		69	1
1677	1	6	39	7		40	
1678	1	2	32	16		80	2
1679	2		32	6		128	1
1680	4	7	41	7		138	3
1681	17	2	81	17		179	4
1682	21	2	102	13		247	4
1683	4		31	15		131	
1684	4	1	49	18		118	3
1685	No vermin recorded						
1686	10	2	41	25		141	6
1687	7	3	37	21		47	9
totals	109	52	721	183	1	1603	49

1833	Fox	Badger	Fitchys	Statts			Myrtle Cat
	5s	1s	2d	2d			1s
1831	7	3	4	8			5
1849	6		6	18			

Table 2

The variety of species and numbers are a valuable record of our early mammal, and bird population that cannot be found elsewhere. Perhaps these records should be entered as early records in ORKS. Some of these species remained with us through this period of persecution, others are slowly recovering but, with the possible exception of Fox and Badger, none of them are any longer regarded as vermin.

References

Lovegrove, R., *Silent Fields*, Oxford University Press, 2007

Morwenstow Parish Registers, Cornwall Record Office, P 158/5/1, 1666-1695.

Owl Pellet Analysis to determine small mammal populations.

Barn owl.

Many birds regurgitate indigestible material in the form of pellets. Analysis of these pellets can indicate the dietary preferences of the birds. From a mammologist's point of view there is a more interesting aspect – predators, especially owls and raptors are often specialist small mammal hunters and are a lot more effective than an ecologist with a bag full of Longworth traps. Owls are especially useful in this respect as they have relatively gentle digestive systems and also tend to swallow their prey whole – when they regurgitate the pellets they contain many complete bones amongst the fur a debris. All British owls produce pellets and accumulations of pellets may be found near roosts and nest sites. Barn owls are particularly co-operative as they tend to use regular roosting/breeding sites within old buildings and provide a reliable source of pellets. Local knowledge or contacts may be aware of suitable sites for collection. Barn owls are legally protected from disturbance during the breeding/nesting season, generally regarded as between the 1st March and 31st August and pellets should ideally only be collected outside this time. Only collect with the full permission of the property owner and bear in mind that owls often use old or potentially hazardous buildings – do not take any chances with your own safety. There is a huge amount of information on barn owls on the Barn Owl Trust website https://www.barnowltrust.org.uk

Barn owls typically consume 3 or 4 prey items in a night's hunting and 6 or so hours later they produce one or two thumb-sized black pellets. Since barn owls can be hunting up to 4 km from the roost (less so in the summer when prey is abundant) this has to be taken into account when considering the information gathered by analysis. However, this is still an excellent method of collecting small mammal records.

Barn owl pellets.

Ideally pellets less than 3 months old should be used, older pellets break down and are tricky to discriminate. Pellets should be kept dry after collection, or they can be bagged up and frozen to kill the inevitable resident grubs and bugs.

Materials required

Storage and soaking pots – yoghurt containers or similar are ideal, a dissection tray – this can be a plain white plate or ecological sampling trays (see materials suppliers), fine forceps and dissection needles – a couple of darning needles in cork handles will work fine, some petri dishes to collect and study the bones (the lids from the aforementioned yoghurt pots will also suffice) and a good hand lens. Getting hold of a simple dissecting microscope will make the analysis easier – especially for identifying the shrew species.

Method

Pellets can be dissected dry but it is easier to soak them overnight in water (I add a few drops of domestic bleach to stop them festering too much). Our primary objective is to determine the small mammal prey species so we will be looking for skulls and lower jaws. Each pellet is treated separately so that the number of prey items can be determined.

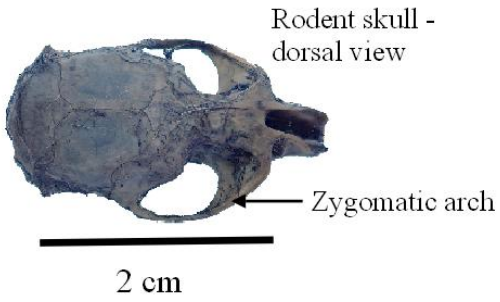
Each pellet is teased apart with dissection needles – the pellet is mainly fur and small bones – rodent skulls are fairly large and easy to see, with both rodent and especially shrew skulls the rear part of the skull may be missing. Generally the pellet will contain complete heads so try and find both lower jaws for each skull. The lower jaws of shrews are tiny – 10-12 mm long - and may be hidden in the matrix so it is worth spending 5 – 10 minutes working through each pellet. Collect all the fragments together and carefully remove the majority of the fur and debris but being careful not to damage the skulls further – shrew teeth in particular are easily dislodged. Typically each pellet will contain the remains of 3-5 small mammals. Bear in mind that owls will also eat small birds (particularly starlings and house sparrows), amphibians and insects so keep an eye out for these.

Identification

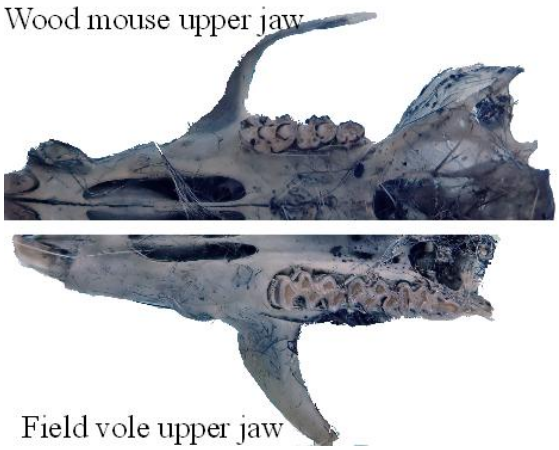
Barn owls feed mainly in open country so field vole (*Microtus agrestis*) and common shrew (*Sorex araneus*) will make up the majority of the prey. Bank vole (*Myodes glareolus*), wood mouse(*Apodemus sylvaticus*), pygmy shrew (*Sorex minutus*) and water shrew (*Neomys fodiens*) are also commonly found. Other species such as house mouse (*Mus domesticus*), harvest mouse (*Micromys minutus*), hazel dormouse (*Muscardinus avellanarius*), brown rat (*Rattus norvegicus*) and even water vole (*Arvicola amphibius*) should be considered in Cornwall. In the Scilly Isles any shrew remains will almost certainly be those of the lesser white-toothed shrew (*Crocidura suaveolens*). Yellow-necked mouse (*Apodemus flavicollis*) cannot easily be discriminated from wood mouse but it is not known to occur in Cornwall. Bats and moles may also be taken and, very rarely, rabbits and weasels.

Separate the skulls and lower jaws into *small rodents*, *shrews* and '*others*'. Small rodent skulls are less than 2cm long with prominent front teeth and zygomatic arches (cheek bones) the lower jaws often remain with the skull in the pellet. Shrew skulls have usually lost the delicate cranium and consist of 1cm or so of

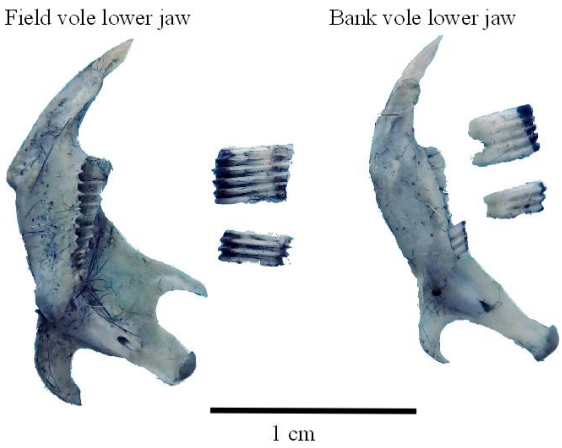
pointed upper jaw. The lower jaws are long and thin and the teeth have marked red/brown tips (unless the pellets originate on the Scillies – see above).



Take the skull and examine the teeth of the upper jaw. Vole teeth are zig-zagged whereas those of mice are nobbly.



The easiest way to discriminate between bank and field vole is by the effort required to extract the upper molars. Field vole teeth have open roots – they are similar in cross-section above and below the gum – and can be easily removed from the jaw. Bank vole teeth have a closed root – the tooth is smoother and tapers below the jaw. In adult bank voles this is clearly seen by extended roots, younger animals have flatter tooth bases, in both considerable effort is required to extract the tooth.



Water vole skulls will tend to be much larger (4cm+) and the upper incisors are dark straw in colour, otherwise teeth and sockets are similar to the field vole.

The teeth of the wood and house mouse have rounded cusps whilst those of the hazel dormouse (an unlikely find) are ridged. The upper incisors of the house mouse have a notch at the rear when viewed in profile. Extracting the first upper molar (towards the front of the skull) the roots and their sockets can be seen. The wood mouse has 4 roots, the house mouse has 3 larger roots and the harvest mouse has 5. The brown rat also has 5 roots although this is clearly a much larger skull than the harvest mouse. If a hazel dormouse is suspected then try to identify the relevant lower jaws and extract the teeth – a double row of root sockets will be seen whereas other mouse species have a row of single larger sockets.

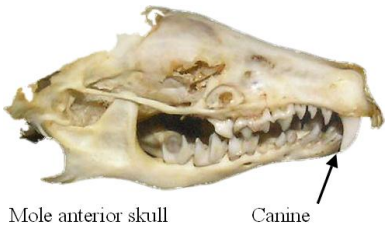
Water shrews are readily identified by their teeth. The long front incisor of the lower jaw is flat on the top whereas those of common and pygmy shrews have a series of cusps or peaks. On the upper jaw

the top incisor is clearly hooked. Between the front incisor on the upper jaw and the first large molar are a series of small triangular unicuspid teeth. These are seriously tiny, occupying only a few millimetres of the jaw and they are also quite vulnerable to being displaced. Careful inspection with a powerful hand lens or a dissection microscope will reveal 4 unicuspid teeth in the water shrew's upper jaw (the rear-most one being very small).

An adult common shrew skull is approximately twice the size of a pygmy shrew skull, however to confirm the difference it is necessary to inspect the unicuspid teeth in the upper jaw. Both common and pygmy shrews have 5 unicuspids – again the rearmost is very small and almost hidden on the inner side of the jaw – if the third of these little teeth (counting from the front) is smaller than the second then the specimen is a common shrew, otherwise it is a pygmy shrew. Although this sounds rather subjective, the difference is reasonably clear after a few samples have been compared.

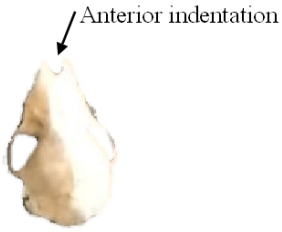
Common shrew skull

Mole skulls in pellets are similar to shrews, although larger, and typically the cranium is missing. The upper jaw has a pair of large canine teeth which, if extracted show a characteristic double root.



Mole anterior skull

Bat skulls, both the vesper bats and the horseshoes, have a large indentation in the front of the skull between the upper incisors. Detailed identification of bat species is beyond the scope of this article.



Pipistrelle skull

Don't be afraid of recording 'vole species' or 'shrew species' etc. if you are not sure of the detail – these are still valuable records. You can always ask another member of the group to help with the key or try taking some photographs and use the Facebook page or website for assistance.

Recording

Try to determine how many individuals of each species are present in the pellet – count the upper and lower jaws – ideally there will be two lower jaws and one skull for each individual but all the parts may not be recovered – for shrews in particular it is not uncommon to find

lower jaws without the corresponding skull.

As mentioned earlier, the owl could have been hunting over a large area, up to 5000 Ha, so the records need to be qualified. Barn owl roosts may also be vulnerable to disturbance so it is sensible to request the location is blurred to 1km on any record database. Using the ORKS recording system pellet results should be entered as 'Other' in the record type and the details entered in the comments box.

Summary

Owl pellets provide an excellent resource for recording small mammals – often providing a very different set of results to that obtained by Longworth trapping. The two methods are complimentary and help to build a picture of small mammal populations and distribution.

With a little time and care all of the key small mammal species can be identified reliably.

References and resources

https://www.nhbs.com/equipment

https://www.orks.org.uk/

- Dave Groves

Photographing Cornish Wildlife

We are incredibly lucky to have a wide variety of wildlife in our countryside and along our coasts, and here in Cornwall, we also have some incredibly talented wildlife photographers. One of them, Jack Hicks, has recently joined the Cornwall Mammal Group committee and below he shares some of his tips and tricks to help you capture better images of the wildlife you may encounter. Also, keep a look out for any CMG emails coming through as Jack will be offering a workshop in the near future.

The most important aspect of wildlife photography is putting in the time, and there is no substitute for patience. I've been photographing wildlife for just over 2 years now, and I am only just finding reliable locations, such as nesting sites and migratory hotspots. I don't often go out with a species in mind, I like to go out and see what I can find. It usually involves a lot of walking and many hours spent with little to show for it, but it makes it all the more rewarding when you do get an image of something you're proud of.

There aren't any shortcuts for the time needed to put into finding subjects to photograph, but there are a few things you can do to give yourself an increased chance of finding and photographing wildlife;

Research

There are two ways to approach wildlife photography, heading out with a particular subject in mind and just going out and seeing what you find. When looking for a specific species, I do some research prior to heading out to a location. This is often a simple website search to learn what times of day a species is most active, which habitat is suitable and what behaviours to expect in which seasons, for example, fledgling and courtship behaviour. I then look for local places that fit the criteria and which time I should be in the field, and also check online for any recent sightings.

Time of Day

The period of the day you choose to look for wildlife is probably the most important factor in wildlife photography. Not only can you give yourself the best possible chance of finding species, but you can also give yourself better photography conditions. Many wildlife species are most active in the few hours after dawn and the hours before dusk. This is when diurnal species are becoming active, looking to eat after fasting through the night or to stock up before the coming night. You also have a chance of spotting nocturnal and crepuscular species by being out just after sunrise or just before sunset.

From a photography point of view, the hours before dusk and after dawn give you the best light conditions. These hours are often referred to as 'golden hour'. This just means that the sun is at its lowest point in the sky and doesn't cast harsh shadows on the animals feather or fur textures. Another general tip is to have the sun at your back, this will light up the subject in front of you creating more detailed images.

Once you've found a wildlife hotspot or location of a species you'd like to work with, keep going back. Go back on different days, different seasons, different weathers (providing you still have enough light to photograph with). Familiarise yourself with the animal's behaviour and activity patterns, situate yourself in the best location for viewing the subject and lighting the subject.

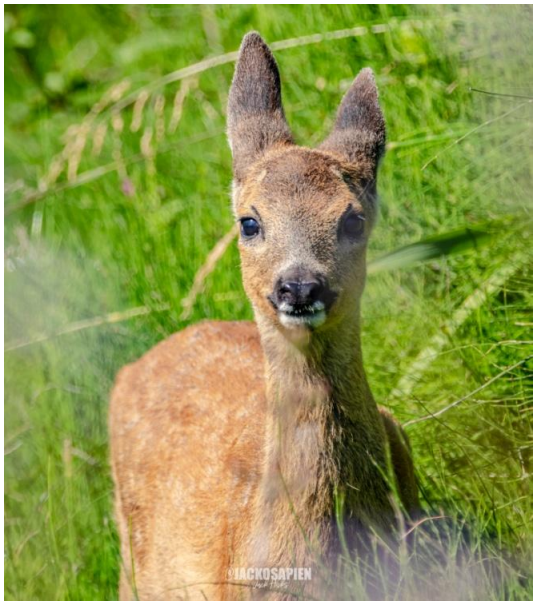
Roe deer fawns. Image by Jack Hicks

Utilise local sightings pages and social media

There are many wildlife sightings pages and groups that update daily on what has been seen in Cornwall, these are a great resource for finding locations to visit. Social media can also be a valuable asset; wildlife pages and groups on Facebook, Twitter and Instagram are also good sources of local sightings. The Cornwall Mammal Group Facebook page is a great place to start.

Wildlife Hides

Hides are a great way to spend time with slightly more habituated subjects, with little disturbance. Spending time in a wildlife hide will also allow you to familiarise yourself with your camera and often provide opportunities to hone your craft.



Roe deer. Image by Jack Hicks

General Tips

There are other general techniques you can use to maximise your chances of photographing wildlife. Walk slowly, this not only gives you a better chance to spot animals, but also lessens the likelihood that you will scare an animal off.

Be very quiet, again this lessens the chance of spooking animals, and also allows you to listen for bird calls, rustling in bushes and splashes in water. For example, I was recently working in a field alongside the A30, and between the sound of traffic I could hear an animal calling. I slowly followed the sound and suddenly 2 roe deer fawns ran out a few metres in front of me, they paused to cool down in a little stream for a few minutes before heading off into the reeds. This was an example of a chance encounter that was achieved by being out at dawn, moving slowly and quietly, and researching which habitat roe deer frequent.

Animal Welfare

Lastly, it's important to remember the welfare of the animals is more important than getting a good photo! There's a fine line between getting a photo from a comfortable distance and pursuing a closer shot at the cost of the disturbing the animal. It's never worth it, it's much more rewarding taking a well composed photo from a distance and knowing the animals comfort wasn't compromised.

Hopefully you've found some of this helpful, and if you would like to learn some of the technical aspects of wildlife photography, watch out for Jacks Cornwall Mammal Group wildlife photography workshop coming soon.

- Jack Hicks

Local Action – Get Involved, Coastal Otter Project

Coastal Otter Project

Several attempts have been made to study otters around the Cornish coast including work by Hilary Marshall in the 1990s and Beth Simmon's report in 2000. Over the last couple of years CMG has made a couple of attempts to set up surveys for otters around our coastline. Following useful chats around the Exeter Mammal Society conference earlier this year, we are now working with a network of conservation groups across the South West along with academics and national and regional organisations to try and get this project going again.

Otters in a natural environment

It would be difficult to define a 'natural environment' in the UK, perhaps we would be better to consider environments with limited disturbance for otters. The Scottish Highlands and Islands might fall into this category. Otters in these areas are frequently observed using coastal habitats for both feeding and breeding. In the islands where river systems are often short and relatively spartan, otter populations are sustained by the rich coastal marine ecosystem. Otter territories are less linear and there appears to be more 'sharing' of resources in marine habitats, especially between females. Moreover since availability of prey is dependent on tidal cycles and there is generally less disturbance than in the south of the UK, otters are often active during daylight. Projects in Wales have also looked at otters in coastal habitats and their diet.

Otters in Cornwall

Surveys indicate that otters in Cornwall occupy most suitable riverine habitats – they have probably reached the carrying capacity of the freshwater system. Although it might seem that the marine environment would be a premium habitat for otters with the abundance of suitable prey, in some respects this is dependent on suitable weather.

European otter, Lutra lutra on the coast. Image by Dan Forman

Otters are not especially strong swimmers and big swells or rough seas would affect their ability to find food. Otters are also dependent on a supply of fresh water which they need to rinse their coats regularly in order to preserve the waterproofing and insulation. Cornwall's coastline is not particularly rich in sheltered bays and islets and is often exposed to big seas and Atlantic storms. It seems probable that otters could not depend entirely on coastal habitats in Cornwall. The presence of otters in marine habitats may be a positive indication that available freshwater habitats are fully occupied and the animals are using sub-optimal or peripheral habitats, especially bearing in mind the level of disturbance and development that is often seen around Cornwall's coast.

Obtaining a better understanding of how otters are using the coastline will inform decisions about our own use of the coast, and as a protected species under threat over much of its range the otter will deserve consideration in planning decisions affecting not only the coastline but critically the freshwater streams, rivers and estuaries that it uses for access and connectivity.

Otter species in other countries

The only entirely marine otter species is the sea otter (*Enhydra lutris*) of the Pacific coasts. The marine otter or sea cat (*Lontra felina*) found on the Pacific coast of South America is predominantly marine although it has been recorded in freshwater rivers. Their coarse fur appears to be less dependent on being washed and they may also be independent of fresh water for drinking. The marine otter is one of the smallest marine mammals and is relatively unstudied. Other otter species including the North American river otter (*Lontra Canadensis*), the neotropical otter (*Lontra longicaudis*) and the Cape clawless otter (*Aonyx capensis*) have been recorded using coastal habitats although they are predominantly found in freshwater.

North American river otter, Lontra canadensis. Image: Dave Groves

Spraints as indicators of feeding activity

Otters use their droppings (spraints) to communicate with other members of the species. As an essentially solitary animal often occupying a large range, it is a useful method for letting other otters know that the area is taken.

Spraints are often left in prominent locations near river junctions or bridges – conveniently for those of us who want to survey or collect!

European otter spraint. Image: Dave Groves

Passage time and impact on spraint collection

Food passes through the otter's gut remarkably quickly – depending on levels of activity this can be between 1 and 4 hours.

In Scotland, where the otters typically hunt for 20 to 30 minutes before returning to the shore to groom and spraint before returning to the sea, then collecting spraint from along the coastline is fairly straightforward. In the South West where disturbance, especially during the daylight hours, is likely to discourage otters from spending long periods in the sea then animals will generally be moving inland after hunting and leaving spraint along their route.

Otters can travel rapidly and are regularly recorded travelling several km in a day. Combining this information we have agreed to collect spraint from within about 1 km of high water.

Analysing spraint to identify prey species – what shows up, what is over-represented…

Otter spraint contains many hard remains of the prey consumed and therefore allows us to determine what the animal has been eating. Bones, scales, feathers and fur from vertebrate prey are found along with crustacean carapaces and the remains of invertebrates. Spraints from freshwater are relatively simple to analyse as our local rivers contain comparatively few fish species, and frogs, birds and small mammal or rabbits make up the balance of the otter's diet. The important bones for the identification of fish prey are the vertebrae and the premaxillae (upper jaw). Keys are available to help in the identification of most of the freshwater and some commoner marine and estuarine species, for example The Mammal Society publication 'A guide to the identification of prey remains in otter spraint', although the Project will be aiming to develop our own keys and reference collections for other species.

For a large animal, the otter eats a surprisingly large proportion of bite-size fish – sticklebacks, minnows and bullhead may make up over 25% of the diet in freshwater. In marine habitats small fish such as blennies and gobies are often taken. Larger fish are usually brought to the shore and may not be consumed entirely so may be under-represented in the spraint as the spinal column and head may be left uneaten.

Fish remains. Image by Dave Groves

In these cases the use of scales to identify the species can be important. There are various methods of expressing the findings from spraint analysis that can describe to relative contributions of the prey to the otter's diet but our first objective is to confirm that otters are feeding on marine prey. Ultimately the gold standard would be to use DNA analysis to confirm prey identification but the microscopic analysis is well within our capabilities and budget at the moment.

Peripheral benefits

The Coastal Otter Project should provide us with important information about how otters use their environment in the South West. The ultimate aim is to improve understanding of use of the marine habitat by otters by means of dietary analysis. The Project will help build links with other groups and organisations as

well as academic and research bodies which we hope will be valuable networking for members. There is a lot of work involved in completing the Project and small groups such CMG can never be sure if there is the commitment to deliver as members move on and change focus. However the Project will improve our recording of otters in the county just through spraint collection. We hope we can also provide some spraint collection and analysis training, revive some of Kate's old Otter Spotters and encourage new interest. There are scattered resources in print, on the internet, and hidden in desk drawers which would be useful for identifying prey species – we hope that we can draw these together and build our own reference collection of marine fish bones that can be used in the future.

Getting involved

Cornwall has a long and fiddly coastline – it is not possible for one or two individuals to survey all 700+ km so we will concentrate on previously recorded sites for spraint collection. We have worked our way through the available records from ERCCIS, NBN and the National Otter Surveys **but** ***if you are aware of any sites along the coast or within approximately 1 km of the coast where you have seen spraint in the last year then please let us know***.

Once we have a set of target collection areas we will be looking for volunteers to collect spraint and return it to the Project for analysis – details to go onto the website soon – but if you are keen to help please let us know. We will be trying to organise spraint ID and collection workshops later in the year in a couple of locations.

Currently we are working with Newquay College on this Project to develop the analysis protocols, we hope to be able to run some spraint analysis workshops once we have the methods and keys sorted out and this might keep some of us busy during those long winter nights…

European otter, Lutra lutra feeding on the coast. Image by Dave Groves

- Dave Groves

Small mammal recording at Woodland Valley

In March of this year Peter Cooper, with a little assistance from myself and other EcoSoc members, completed a 3-day survey of the small mammals living at Woodland Valley Farm in Ladock.

For those of you who are unaware, Woodland Valley is the location of the wildly successful Cornwall Beaver Project, which saw beavers returned to Cornwall after 400 years of extinction. One particularly special aspect of this project is the fact that biological data has been collected before and after the introduction in order to measure the impacts of the beaver's on the surrounding environment.

Cornwall Mammal Group has been proud to assist with this through biannual mammal trapping surveys. Four transects within the fenced beaver site were monitored using Longworth traps. A total of 22 individual animals were caught, with fur marking helping to identify recaptures.

Although this only equated as a 16% capture rate across the 3-days, a good variety of species were found including 11 wood mice (*Apodemus sylvaticus*), 8 bank voles (*Myodes glareolus*) and 2 field voles (*Microtus agrestris*).

However, the most exciting capture, was a lovely harvest mouse, the first that the Cornwall Mammal Group has caught on the site. Harvest mice (aptly named *Micromys minutus*) are the UK's smallest rodent species, with the individual caught at the farm weighing just 5 grams, less that than of a 2p coin.

Harvest mouse, Micromys minutus. Image by Peter Cooper.

Bank vole, Myodes glareolus. Image by Gemma Haggar.

The next survey will be completed this autumn, with the potential for members to attend, so keep your eyes peeled for updates on the website!

Hopefully this data, alongside studies on the site by researchers from the Universities of Exeter and Southampton, and of course the tireless work of Chris Jones and the Cornwall Wildlife Trust, will begin to piece together the impacts of beavers on our rivers and the surrounding wildlife.

\- Gemma Haggar

Microplastic Trophic Transfer in Seals

There is some great internationally recognised mammal related research happening right here in Cornwall. The following is another example of the groundbreaking work and expertise we have, in this case from Sarah Nelm (Plymouth Marine Laboratory and University of Exeter, Penryn Campus).

Plastic pollution is now one of the most widespread and significant threats facing our oceans. Microplastics (pieces less than 5 mm in size) are of particular concern because their small size means they can be eaten by a whole range of species, from microscopic zooplankton – tiny creatures at the base of the food chain – to huge seawater-sieving whales and anything in between. To make matters worse, there are not one but two ways that microplastics may be ingested. Aside from eating them directly, carnivores may also be exposed to 'trophic transfer'. This is where prey containing microplastics are eaten by predators, and the plastic moves up the food web.

Until now, trophic transfer has only been observed in animals near the bottom of the food chain, such as crabs, during laboratory experiments. We wanted to know whether it occurs in those at the top of the food chain, and to what extent. Top predators, such as seals, are often considered indicators of marine ecosystem health because studying them can help us understand changes in the wider environment. In addition, humans are also top predators because we eat fish and other seafood, which means we too may be exposed to microplastic ingestion. Researching microplastics in marine top predators will help us understand any possible implications for our own health.

We analysed scats (poo) from four captive grey seals fed on wild-caught fish and digestive tracts (guts) of some of the fish. There are several reasons why we chose to use captive seals; wild seals often haul-out to rest on beaches and in caves which are difficult, and often dangerous, to access. The seals in this study live in at the Cornish Seal Sanctuary so their scats are easy to collect. Related to this, captive seals are used to humans whereas wild seals can be very sensitive to disturbance. From a science perspective, captive seals are a more robust way of investigating trophic transfer because their environment is controlled. While wild seals may be exposed to marine litter, we know that captive seals are not. Because we could eliminate the possibility that the seals in our study were eating plastic directly we could be sure that any microplastics found in their scats came via their diet.

We found that a third of fish and half of scat sub-samples contained between one and four microplastics. Ethylene propylene, a type of synthetic rubber which has many uses, including hoses, tubing and roofing membranes, was commonly found in both fish and scats. Other polymers, such as polyethylene, neoprene and polypropylene, were also prevalent. Blue, black and red were the most frequently found colours, a result which corresponds to findings from other studies on microplastics in the general marine environment.

Our study is the first to show that trophic transfer is an indirect, yet potentially major, route of microplastic ingestion for marine top predators. The next steps are to investigate the extent of microplastic ingestion in wild marine mammals and assess whether they cause any impacts on animal health.

To read about the study in full, please go to:

https://www.sciencedirect.com/science/article/pii/S0269749117343294

- Sarah Nelms

Hedgehog Update

As we are very well aware, there has been increasing concern for the UK's population of hedgehogs. The recent People's Trust for Endangered Species (PTES) report (The State of Britain's Hedgehogs 2018) has updated their 2015 report and has highlighted these concerns.

Given the general difficulty of observing, and therefore studying, hedgehogs, they have been the subject of many different citizen science projects designed to use valuable information from the public as part of formal surveys and incidental observations. These types of surveys have been crucial in informing the recent PTES report. This has included data from the PTES's Mammals on Roads and Living with Mammals and BTO's Garden BirdWatch. Although the data collected during these surveys are very different, combining data from different sources enables us to investigate whether there are any common trends. The picture presented by The State of Britain's Hedgehogs reports is incredibly interesting and it confirms some of the concerns that I have had. It's often easy to wonder whether you are simply looking back with 'rose tinted spectacles' and thinking that there used to be lots more hedgehogs than there are now. One thing I have really noticed is the lack of hedgehog mortalities on the roads and, although it's never nice to see a squashed hedgehog, it does indicate that there is a population locally. As I have lived in lots of different places over the last 20 years, it's difficult for me to make a direct comparison with prior hedgehog observations, but the Mammals on Roads report shows that the counts of hedgehog road casualties fell by between a third and a half between 2002 and 2017.

Interestingly, the picture from urban sites is quite different, although there has been a decline in the number of sites that have recorded hedgehogs since 2003 overall, the data suggest a slight increase over the last 5-10 years (confirmed by BTO's Garden BirdWatch and PTES's Living with Mammals). This seems a little encouraging and it'd be really interesting to understand what might be driving this.

There are various initiatives in Cornwall to help inform us about hedgehog distribution and abundance. In particular, Operation Hedgehog was set up by the Cornwall Biodiversity Initiative and the Cornwall Wildlife Trust with the aim of raising awareness about hedgehogs and involving people in research to better understand the distribution of hedgehogs.

I recently visited Prickles and Paws Hedgehog Rescue which is based in Cubert, Newquay. This is a fantastic charity that rescues, rehabilitates and releases hedgehogs throughout Cornwall. They are also doing a brilliant job of collecting data on the hedgehogs they rescue in order to inform us about hedgehog distribution throughout the county while also doing interesting research with the aim of improving hedgehog rehabilitation success. Again, this relies on data from the public (in terms of members of the public noticing poorly hedgehogs and alerting Prickles and Paws), and so we need to be aware that some of the trends may be a result of 'sampling effort' rather than providing us with definitive results and conclusions that represent the reality of the situation for hedgehog populations. A quick look at the data last week revealed some interesting annual trends in terms of hedgehogs that have been brought into the rescue centre (Figure 1).

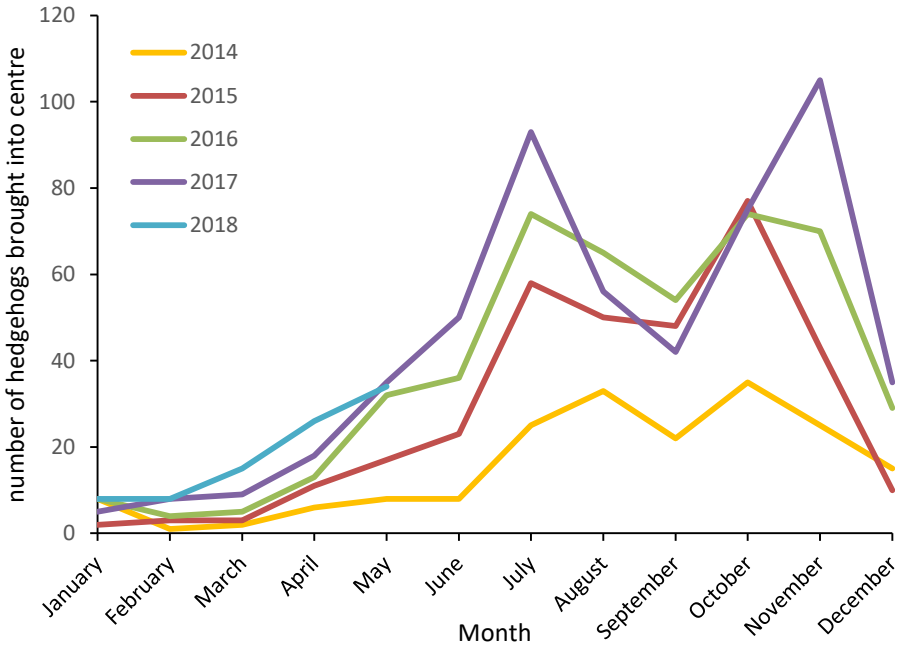


Figure 1 – The number of hedgehogs received by Prickles and Paws by month and year.

The number of hedgehogs they have received has increased in each year; however, it is difficult at this stage to link this to the number of hedgehogs that have needed rescuing in each year as we would expect the numbers to increase as Prickles and Paws becomes more widely known. The trend that interests me is the consistent drop in the number of hedgehogs in September. In fact, the first thing I asked Prickles and Paws is if they all go on holiday in September every year! (Given how busy they are, I actually suspect they very rarely get a holiday!) Katy at Prickles and Paws said that they receive fewer hoglets during September and that it's a bit early for the autumn juveniles. Katy also highlighted the necessity to consider the 'sampling effort' factor here as she wondered whether it could be related to the schools going back and perhaps fewer people actually coming across hedgehogs, although as she also said it would be very interesting to consider the drop in terms of food availability and weather

European hedgehog, Erinaceus europaeus . Image by Dave Hudson

at this time. Hopefully we'll be able to analyse these data in more detail soon in order to understand these trends.

Other current hedgehog related projects include undergraduate students at the University of Exeter researching the factors that affect whether a hedgehog may have been observed in a garden. This aims to survey members of the public to find out whether they have sighted a hedgehog in their garden and then to supplement this information with a subset of surveys.

The survey has been featured in BBC Wildlife magazine - “Understanding where hedgehogs thrive, and the conditions under which they do so, may allow us to change our gardening practices to attract them into safe gardens and away from roads,” says BSc student Emily Gilford, “and possibly aid an increase in hedgehog populations in the UK”.

Sightings will be followed up by a small number of field research visits, where researchers will conduct non-invasive invertebrate surveys, assess surrounding land use, measure shrub and foliage coverage and install and study footprint tunnels.

Presence and absence records can be submitted via an online survey.
Queries about the study can be e-mailed to: exeterhedgehog@gmail.com

European hedgehog, Erinaceus europaeus . Image by Dave Hudson

Please do take part in the survey regardless of whether you have seen a hedgehog in your garden or not – it is really quick to do and every new bit of information really helps! If you're happy to distribute this survey more widely then please do so as this will be hugely beneficial to the significance of the results. The initial analysis is not being restricted to Cornwall, so please also send 'up country', as we are also interested to see how observations vary between counties!

Finally, a group of students at the University of Exeter are setting up The Prickle Project. This is an initiative aimed at engaging primary school children with conservation and ecology while collecting valuable information about the distribution of hedgehogs around Cornwall. The students aim to visit local primary schools, teach the children about hedgehogs and then loan the school their hedgehog tunnels (a common method of surveying for hedgehogs) for a week for the children to survey for hedgehogs within the school grounds. The University students will then return to the school to help the children decipher the results they get. If you have contacts with local primary schools that might be interested in this initiative, then please do let me know and I will pass your information on to the students running the project.

All of these projects rely on valuable information from the public and really highlight the benefits of engaging the public with surveying species, both to inform conservation research but also to develop an awareness of the importance of conserving these species.

- Kelly Moyes

CMG members local news stories

CMG has a couple of Bushnell trail cameras which are available for members to borrow. I'm glad to say that the cameras have been well used recently. Several members have tried the kit out in their gardens to record hedgehogs and other small mammals.

One camera went out onto Chark Moor in mid-Cornwall early in the summer and picked up some nice records of fox, badger, red and roe

deer and grey squirrel (as well as the ponies which were on the moor to graze off the scrub and improve the habitat for butterflies. Chark Moor is owned by the Gaia Trust (https://www.gaiatrust.org.uk/) a farming and conservation charity that we have worked with on many occasions over the years. Another of their sites is at Treraven just south of Wadebridge and their new site manager Richard Austin is keen to understand more about the wildlife on the site. Early days yet but the camera has already confirmed rabbit and roe deer!

- Dave Groves

Juvenile badger found in Cornwall, appearing very dehydrated. Image by Jacque Merrick

During July, CMG committee member, Jacque Merrick', neighbours had shared images on Facebook of a badger that had been foraging in their shed in daylight. Badgers are primarily nocturnal, shy mammals.

"In over 30 years of having an active badger sett, on my land just yard's away from my home, I've rarely observed them, (except with my trail camera trap), for more than a few moments, as they pop their heads out of the sett entrance as dusk approaches, after which they quickly disappear into the undergrowth," said Jacque.

"But with (the newly christened) Master Brock, not only was he active in broad daylight, he was alone, tottering around in a very busy yard, with people & loose dogs close by."

Jacque initially thought that with the short nights at this time of year, coupled with the extraordinary hot dry weather we've are having, this young badger could just be very desperate for food and water.

“When I discovered that my neighbour was able to return to the shed, setup his camera and place food in the doorway, very close to the badger and he'd still not scurried away, I became more concerned.”

Footage of the badger showed that he seemed unsteady on its feet, very lethargic, his coat appeared to be dull & nose very dry.

He was observed for over an hour, wandering around Jacque neighbours shed, not attempting to leave through the open door or to try and properly conceal itself. He was clearly sick, at the very least dehydrated. The images were forwarded by Jacque to Bob Speechly, of Cornwall Badger Rescue and Brock, who recognised that the badger was a poorly dehydrated juvenile.

Jacque is an experienced British Divers Marine Life (BDML) medic and with this training, was able to catch the badger before transferring him to a box. Badgers should not be approached in this way without training though as they do have an incredibly strong bite and if you find yourself in this position you should call in someone like Bob **01736 797740 (24 hr answer phone),07831121949 (mobile)**. After a midnight rendezvous, the badger was safely transferred into Bobs care.

Juvenile badger found in Cornwall, suffering from head injury. Image by Jacque Merrick

Initially Bob also thought the badger was dehydrated, however when he did not improve in the morning, he was taken to the vet's. The vet suspected ‘Master Brock’ had had a blow to the head, possibly from a horse, and was given anti-inflammatory medication and continued to be monitored closely. He began eating and drinking but appeared to be behaving like he was "drunk" holding his head to one side, with one eye not open fully. Final update on Master Brock, he was released back into the wild at the sett on Jacques farm in the evening and quite clearly knew exactly where to go.

Polecat Records

Polecats – plenty of records coming in for polecats and polecat-ferrets over the last few months onto both the ORKS (Online Recording Kernow and Scilly) database and also the National Biodiversity Network (NBN). As usual, there is some confusion about how to separate the two – an issue with the animals themselves as they seem to interbreed quite happily! DNA studies by CMG and Exeter and Cardiff Universities classified 2 of the 9 samples collected as pure polecat (having less than 10% DNA markers of ferret origin) although 8 of the 9 were morphologically identified as polecat (i.e. they had all the visual indicators of polecat – dark coat, no white feet, small white chest/throat patch and 'bandit mask' face markings with a dark nose. Although the remaining animals had predominantly polecat DNA (averaging about 66% of the genetic markers examined) they were still considered hybrids.

We continue to wrestle with the recording issues – should an animal that looks like a polecat be recorded as such in the absence of genetic confirmation? Is it safer to record all Cornish sightings as polecat-ferret?

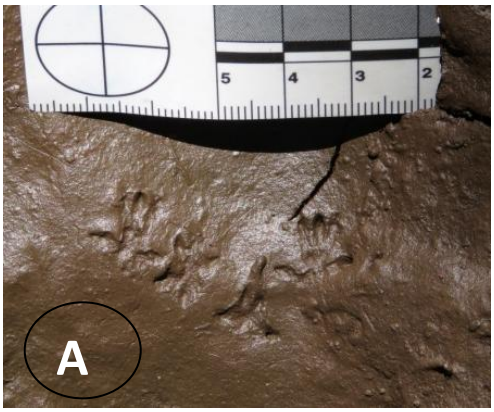
My own view is that we have confirmed that pure polecats are present in Cornwall and if good photographic evidence is available (unfortunately this is generally from road casualties) they should be recorded as such. Other sightings, even clear sightings by observers familiar with the species, should be entered into the databases as polecat-ferrets. Professor Robbie McDonald at Exeter University has offered to support another attempt at collecting samples in collaboration with Lizzie Croose at the Vincent Wildlife Trust. Last time Vic Simpson and I acted as collection points for a selection of grizzly and malodorous corpses before they were dispatched to Cardiff – does anyone fancy a challenge? A strong stomach and a 'non-food' freezer (or a VERY understanding family….) are the key requirements. Get in touch with me if you would like to take this on.

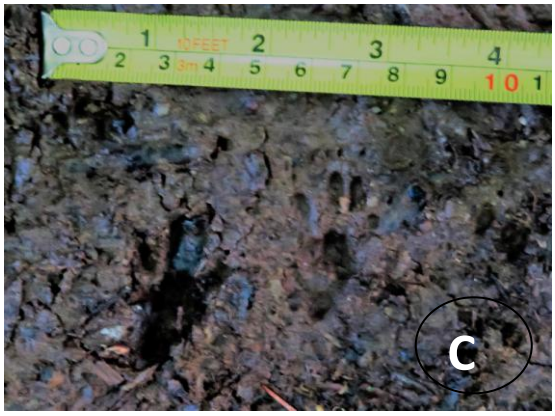
Polecat/ferret? Image by Dave Groves

- Dave Groves

Whose Track are you?

Below are some mammal signs found during the spring and summer of 2018. Can you identify who made them and what they were doing? It'd be great to see images of tracks and sign that you can find so please post them on our Facebook page.





The answers will be giving in the next newsletter. If you want to know more about identifying animal tracks and sign, then please join us for one of our events.

Answers below to the questions from the last newsletter, (Winter 2017). How many did you identify?

Image: Angie Nash

Image: Angie Nash

Image: Angie Nash

A) Badger trails

Moving around, nose to the ground working like a shovel to sniff out and unearth roots, bulbs and tubers, this badger carved long paths through the forest floor.

B) Grey squirrel

A ruler may have helped with this identification as its small size helps to identify from, e.g. badgers that will leave similar traces with their noses when sniffing out and unearthing food. This squirrel looked to be systematically finding and burying acorns.

C) Deer feeding

In this example, deer have stripped bark. Deer only have front teeth on the lower jaw (the upper jaw has a hard palate) and you can see the clear outline of the lower teeth entering the bark before stripping the bark upwards.