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Froglife's newsletter - amphibians, reptiles & nature news
Issue 20 spring/summer 2020

Blessed as a newt

Plus... Identifying UK newts : Poems from Creeping Toad : Monitoring amphibian tunnels

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Design by Dr Victoria Larcombe

Photo: Craig Mackay

GWH
Garden Wildlife Health

Garden Wildlife Health (GWH) is a collaborative project between the Zoological Society of London (ZSL), the British Trust for Ornithology (BTO), Froglife and the Royal Society for the Protection of Birds (RSPB) which aims to monitor the health of, and identify disease threats to, British wildlife.

Visit www.gardenwildlifehealth.org to find out more

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Dear supporters,

Firstly a huge thank you to everyone who has contributed to this newsletter. We have a great range of informative and interesting articles, poems, photos and artwork. It is fantastic to see how inspirational great created newts are. They certainly bring out the creativity in people.

It is the time of year when you will see great crested newts in ponds. The males do an amazing mating dance to attract females. If you shine a torch into a pond at night with newts you may witness this.

You can enter your sightings onto our App. However please remember great crested newts are a protected species and only someone with a great crested newt licence can handle them.

We have included in the newsletter the lovely mural of great crested newts at Spitalfield and further creativity has been added by one of our trustees, Gordon, who has submitted poems from one of his sessions with young people.

Thanks goes to all of our supporters, donors, friends, staff, trustees and volunteers for all they have done to help us achieve so much. Fifty five ponds in Sheffield and building on a network of ponds at Muiravonside Country Park highlights how much can be achieved with everyone’s support.

I hope you enjoy this newsletter as much as we have enjoyed compiling it.

Finally thanks to Vicky for designing this newsletter, she always does us proud.

Kathy Wormald, CEO

K. Wormald

Identifying UK newt species

by Kathy Wormald, CEO

In the UK we have three native newt species: smooth (C), palmate (A) and great crested newts (B,D). All three share common features whilst each also have distinctive ones. Shared features include adults emerging from their overwintering sites in early spring and heading to ponds to breed. The males perform an elaborate courtship dance before the eggs are laid. Females lay individual eggs and wrap each egg up in a leaf of a pond plant. Depending on local weather conditions two to four weeks later larvae (sometimes called newt tadpoles) will hatch.

The larvae have feathery gills around the head, distinguishing them from frog or toad tadpoles. A couple of months after they hatch they start to grow their front legs, again different to frogs and toads, followed by their back legs. At this time of year adult newts spend a considerable amount of time in the water hunting for food. However, once the larvae have absorbed their gills, they leave the water as juveniles (or efts).

Newts spend the autumn/winter months sheltering under rocks, in compost heaps, under logs and fallen leaves. Some will overwinter in ponds. They don't hibernate as such, and may take advantage of milder weather to forage.

Now to their distinctive features. Smooth newt and palmate newts do look very similar and are difficult to tell them apart but here are a few tips. Smooth newts are more widespread and cannot tolerate as acid water and soil as palmate newts can. Both species when on land, have a velvety appearance and are often mistaken for lizards. Their colouring is varying shades of grey or brown and both will have a distinctive yellow/orange dorsal stripe. In smooth newts this starts between the eyes and continues down the body, whereas in the palmate newt the stripe starts just below the head and continues the full length of its body and tail.

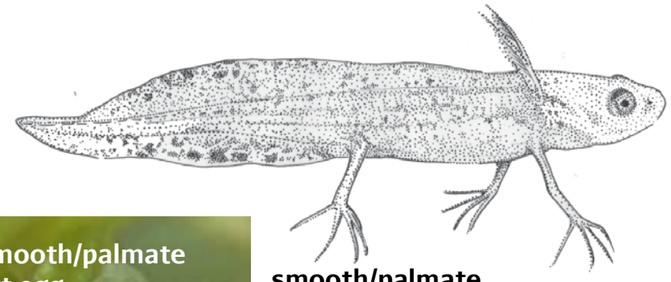
During the breeding season male smooth newts develop a wavy crest along their backs. They have a yellow or orange belly, usually with black spots/or blotches and their throats are spotted.

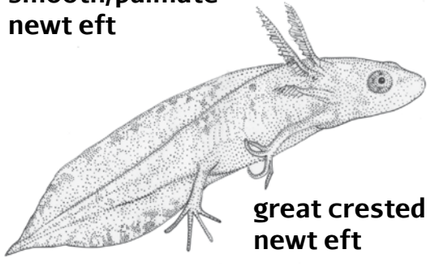
Palmate newts are slightly smaller than smooth newts, they also have a yellow belly, often with dark spots. However, the easiest way to distinguish between the two is that palmate newts do not have a spotted or yellow throat; instead their throat is pink (E). During the breeding season males develop a filament at the tip of their tails and black webbing on their back feet. Their preferred habitat is heathland, moorland and bogland, and shallower ponds in acidic soils.

Great crested newts are the largest newt species in the UK and have been around for approximately 40 million years. During the breeding season the males develop a jagged crest along their backs which has a break at the base of the tail with a white flash on the tail. Females take on a 'bulky' appearance. Their skin is black or dark brown and has a rough, warty appearance. Their undersides are bright orange with irregular black blotches. There are no great crested newts in Ireland but they are found in all other areas of the UK, although in many areas their distribution is patchy, especially in the north and west.

Great crested newts favour larger ponds and they generally do not live with fish. Their eggs (H) are much larger than smooth or palmate newts (I). The eggs are white with light yellow centre surrounded by a jelly capsule. Whereas smooth and palmate newt eggs are greyish-brown or dirty white but are also surrounded by a transparent jelly.

For more information about our UK newts visit www.froglife.org/info-advice/amphibians-and-reptiles





Surveying for newts

by Kathy Wormald, CEO

Headlines such as these highlight how frequently great crested newts and other protected species surveys do not comply with best practice and that often proper habitat assessments have not been undertaken.

And there are plenty of other examples. If proper Phase 1 Habitat Assessments had been undertaken at the appropriate time of the year, this would have highlighted the presence or possibility that great crested newts (gcn) were present. The habitat assessments would have been followed by surveys during spring/early summer and these would have confirmed the presence of gcn and an appropriate mitigation plan would have been put in place. Hence no surprises.

Here are some tips for surveying for newts, but please note these tips are only for lay-people, there is much more stringent guidance for professional surveys relating to proposed property or infrastructure developments.

Newts are most active during the breeding season (generally March - May), and will be in and around standing water (ponds, ditches etc.). Over the summer and early autumn during the day they will take shelter on land and come out to feed at night.

There are several techniques for surveying for newts:

1. Visual search of pond and surrounding area
2. Egg searching
3. Netting in pond (should only be done if you are experienced in netting)
4. Night torching the pond

As great crested newts are protected more techniques are used for surveying them, and can only be carried out by someone with a great crested newt licence. If great crested newts are suspected to be present on a site, a Natural England licence is required before carrying out any surveying techniques.

In daylight simply walk around the pond edge and surrounding terrestrial habitat and record newts and newt efts seen in the water and under logs, large stones etc. Remember newts can travel several hundred metres away from the pond, so look further afield.

You can also look for folded leaves which will indicate egg laying. You can look inside a folded leaf to determine its size and colour but do not disturb too many, and if you come across great crested newt eggs stop immediately as these are protected.

If your pond has little suitable vegetation for egg laying or has limited visibility for torching then you can consider artificial egg laying strips. Newts will lay their eggs in these as they will on plants. You should install them in groups of 5, approximately 1-2m apart for every 25m pond edge. Make sure they are fully submerged. When you check them for eggs remember to put them back in the water for the eggs to hatch. Remove the strips in August/ September.

To make egg strips cut a bin bag across the joined sides to create strips that are about 30mm deep. Cut off one of the joined sides. Then cut lengthways into 1-2cm wide strips up to about 50mm from the remaining joined side. You will end up with a strip with a fringe of long tassels. Wrap this around the end of a stick (length depending on pond depth) and secure with a staple.

Newts are most active after dark and torching is a great way to see them and see the males' wonderful mating dance. Do consider the safety elements when doing night time torching.

You will need a powerful torch. You will torch from the bank of the pond, move slowly around the pond and torch approximately every two metres. Shine the torch into the water, take time to get your 'eye' into it, moving out from the bank and back again.

Daytime surveys are done in April-June to find eggs and night-time torching between March-June for adults and July-September for larvae hatched that year. These timings will vary depending on weather conditions and locations.

Ideal surveying conditions are air temperatures of 5°C or higher, little or no wind, dry with water temperature ideally 10°C or more.

Happy surveying and please do enter your data onto the Froglife App at it helps us a lot with our work, and your data will help to inform wider conservation as all our data is submitted to the National Biodiversity Network database.

http://www.froglife.org/dragonfinder/app/

eDNA for detecting great crested newts

a replacement for traditional survey techniques?

by Dr Laurence Jarvis, Science & Research Manager

Environmental DNA, or eDNA, is released by most organisms as they occupy different habitats. Each species has a unique type of eDNA which can be recognised through laboratory analysis. This provides a novel tool for detecting species within the environment. Sources of eDNA may originate from sloughed skin or hair, eggs, faeces and saliva (Figure 1). Within aquatic habitats, most organisms release eDNA into the surrounding water. An increasing number of methods are now available for detecting the eDNA of a range of aquatic organisms including fish, damselfly nymphs, crustaceans and amphibians. In recent years, techniques have advanced to allow the detection of eDNA of great crested newts from their breeding ponds. This has proved particularly useful for ecologists and voluntary surveyors who need to determine the presence or absence of great crested newts for the purposes of conservation and mitigation. The eDNA technique, though expensive, is usually highly reliable and effective at detecting great crested newts. Research carried out by Biggs et al. (2015) at 35 ponds in Hampshire and Wales showed that eDNA could successfully detect the presence of great crested newts in 99.3% of ponds. This was significantly higher than the success rate of more traditional survey techniques.

Figure 1. A male great crested newt swimming in a pond will release eDNA into its surroundings through shed skin, excreta and saliva.

Traditional survey techniques for detecting great crested newts such as egg-searching, night torching and bottle trapping are labour intensive, carry certain risks (e.g. potential suffocation of newts in traps) and are not always highly effective. Biggs et al. (2015) found that bottle trapping detected great crested newt presence in 76% of ponds and egg searching in only 44% of visits. Using traditional survey techniques, Natural England advice recommends four visits to a breeding pond in the newt breeding season (mid-March to mid-June) using a minimum of three traditional survey techniques (Natural England, 2015) (Figure 2). The eDNA technique, by contrast, can detect great crested newts on just one visit with minimal disturbance to breeding ponds (Biggs et al., 2015).

One of the major advantages of eDNA is the relative ease that samples can be taken from a pond and the subsequent reduction in labour costs. For example, one fieldworker may be able to take samples for analysis within one survey visit, compared to the multiple

Figure 2. Traditional techniques such as egg-searching (A), bottle trapping (B) and night torching (C) need to be carried out on four separate visits to determine presence or absence of great crested newts from a pond.

sessions required using traditional survey techniques. However, the analysis costs associated with eDNA may be significant, especially if carrying out many samples. A second major advantage of eDNA is its overall reliability compared to other traditional methods. However, a range of studies have found variations in the success of eDNA, ranging from 60% to 99% (Buxton et al., 2017).

Despite it's apparent reliability and success in detecting great crested newts, there are a number of limitations of using eDNA to survey ponds:

1. Estimation of abundance: the level of eDNA detected from samples taken from a pond does not correlate well with the number of newts in the pond. Biggs et al. (2015) found that at low levels of detection, eDNA may reflect the number of newts but at higher levels, there was only a weak, non-significant correlation. Therefore, it is not currently possible to use eDNA to estimate the population size or relative abundance of great crested newts using ponds.

2. Life stages: eDNA only records presence, or recent occupancy, of ponds by newts; it does not show which life stages are present e.g. adults, eggs or larvae, or when they were last in the pond (Rees et al., 2014a). Traditional survey techniques can identify actual animals which is useful for looking at life stage, sex ratio and potentially the body condition of individuals.

Figure 3. Ponds which support low populations of newts (A), are shallow (B), or difficult to access (C) are likely to have an increased likelihood of false absences using the eDNA technique.

3. Breeding or non-breeding? It is often useful to determine whether great crested newts are breeding within a pond as this may show persistence of a viable, long-term population. However, the eDNA technique is not able to detect if newts are laying eggs within a pond; it can only determine if they are present, or have recently been present.

4. False absences: a false absence is when a particular technique fails to determine the presence of the species, even though it is present.

Although the level of false absences using eDNA was very low in one study carried out by Biggs et al. (2015), this was only carried out on 35 ponds in two counties in the UK. Similar research carried out by Rees et al. (2014) on 38 ponds showed that eDNA had a lower success rate of 89% in detecting great crested newts in ponds.

5. False positives: detecting newts when they are not present is less commonly a problem with eDNA for great crested newts but can occur when there is contamination within the samples collected (Thomsen & Willerslev, 2015). Potential sources of contamination include: excrement from animals that prey on great crested newts; the eDNA of dead great crested newts being carried to the pond by other species (e.g. birds); or unsterilized equipment contaminating samples (Bohmann et al., 2014).

6. Reduction or loss of DNA in the water: loss or reduction in the quantity of DNA from within samples can result from inhibition, degradation, and binding to sediments.

Overall, although using eDNA to detect the presence of great crested newts is highly effective and usually reliable, ecologists and surveyors must be aware of the potential limitations when carrying out surveys. Therefore, caution should be taken when analysing the results from eDNA; ecologists and surveyors should consider eDNA as an additional technique to complement traditional survey methods, rather than being viewed as replacing existing techniques (Rees et al., 2014).

Metabarcoding differs from species-specific e-DNA methods in that sections of DNA (primers) are identified which span multiple species groups, whilst also adjoining DNA which is species specific (Harper et al., 2018). This enables a range of species to be identified from samples and allows community analysis to be undertaken. For example, Harper et al. (in review) have shown, using metabarcoding techniques, that great crested newts are more likely to inhabit ponds where smooth newts (*T. vulgaris*) and moorhens (*Gallinula chloropus*) are present, but not ponds with common toad (*Bufo bufo*), common carp (*Cyprinus carpio*) and three-spined sticklebacks (*Gasterosteus aculeatus*) were present. Other uses of metabarcoding have been demonstrated by Dufrefnes et al. (2018) who used the technique to successfully identify the invasive Italian crested newt (*Triturus carnifex*) from native great crested newt (*T. cristatus*) populations in Switzerland. Therefore, community analysis has the potential for identifying species composition and result in development of more effective conservation initiatives.

Metabarcoding is still in its infancy, and there are potential problems such as abundant species preventing detection of rare species (Harper et al., 2018). In a study comparing the effectiveness of eDNA with metabarcoding, Harper et al. (2018) found that although metabarcoding enabled a greater volume of biodiversity information to be obtained from samples, the technique is currently not as sensitive as single-species e-DNA techniques. As with e-DNA, metabarcoding should not yet be considered a replacement to traditional survey techniques but rather to complement methods already used (Harper et al., 2018).

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Low Impact Class Licence for Great Crested Newts

by Dr Laurence Jarvis, Science & Research Manager

Across England, ecologists wishing to survey for great crested newts must hold a Class 1 or 2 survey licence granted by Natural England. These licences allow ecologists and volunteers to undertake surveys for great crested newts. However, due to the large number of surveyors wishing to hold a licence, and the rate of development of land across England, this licencing approach is proving time consuming and costly to implement. Therefore, Natural England have devised an additional licensing system which may be applied in certain situations. Known at the Low Impact Class Licence (LICL), this follows on from a similar bat licence initiated by Natural England. In the Low Impact Class Licence approach, surveyors are able to become Registered Consultants which is promoted by the Chartered Institute of Ecology and Environmental Management (CIEEM) and Natural England (Figure 1). To obtain accreditation by Natural England, surveyors have to attend training and meet rigorous criteria, demonstrating that they are competent to take on work with less regulation. Surveyors must demonstrate an understanding of the licensing process by passing a test following attendance at a training course provided by Natural England.

Surveyors holding a Low Impact Class Licence can only operate in certain situations, as follows:

- The development must not extend beyond a certain size, including both aquatic and terrestrial habitat. This area differs depending on the distance from a waterbody used by great crested newts.
- The development should be of a short duration, usually up to six months and no longer than 12 months.
- Waterbodies used by great crested newts must not be affected; although ditches that are used by great crested newts may be temporarily impacted across a part of their length.
- The licence is only applicable at sites where there has been no history of licensed great crested newt mitigation, and where there are no other proposals for development.

The Low Impact Class Licence must be used as in conventional mitigation licensing and only be employed when it meets the purposes of the legislation, when alternative options have been considered and favourable status of the great crested newt population will be maintained. However, unlike conventional mitigation licences, the responsibility is on the Registered Consultant to gather all the necessary information to demonstrate that the above criteria have been met.

Figure 1. To become a Registered Consultant and hold a Low Impact Class Licence, ecologists must attend training sessions accredited by CIEEM and Natural England.

Benefits of the Great Crested Newt Low Impact Class Licence

- The process is more cost effective for Natural England so that it only requires submission of a single site registration form and map. Low impact activities do not require the same volume of information to be prepared and supplied compared to that in support of more complex and higher impact activities. This reduces the administrative burdens on Natural England, results in savings for the consultant and speeds up the development process.
- Due to a reduction in administration time, site registration requests can be turned round potentially within 10 working days, rather than the standard 30 (minimum) working days applied to a conventional licence application.
- There may be an option for dealing with unexpected 'last minute' GCN discoveries.

The majority of the advantages of the Low Impact Class Licence result in benefits to Natural England, Registered Consultants and developers. Overall the LICL approach is still in its early stages and is still subject to alteration by Natural England. It may take several years to determine the effectiveness of this new approach and impacts on great crested newts.

Figure 2. The potential impacts on great crested newts and their habitats under the Low Impact Class Licence are not yet fully understood.

My love for amphibians

by Xavier Mahele

Mottled common frog tadpoles splash and twist on the surface of the pond voraciously feeding on bloodworms before shooting down into the murky depths to evade my shadow. Courting male smooth newts dance, suspended in the crystal clear water column fanning pheromones and displaying their ornate crests whilst females wrap their pearl like eggs on the verdant hornwort leaves. The tiny pond in my London garden is brimming with spring life.

Further afield the metallic calls of dink frogs echo through the montane forest at sunset. My torch beam scanning the leaf litter catches the glinting jet black skin of a Ring tailed Salamander beginning its nocturnal foray from underneath a log; the emperor of the forest floor.

Encounters like these have drawn me to the diverse and fascinating world of amphibians.

I am often asked by school friends and family why I am so obsessed with them. Maybe it's because they are all so incredibly different. They range in size from the smallest extant vertebrate - *Paedophryne amanuensis* at 7.9mm to the Chinese giant salamander at 1.8m. There are arboreal leaf frogs which glide and leap through the canopy and fossorial burrowing caecilians. Many loudly fill the soundscapes of their ecosystems after rain while others, like the charismatic Panamanian golden frog wave to attract mates in their noisy stream side habitat.

Some have resplendent colours like the European green toad while troglodytic species such as the olm are paler. Bright aposematic colours on some dart frogs, mantellas and fire bellied toads warn of their toxicity while others like the mossy frogs have incredible textured camouflage allowing them to blend into their environments. Some are even fluorescent under UV light such as the pumpkin toadlet (*Brachycephalus ephippium*).

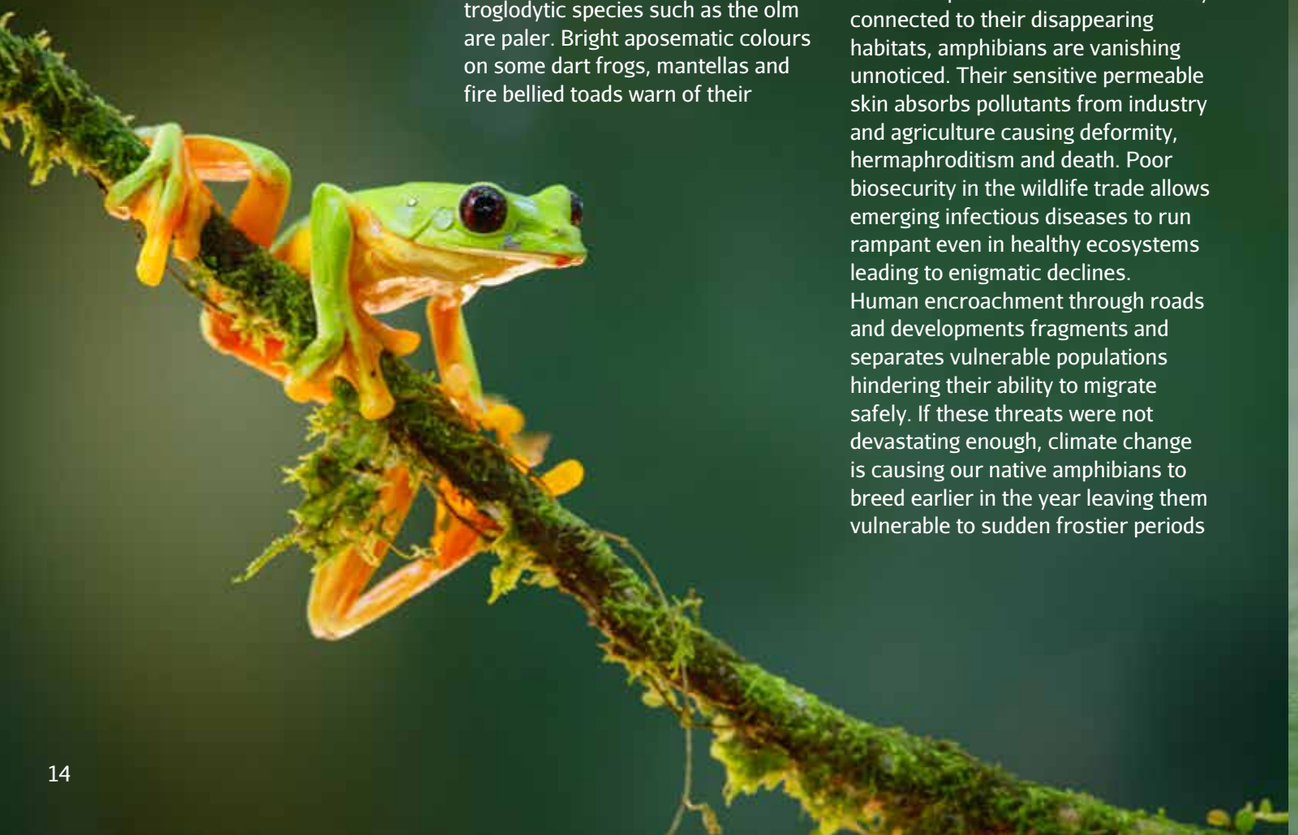
Amphibians have a variety of fascinating reproductive strategies and life cycles from metamorphosis to direct development. Gastric brooding frogs look after the eggs in their stomachs before releasing the neonate froglets from their mouths and Darwin's frogs (*Rhinoderma*) harbour developing tadpoles in their vocal sacs. Midwife toads carry their eggs on their backs and the ringed caecilian (*Siphonops annulatus*) even feeds its offspring its own skin in a phenomenon known as 'maternal dermatophagy'.

As their biphasic lives are intrinsically connected to their disappearing habitats, amphibians are vanishing unnoticed. Their sensitive permeable skin absorbs pollutants from industry and agriculture causing deformity, hermaphroditism and death. Poor biosecurity in the wildlife trade allows emerging infectious diseases to run rampant even in healthy ecosystems leading to enigmatic declines. Human encroachment through roads and developments fragments and separates vulnerable populations hindering their ability to migrate safely. If these threats were not devastating enough, climate change is causing our native amphibians to breed earlier in the year leaving them vulnerable to sudden frostier periods causing winterkill mass mortality. If this continues, populations may not be able to recover.

The global decline in amphibians means the ecosystem services they provide could be lost forever; bioturbation, biomass and pest control are all vital to secure a sustainable future. Without amphibians we could lose our chance to develop new medicines from antimicrobial compounds in their skin. Over 200 peptides from 10 species of *Phyllomedusa* are being developed for their antimicrobial properties and Epibatidine synthesized from *Epipedobates* dart frog poison has the potential to be a highly effective pain killer.

Amphibians indicate a healthy environment yet they also have an intrinsic value. This endeavor to fight against the global decline in amphibians and halt the devastation facing all biodiversity in the Anthropocene is what inspires me. I think it's imperative to secure a sustainable future where we may all be able to hear the calls of anurans filling our wetlands and forests and have the chance to find newts and salamanders hiding under logs.

Beside my little pond I snap photos of the shy common frog hiding in the reeds as a blackbird sings overhead. I'll upload them later to the 'Dragon Finder' app, proud that I'm contributing to our understanding of herpetofauna and pleased my local amphibians approve of the habitat I have created for them.



Toad

The eye of the beholder

by Michael Blencowe (Senior Learning & Engagement Officer, Sussex Wildlife Trust)

Ensconced in my corner of a Sussex pub I didn't look far for inspiration for this month's article. The clanging of brass on lead alerted me to a couple of lads playing that most Sussex of pub games - Toad in the Hole. The perfect excuse for some sycophantic toadying to an amphibian I adore; warts and all.

Toads are beautiful. Yes, I know they have lumpy, poisonous skin. Yes, I know they have a face like Ena Sharples. But that eye. That amazing eye. Next time you see a toad get right up close and allow yourself to be hypnotized by that mesmerizing golden-ringed eye. Fellow toad lover George Orwell called it "about the most beautiful eye of any living creature".

In February that beautiful eye blinks open as toads awaken from their winter hibernation. From under stones, logs and leaves they emerge and start the long walk home - back to the pond where they were born. They proceed on this pilgrimage with a determined, unsteady gait - like one of those old men you see gingerly crossing the shingle on his way to his annual New Year's Day dip. But once the Toad hits the water he is rejuvenated and has one thing on his mind. Croaking and brawling a peaceful pond is transformed into a Club 18-30 pool party as male Toads squabble over females in a writhing ball of amorous amphibians.

The results of this Bacchanalian bonding are long polka dot ribbons of spawn (unlike the Frog's shapeless tapioca blobs) and by May the parent Toads have left their breeding ponds to lead a more respectable life on dry land until their winter hibernation. Amazingly these animals can live for over 40 years.

With their primordial appearance, annual gatherings and rituals there is a touch of evil about the Toad. Throughout England's history they have been vilified; linked to witchcraft and strange superstitions. And, when it comes to folklore, there's nowt so queer as Toads. Rubbing Toads on your body could cure cancer; a live Toad in your mouth could cure skin infections. Precious jewels (toadstones) were reputed to be hidden in a Toad's head. Immortal toad-eaters were a sideshow attraction at country fairs. Travelling Toad doctors could heal you with Toad hearts and legs. The mysterious Toadmen used Toad potions to cure horses (a practice that allegedly continued until the 1930s in some English counties).

It took Kenneth Grahame's beloved 'The Wind in the Willows' to finally drag the Toad out of the dark ages putting him in a tweed suit and in the hearts of the nation. Keep an eye out for these amazing animals around Sussex in the coming months as they return to their ponds.

Toad-in-a-Hole

Curiouser and curiouser

Once upon a time the British people were divided. Impassioned debates raged throughout the land, truth and common sense became distorted and the public rose up and demanded an answer. An answer to one question. How the bloody hell did that toad get inside that rock?

In 1898 two burly workmen in a chalk quarry near Lewes cracked open a hollow chunk of flint. The solid rock, formed 85 million years ago, split open to reveal an airtight cavity at its core. To the quarrymen's amazement entombed within the ancient flint was a dead toad.

During the 1800's Britain 'toad-in-the-hole' hysteria hit the headlines. It seemed like every month the newspapers reported how someone had split open a rock and found a toad inside. Some of these toads had already croaked but others would inexplicably still be alive and hopping. The Victorian world was thrown into theological and philosophical panic. Clergymen preached that the Creator had placed the eternal amphibians in rocks at the dawn of time. Subscribers to Darwin's new theory of evolution were perplexed. Charles Dickens wrote of his bewilderment while others believed it was simply sorcery. Scientists began burying living toads in sealed boxes to investigate the unfortunate animal's longevity.

The Lewes toad of 1898 is the world's only surviving artefact of the entombed toad craze. It now resides in Brighton's incredible Booth Museum of Natural History - one of my favourite places in the whole world. Amongst the many awe inspiring exhibits at The Booth you'll find a special cabinet dedicated to curiosities. In it, lying reverentially on a bed of maroon felt, there is 'Probably the most famous toad in the world'. Admittedly when it comes to world-famous toads it's not a particularly crowded field with only Toad of Toad Hall to contest the title. Alongside the original oval of cleft flint sits the shrivelled body of the infamous amphibian. The whole surreal exhibit is like a Kinder Surprise designed by Hieronymus Bosch.

But this cracked up flint isn't all it's cracked up to be. The Lewes toad was originally presented to the Brighton and Hove Natural History and Philosophical Society by Charles Dawson. That's the same Charles Dawson who would soon be sticking some Orangutan teeth on a human skull and declaring he had discovered the 'missing link' at Piltdown near Uckfield. In 1953 Dawson would be unmasked as a fraudster and the whole 'toad-in-the-hole' phenomenon would come crashing down, dismissed as poppycock.

The British public had been tricked by the lies of a few self-serving charlatans whose deception had been perpetuated by the press. Thankfully this curious, rather embarrassing chapter has been rightfully consigned to a dark corner of our history. Let's hope this sort of thing doesn't happen again.

poems from Creeping Toad

GCN Acrostic

Gradually
Reclining into sprays of
Elegant weeds,
As otters play and
Trout loiter;
Caring nothing for the
Ripples and
Eddies where
Silent pike
Float, full of an
Eerie
Destructive promise

Newts
Evade everything
With a smile, bringing
Their own
Silent danger.

The newt

A small dragon hangs,
Mid-water and weightless,
In a deep cold pool,
A delicate jungle unfurling
Beneath slender, splayed toes,
Watching the world
Through eyes as golden
As a pirate's envy.

Watch

Night dark and jewelled
A cruise, a prowl, a darting strike;
Stillness follows.

GCN Nest Mural by Jane Mutiny
at Spitalfields City Farm

Newts: latest literature

by Dr Laurence Jarvis, Science & Research Manager

Identifying suitable breeding ponds is crucial for amphibians. Newts may select ponds in which to breed using a range of criteria such as habitat quality, including pond size and location; the size and age of the individual; as well as the presence and abundance of members of the same species (conspecifics). In addition, newts may use the presence and cues of individuals from other species when making decisions about dispersal and migration (heterospecific attraction) (Figure 1). Cayuela et al. (2018) carried out research on great crested newt (*Triturus cristatus*) dispersal patterns to determine how they are affected by the presence of two heterospecific species: the alpine newt (*Ichthyosaura alpestris*) and the palmate newt (*Lissotriton helveticus*). Over a 20-year period at four clusters of three ponds in eastern France the researchers carried out capture-mark-recapture on great crested newts. Cayuela et al. (2018) found that great crested newt dispersal varied depending on the context: individuals were less likely to emigrate from ponds with high densities of palmate and alpine newts and were more likely to immigrate to ponds with high densities of palmate and alpine newts. It appears that *T. cristatus* adults do not avoid ponds with a high density of other newt species to limit competition such as for food or egg-laying sites. Instead, the results from this study show that great crested newts tend to aggregate in ponds with high numbers of other closely related newt species and may be using scent cues to locate suitable breeding ponds (Cayuela et al., 2018). These results suggest that great crested newts may use the presence of other closely related newt species as a proxy of breeding pond quality, i.e. if there are already high numbers of palmate and alpine newts present in a pond then it indicates high prey abundance and a good quality habitat for breeding.

In a related study on great crested newts, Denoel et al. (2018) found that great crested newts exhibit two types of behavioural strategies: site faithful and high dispersing. Whether an individual exhibits a site faithful or dispersing strategy may depend on environmental conditions, as well as the individual. Denoel et al. (2018) found that individual newts which migrated in one year were likely to migrate to another pond the next year; however individuals which remained site faithful in one year were likely to remain for the next and subsequent years (Denoel et al., 2018). These findings show that individual behavioural variation may occur within great crested newt populations. In this study, individual newts which exhibited the dispersing strategy occupied, on average, larger ponds than individuals displaying the highly site faithful strategy. In addition, individuals with a low site faithful strategy had a larger body size and higher survival rate (Figure 2). Larger individuals are likely to be able to move faster and are less prone to desiccation than smaller individuals. Therefore, the risks posed of migrating on land are higher for smaller newts and these are less likely to be high-dispersers.

Sound production has been widely studied in anurans (frogs and toads) but remains relatively understudied in newt species. Terrestrial salamanders produce low intensity sounds, such as hisses, clicks, or squeaks, when threatened or during mating (Hubáček et al., 2018); however, little is known about sound production in European newt species. It is known that aquatic newts occasionally produce squeaks when handled or clucking sounds whilst gulping air at the water surface but little else is known of sound production or its function in these species. Generally, salamanders and newts lack a tympanum and middle ear, but they may detect sounds through other means such as an air-filled mouth cavity or air volumes in their lungs (Hubáček et al., 2018). Hubáček et al. (2018) studied the acoustic repertoire of a population of alpine newts (*Ichthyosaura alpestris*) and smooth newts (*Lissotriton vulgaris*) in the Czech Republic (Figure 3). The researchers found consistent under water sound production, mainly clicks, in these two species. Newt underwater sound production varied among individuals but not between species (Hubáček et al., 2018). However, click frequency was affected by body mass and suggests that clicks may provide some information about the body size of the sound producer in the absence of visual cues. Therefore, these clicks may have some potential for sex recognition in alpine newts because of their prominent sexual size dimorphism with females being larger than males. Although some of the findings from this study are speculative, it demonstrates the potential for a function for underwater sound in aquatic European newt species.

Introduced species from northern Europe such as the alpine newt increase the risk of introducing Bsal to wild populations of newt in the UK.

Both smooth newts (A) and alpine newts (B) produce underwater clicks which may be used to help identify individuals within an area.

Amphibian disease spread is becoming of increasing concern in the UK. The chytrid fungus, *Batrachochytrium salamandrivorans* (Bsal) is a recently discovered disease which has caused high mass mortality and population declines in newt and salamander species in The Netherlands, Belgium and Germany. Research suggests that this disease originated in Asian salamanders and has been brought to Europe via the pet trade. The disease has not yet been found in North American species but has been recorded from pet specimens in both the UK and northern Europe. To evaluate whether BSal is present in newt species in UK newt species (smooth, palmate and great crested newts), Cunningham et al. (2019) carried out disease surveillance between 2013 and 2017 as well as using archived samples. Results from this study indicate that Bsal is either not present in wild amphibians in the UK, or that its presence is localised and/or at low prevalence (Cunningham et al., 2019). Cunningham et al. (2019) therefore recommend "it is appropriate to adopt the precautionary principle and develop plans based on the assumption that wild amphibians in the UK are currently Bsal-free". However, there is still a risk of the disease spreading to wild newt species from captive specimens in the pet trade. It is important to convey this message to hobbyists who may hold captive specimens of species from Europe, such as the alpine newt, to ensure that our native newt species remain disease-free.

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Reports on three Great Crested Newt sites

Hampton Nature Reserve, Peterborough

by Ross Edgar, Conservation Officer

Hampton Nature Reserve (HNR) is a 300 acre former brick pit & is a designated SSSI (Site of Special Scientific Interest) & SAC (Special Area of Conservation) on the outskirts of Peterborough. The reserve has a number of protected species, including great crested newt.

Froglife manages the reserve on behalf of the landowner (O&H). The site is closed to the public & the only way to access it is to volunteer with Froglife. Volunteers work on different projects around the reserve including habitat management & also a variety of species surveys across the site.

There are more than 300 ponds on the reserve & almost all of the terrestrial habitat is favourable for great crested newts including scrub across the site & woodland to the northern & southern areas of the reserve.

We are currently working on the habitat management & improvement programme. One of the main tasks during volunteer days is clearing trees & scrub around ponds that are in later stages of succession. The cut material is then used to build hibernacula.

Hibernaculum, close to a survey pond

Another project that has just been completed is the undertaking of targeted marginal vegetation management, mainly reed bed, clearing scallops into 65 great crested newt breeding ponds around the reserve. The scallops are generally 1.5 metres wide & 1.5 metres from the pond edge. This allows access for torch light surveys during spring. The 65 ponds, spread across the reserve are then surveyed three times each year. The cut reed is piled up making habitat piles that are beneficial to grass snakes & other wildlife.

Brush Cutting scallops in one of the newt survey ponds February 2020

Muiravonside Country Park

by James Stead, Come Forth for Wildlife Project Manager

Muiravonside Country Park, managed by Falkirk Community Trust, is the only country park in the Falkirk area and has a fantastic range of habitats and attractions within. These include woodland, parkland, an animal farm, sculpture trail, play areas and café. However the country park is also home to a population of great crested newts and Froglife originally worked in the park in 2015 on our previous project in Scotland, Scottish Dragon Finder, to restore the existing great crested newt pond and create four new lined ponds nearby.

With these successfully in place and our new Scottish project, Come Forth for Wildlife, launching at the end of 2019, there was scope to further enhance the network of great crested newt ponds. Creating new ponds of different shapes, sizes and depths is of great benefit to a range of flora and fauna but also has advantages for the great crested newt population. This pond network is now more robust, meaning that if a pond were to fail in the future or be compromised then great crested newts could utilise other ponds for breeding. The additional ponds also give the chance for the local great crested newt population to expand.

In November 2019 two new lined ponds were created. One of these is near to a footpath within the country park and is the only pond in the park to feature a dipping platform which is a now a great educational resource for the local rangers. A second pond is located more discreetly in an area not easily accessed and thus quieter for wildlife. These ponds will be monitored over the next ten years and staff are always on the lookout at the country park for newt sightings. We will be keen to see what takes up residence in the new ponds as spring develops in 2020!

Ponds created in 2015 by Froglife

One new pond created in November 2019 as part of Come Forth for Wildlife

Reports on three Great Crested Newt sites

Sheffield Wildlife Corridor

by James McAdie, F.E.S Operations Manager

I vividly remember growing up that break times and lunch times at school were spent frantically moving from individual to individual looking to conclude deals trading in the accepted currency of the playground…Panini Football Stickers! You would have a stack of duplicate stickers that you were looking to swap in exchange for ones that you needed to complete your collection with all having a similar value with an exception, the golden foil club badge stickers. Every potential deal would start with the same question "Do you have any gold stickers?"

Life has changed since the days of Panini football sticker collections for me with the playground meetings being replaced with site meetings usually to discuss pond restorations or creations. The request to ascertain the presence of gold stickers now has been replaced with the question "Are there Great Crested Newts in the ponds?" Great Crested Newts have become for me and many others the golden stickers of the pond world. This is not to devalue the ponds' other inhabitants or place the Newts importance above our other fellow amphibians but it has for numerous reasons including its protection status become one of the initial discussion topics.

Two sites almost 4km apart on the South East side of Sheffield were home to populations of Great Crested Newts as well as a whole range of other wildlife. Good quality GCN sites in Sheffield were not in abundance and this was one of the reasons that Froglife in partnership with the City Council enhanced these sites with the restoration and creation of new breeding ponds for the newts present. This work, completed over four years ago, has proved successful with surveys showing a healthy increase in Newt numbers on these two sites.

As often happens with these successful partnerships a new idea was discussed and wheels were put in motion to secure funding for an ambitious project to follow the course of the River Rother creating new ponds and improving habitat joining the two original sites with 34 new ponds. This wetland corridor would provide stepping stones spread amongst ideal habitat that would allow the Newts to move freely and also added connectivity to nearby sites with populations of Willow Tit and Harvest Mice (two more golden sticker candidates!).

The Sheffield Wetland Corridor project was born and with help from Sheffield City Council, Environment Agency, Veolia Environmental Trust, National Grid, Bike Track and many others the project began. Working along the corridor lined ponds and scrapes were created with wildlife friendly basking banks, hibernacula and a mixture of native aquatic planting and seed sowing complimenting the new water bodies. As the months went by the heavens opened and the rain fell filling the ponds as quickly as they were created. Within a year of funding being secured the projects major works have been completed with the target of 34 pond creations being surpassed and 55 new water bodies spread along the corridor.

With the project being completed by the planting of almost 7,000 native tree and scrub whips by the local community and schools in Feb/Mar 2020 it is too early yet to measure the success of the project. With the quality of the habitat works carried out being so high I am very optimistic that in the near future Sheffield will be adding a great deal more gold stickers to their already impressive collection!

Studying the effects of predator cues on

great crested newt larvae

by Rachel McNally

Amphibians have always been close to my heart, so I was thrilled to get the opportunity to conduct my postgraduate research project at Froglife's Hampton Nature Reserve in 2018. My study involved looking to see whether chemical cues released by predators, also called kairomones, affected the larval development of great crested newts (*Triturus cristatus*).

Predator-induced plasticity (the effects of predator chemical cues on prey species) is often studied in amphibians. In 2010, Froglife's own Dr Laurence Jarvis investigated the effect of chemical cues produced by three-spined stickleback (*Gasterosteus aculeatus*) on great crested newt embryos. My work was to follow this up, by looking at how three-spined stickleback kairomones affected great crested newt larvae.

I collected larvae from three ponds on Hampton Nature Reserve that were known not to have any fish present within them. I redistributed the larvae, putting some in ponds where three-spined stickleback were known to be present, some in ponds without fish present, and leaving some in their original ponds. To keep track of the larvae, I made small mesh bags to put them in within the pond - this meant that the kairomones could get to the larvae, whilst keeping them safe, secure and easy for me to find. They were kept in these ponds for two weeks, during which time I visited the site three days per week and took photos of the larvae. I used these photos to digitally measure the larvae's length, height and shape, so that I could see how quickly they grew and how their proportions changed over time.

Based on numerous studies in other species, I was expecting the larvae to grow more slowly and develop a larger tail fin when they were kept in ponds with fish present. In addition, I expected that those individuals that were kept in fish-containing ponds may not survive for as long as those kept in ponds without fish - this was based on Dr Jarvis' findings from 2010, as he found that the embryos did not survive as long when exposed to three-spined stickleback kairomones.

To my surprise, I didn't see any of these effects! There was no difference in either the speed at which the larvae grew, the proportions that they developed or the time for which they survived between larvae kept in fish-containing ponds and those kept in non-fish-ponds. The lack of response to kairomones in the development and proportions of the embryos supported a number of previous ex situ studies on the topic but, with a wealth of research in amphibians showing effects of kairomones on these factors, it was surprising nonetheless. Similarly, a lack of difference in survival time between the fish-pond and non-fish-pond efts was unexpected, as this is not what Dr Jarvis had found in his earlier study, but it is a promising result for this protected species.

Of course, there may have been some other factors which affected my results. Many studies start with embryos, whilst I only looked at the larvae, so it is possible that embryonic exposure to predator kairomones is the key to plasticity in great crested newts. Similarly, amphibians have been shown to react in different ways to different predator cues, so it is possible that opposing effects from other predators in the ponds (for example diving beetles or dragonfly larvae) counteracted each other, cancelling out any changes that might have been seen otherwise. The larvae may also have changed in ways that I didn't study, such as by altering their behaviour. It is clear that more research is needed to further investigate this, and to confirm whether what I saw was a true effect (or lack thereof), or if there were other factors at play that caused these results.

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I couldn't have done any of this without the incredible help and guidance of Dr Laurence Jarvis, Ross Edgar and Froglife volunteers, or without my University of Leeds supervisor, Dr Chris Hassall.

Six years of monitoring under-road tunnels for amphibians

by Sheila Gundry, Development Manager and Dr Laurence Jarvis, Science & Research Manager

Over the past six years Froglife have been monitoring the success of road mitigation tunnels for amphibians. We have used unique infrared time lapse cameras to monitor amphibian movements through 34 tunnels across 7 sites in four countries across Europe (England, Scotland, France and Portugal). During this time period we have recorded 4,760 individual amphibians from 11 species including common frog (*Rana temporaria*), agile frog (*R. dalmatina*), fire salamander (*Salamandra salamandra*), great crested newt (*Triturus cristatus*), western spadefoot toad (*Pelobates cultripes*) and Iberian ribbed newt (*Pleurodeles waltl*). In 2019 Froglife published findings from one of our sites in Northern England, demonstrating a significant population increase in the great crested newt, a European protected species, over a four year period.

Our research has shown that mitigation tunnels can provide benefits to amphibian populations, providing valuable corridors between terrestrial and aquatic habitats. We are currently working on analysing data from all of our sites to fully evaluate the success of the tunnels and to provide guidance for developers, local councils and ecological consultants. This will be helpful for implementing the most effective mitigation solutions for amphibian species.

Newly installed mitigation tunnels at a site in the south of England.

Male great crested newt (Triturus cristatus) entering a tunnel.

A common frog (Bufo bufo) exiting a tunnel at one of our sites in northern England.

Now that we have good data to demonstrate the efficacy of road mitigation tunnels for amphibians, the next step is to promote their use. Too often research is disseminated in the academic world and does not reach the decision makers and, in this case, infrastructure developers. Froglife has initiated a campaign to promote more good quality road mitigation tunnels: https://www.froglife.org/what-we-do/education/london-t-o-a-d/t-o-a-d-campaign/ . This is proving to be popular and support levels are increasing rapidly. The campaign is being run in tandem with a series of public engagement events to raise awareness of the issue of amphibian road deaths and the role of road mitigation tunnels. To attract new audiences Froglife has created a virtual reality experience of a toad passing through a tunnel under a road. This gives an immersive toad's-eye view of the world and the challenges toads face. 5363 people have tried the virtual reality so far and evaluation shows that 75% of people asked had more understanding of why toad tunnels are needed after the VR experience.

These events are being run in high-footfall areas such as London stations and major events such as New Scientist Live! which attract a different range of people from standard wildlife events. New Scientist Live had 40,000 attendees, with 1582 undergoing the Toads VR, which is 13% of the total visitor base.

The campaign is gaining high levels of support and once we have reached a substantial number of signatories, we will use that to provide greater impetus to our guidance to decision makers. We will contact the relevant Government departments, all UK Local Authority transport departments, ecological consultants and developers, and by combining guidance on road mitigation tunnels based on our research plus the substantial support from the public from our campaign and petition, we aim to effect real change.

Jarvis, L.E., Hartup, M. & Petrovan, S. O. (2019) Road mitigation using tunnels and fences promotes site connectivity and population expansion for a protected amphibian. European Journal of Wildlife Research, 65:27-38. https://doi.org/10.1007/s10344-019-1263-9.

Road mitigation tunnel awareness raising stall at Liverpool Street station, London

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Photo: Greg Hitchcock

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And finally, but certainly not least, a big thank you to all of our volunteers especially all those toad patrollers who did such a terrific job again this year.