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The threats facing Scotland's herpetofauna, and what can be done about them

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As well as the overall threats facing all wildlife (habitat loss and degradation, and climate change, mainly) Scottish amphibian and reptile species can face some quite specific threats (Downie *et al*., 2019; McInerny & Minting, 2016). For example, mortality on roads is a major issue for common toads (*Bufo bufo*), linked to the mass migrations in the spring of adults to breeding ponds and in the autumn of juveniles from ponds. Great crested newts (*Triturus cristatus*) have a problem related to their patchy distribution in Scotland and their specific habitat needs: if a pond becomes unsuitable because of vegetation growth, there may be nowhere accessible for the population to migrate to. Charismatic but sensitive species like European adders (*Vipera berus*) may suffer from over-enthusiastic wildlife watchers, especially in these social media days when crowds can be rapidly assembled: current legislation limits disturbance to breeding birds, but there is little similar restriction on disturbance to active reptiles and amphibians (with limitations on interactions with great crested newts the main exception).

The following is a summary of the discussion that took place in a Discussion Topic session at which attendees were asked to assemble a list of the threats they thought our herpetofauna faces, and to make suggestions as to how these threats could be mitigated.

Climate change and habitat loss largely account for the decline in biodiversity across all areas of the world, but other factors can be particularly harmful to amphibians and reptiles. Road mortalities, especially for migrating toads and common frogs (*Rana temporaria*), along with gully pot entrapment have detrimental impacts on amphibian populations. One solution to saving toads and frogs from drowning in gully pots is via the use of ladders that can be inserted into drains, allowing animals to climb back out. Additionally, wildlife tunnels can provide a safer alternative route to crossing roads, eliminating the dangers of traffic and drains.

Pollution is another global threat to species persistence, but there is a lack of focus on the effects of pollution on herpetofauna – particularly reptiles due to their lack of semi-permeable skin. However, reptiles may be susceptible to pollution via bioaccumulation as they prey on animals directly exposed to pollutants. These sub-lethal effects are difficult to observe, especially at the population level, and hence are understudied. Anthropogenic noise pollution also disrupts herpetofauna as mating calls in the form of vibrations are interfered with. Chemical communication can additionally be affected by climate change as both increasing temperatures and carbon dioxide concentrations change the expression and composition of pheromones. These pheromones are important for mate recognition in reptiles, thus disturbance to these reproductive processes may have long-term effects on reptile perseverance.

Another type of pollution occurs in the form of anthropogenic litter. On one hand, rubbish items have been shown to be structurally useful for some amphibians – newts have been seen to lay eggs on plastic – but chemical seepage from litter is considered the main concern. Similarly, microplastics interact with chemicals that can disrupt normal physiological processes. Microplastics are often consumed by tadpoles which can cause blockages in their digestive tracts and also leads to muscle malformation, both of which can hinder development. Many studies have explored the effect of microplastics on fish, but few data have been created and quantified regarding amphibians, despite their ability to absorb and excrete toxic chemicals.

Other species, especially game birds, can be a danger to herpetofauna. Common pheasants (*Phasianus colchicus*) kill adders and other reptiles. Domestic dogs (*Canis lupus familiaris*) and domestic cats (*Felis catus*) also create problems for amphibians and reptiles, particularly adders and slow-worms (*Anguis fragilis*), by predating on them, but also via aquatic pollution to water bodies due to topical flea treatments, for example. Ongoing research is investigating the effect of the accumulation of flea treatment compounds on amphibian physiology and health. Furthermore, highland cattle (*Bos taurus*) are seen grazing areas surrounding ponds which can also lead to disturbance and herpetofaunal mortalities. An obvious solution utilised across Scotland is to erect fencing around the perimeter of ponds to prevent entry by dogs.

There is much controversy surrounding social media and, although social platforms can be useful for collaboration and sharing of information, global access to such information can lead to over-exposure. Therefore, disturbance to potential herpetofaunal sites has been amplified and this has led to researchers keeping information on known spots to themselves, or restricted to small communities, to prevent excessive numbers of people from flooding areas where herps are present. Sharing of false information is another issue with social media, meaning that inappropriate and

potentially damaging behaviours can be replicated all over the world without considering the wider implications. Hence, some regulation is needed: for example, to prevent the harvesting of frogspawn on a large scale.

The recently proposed relaxation of legislation for the protection of herpetofauna in the U.K. (Tse-Leon, 2024) has meant that now only IUCN-defined threatened species are considered in need of legal protection. Adders are hence assumed not to need protection due to their relatively high abundance across Scotland. It was debated whether legislation was ever originally followed and concluded that implications must be reinforced to prevent activities that cause disturbance. Even unobserved crimes such as dumping chemicals into ponds need to be monitored more effectively. Often, local walkers are the best source of consistent information regarding such events.

Finally, disease is a worldwide threat to fauna and flora, and examples of lethal pathogens for herpetofauna are the fungi *Batrachochytrium dendrobatidis* and *B. salamandrivorans* which cause chytridiomycosis in amphibians. As Scotland's climate is getting warmer and drier, with even drought occurring, it is thought that chytrid disease may thrive and hence increase its success in such conditions. Awareness around infectious disease in increasing, but further investigation into how such fungi evolve and invade new areas and species is required to protect Scotland's herpetofauna.

REFERENCES

Downie, J.R., Larcombe, V. & Stead, J. (2019). Amphibian conservation in Scotland: a review of threats and opportunities. *Aquatic Conservation* 29, 647-654. https://doi.org/10.1002/aqc.3083

McInerny, C.J. & Minting, P.J. (2016). *The Amphibians and Reptiles of Scotland*. Glasgow Natural History Society, Glasgow.

Tse-Leon, J. (2024). Protecting Britain's wildlife laws. *The Glasgow Naturalist* 28(2), 91-94.