NatureScot
Scotland's Nature Agency

**NatureScot**

**SCIENTIFIC ADVISORY COMMITTEE**

**INFORMATION PAPER**

# DEVELOPMENT OF A STRATEGY ON THE CONSERVATION OF HERPETOFAUNA

## Purpose

1. This paper reports on the development of a strategic approach to the conservation of native Scottish reptiles and amphibians.

## Action

1. **The Committee is asked to note the work undertaken to date.**

## Preparation

1. The paper has been prepared by Rob Raynor with input from Colin Bean and John McKinnell. It is sponsored by Eileen Stuart.

## Background

1. Amphibians and reptiles are a long neglected group of animals and the need for a structured approach to their conservation in Scotland was identified within NatureScot some time ago.
2. To address this, a draft strategy for the future conservation of Scottish amphibians and reptiles has been developed by NatureScot drawing on input from specialist non-governmental organisations and discussions at The Amphibia and Reptiles of Scotland conference held in the University of Glasgow in 2018, with the intention of using this forum to help inform a framework for future conservation action of herpetofauna in Scotland. The draft strategy, now titled: A strategy for the conservation of terrestrial amphibians and reptiles of Scotland, took account of the comments made by species specialists at the conference, and was reviewed by a member of NatureScot’s Expert Panel, Professor Rob Ogden (University of Edinburgh), in 2020 (see Annex).
3. This broad strategy is intended to help guide the work of public bodies, business and voluntary organisations, recognising that a partnership approach between the relevant stakeholders is required if we are to achieve our common objectives for the conservation of Scotland’s herpetofauna. The approach recognises the five key global drivers of biodiversity loss and our intention is that it will help support the next phase of delivery of amphibian and reptile conservation objectives within the Scottish Biodiversity Strategy. We also envisage that it will help guide our priorities in terms of grant aid/support for the work of the herpetological NGOs within Scotland.
4. In developing the strategy we have:-

* sought the views of the relevant specialist herpetological NGOs and their associated volunteers on their priorities for future work and direction;
* considered where there may be efficiency savings to be made by working collaboratively with other (non-herpetological) specialist NGOs;
* reviewed the available best practice guidance;
* reviewed the existing scope of surveillance & monitoring requirements and what improvements/additions are required;
* proposed new areas of commissioned research and survey which may be taken forward if resources are available.

1. The strategy is divided into two parts; the first provides an overview of the current situation, including evidence of species decline, gaps in existing knowledge, pressures and threats, the status of protected sites, current conservation action and the challenges to delivering herpetofauna conservation. Part 2 comprises the strategy itself, focusing on addressing deficiencies in species information, addressing the pressures and threats and moving towards a more inclusive and proactive approach for the future.
2. At its core lies the concept of connectivity. Unlike many terrestrial vertebrates, amphibians and reptiles generally have limited ability to disperse very far from their natal area. In a fragmented landscape this can lead to isolation and threaten local populations. Add to this the influence of climate change on essential habitats and some species become vulnerable to extinction if there is no opportunity for successful migration elsewhere.
3. One potential mechanism for improving habitat connectivity, especially in lowland intensively farmed and/or urban/industrial landscapes is to utilise existing linear features such as former dismantled railways where they still exist and manage the habitats along them sympathetically for the benefit of both herpetofauna and other wildlife such as pollinators. This might also be achieved even when such features are destined to be developed as long distance footpaths, cycleways etc., provided sufficient undeveloped and suitably managed habitat along the margins can be retained. Feedback from specialist herpetological NGOs suggests that we ought not to place too much emphasis on this as a priority for future action, but we consider that it can, nevertheless potentially make a useful contribution.
4. In terms of delivery, the strategy encourages a collaborative approach to herpetofauna conservation, promoting cooperation with other specialist organisations responsible for taxa facing similar threats and identifying actions that can be of wider benefit, including helping pollinators and utilising networks that can also bring people closer to nature. Rather than focusing on the needs of amphibians and reptiles in isolation, we should be looking for synergies with the work of other specialist NGOs (e.g. Butterfly Conservation, BugLife etc.).
5. The stated aim of the strategy is “To maintain healthy, self-sustaining populations of all native amphibians and reptiles and reverse previous declines”
6. To support this, the strategy has three objectives:

* To improve our understanding of the current status of Scottish amphibians and reptiles and the threats they face
* To reverse any previous declines in populations, range and genetic diversity and address the pressures and threats faced by Scottish amphibians and reptiles
* To set in place a more inclusive and proactive conservation management approach for the future.

1. The strategy takes account of the recent species prioritisation and red-listing exercises, both of which highlight the natterjack toad’s vulnerability in Scotland, see [vulnerability of the natterjack toad population in Scotland](https://www.arc-trust.org/Handlers/Download.ashx?IDMF=c8d67d80-1670-4d0a-a504-a3ed0bcf4725). The natterjack is the only native Scottish herpetofaunal species assessed as ‘Endangered’ at both Scottish and GB levels according to IUCN risk criteria. The adder and common toad are assessed as ‘Near Threatened’, while the remaining species are all assessed as ‘Least Concern’. This should not, however, be interpreted as an indication that there are no concerns about the status of any of these species, given past declines and habitat loss/degradation.
2. While much of the available resource will likely continue to focus on natterjack toad and, to a lesser extent, great crested newt, the strategy aims to redress the balance by devoting increased effort towards the other 7+ species that are not identified as EPS. This is partly through the efforts of the voluntary sector but also through some new NatureScot commissioned work, such as the forthcoming repeat of the 1990s SNH Scottish adder survey, planned for 2022 and 2023.
3. The strategy promotes the idea of establishing a formal Scottish herpetofauna conservation steering group with representation from the key stakeholder organisations (including, for example, the ARC Trust, ARG UK, FrogLife, key academic institutions (such as the University of Glasgow), other eNGOs that own/manage relevant wildlife habitats in Scotland, local authorities and certain major landowners including Forestry & Land Scotland). Such a steering group would be responsible for helping to develop an implementation plan to support the strategy and monitoring progress against it, securing commitment from the respective organisations tasked with delivery and providing support and assistance with delivery, wherever possible. An annual conference or similar could provide a platform to review progress and help maintain momentum towards the objectives.
4. We consider that the strategy should ideally, be explicitly referred to within the next edition of the Scottish Biodiversity Strategy. Similarly, it is vital that the aim of the strategy is supported by future changes to agri-environment schemes in Scotland and early input to the process of developing a new suite of herpetologically-friendly prescriptions for the next agri-environment scheme is seen as a priority.
5. To sum up, if we are to achieve our NatureScot goal of a nature-rich future, we need to focus now on what we can do for all of our biodiversity, not just the high profile charismatic species that have widespread public appeal, or the “quick wins” that generate snappy good news stories. This strategy aims to do just that for a group of largely neglected and often maligned vertebrates. It will doubtless evolve further but the strategy as it stands hopefully now provides a framework on which to build.

**February 2022**

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ANNEX

A strategy for the conservation of terrestrial amphibians and reptiles of Scotland

FOREWORD

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## INTRODUCTION

This document set out the current situation for Scotland’s amphibians and reptiles. It describes the main threats and opportunities affecting the Scottish herpetofauna, the reasons why action is needed and the challenges we must meet to enable their conservation. It then shifts the emphasis towards a more strategic approach to conserving these species in the future, recognising the five key global drivers of biodiversity loss and supporting the next phase of delivery of the Scottish Biodiversity Strategy. The strategy (for amphibians and reptiles) has been prepared by NatureScot drawing on input from specialist non-governmental organisations and discussions at a herpetofauna (herps) conference held in Glasgow in 2018, with the intention for it to form a framework for future conservation action in Scotland. An implementation plan will be produced in due course to support delivery.

The strategy is intended to help guide the work of public bodies, business and voluntary organisations, recognising that a partnership approach between the relevant stakeholders is required if we are to achieve our objectives.

A key requirement is a better understanding of the current population status and trends of Scottish reptiles and amphibians, as well as the threats and pressures affecting them. The population status and trends of most species are incompletely understood. So, while there is evidence of pond losses in the last century and land-use change, the lack of long-term systematic monitoring for most species means that the empirical evidence base for population declines and our understanding of the effects of perceived threats and pressures is often inadequate.

At its core lies the concept of *connectivity*. Unlike larger vertebrates including most birds, amphibians and reptiles generally have limited ability to disperse from their natal area. In a fragmented landscape this can lead to isolation and threaten local populations. Add to this the influence of climate change on essential habitats and some species become vulnerable to extinction if there is no opportunity for successful migration elsewhere.

Such challenges are not, of course, unique to amphibians and reptiles; the declaration of a climate emergency, and recognition of the critical role that pollinators play both in natural ecosystems and in food production, both point to the importance of improving habitat connectivity. The strategy therefore encourages a collaborative approach to herp conservation, promoting cooperation with other specialist organisations responsible for taxa facing similar threats and identifying actions that can be of wider benefit, including helping pollinators and utilising networks that can also bring people closer to nature.

# PART 1: THE CURRENT SITUATION

# **AN OVERVIEW OF SCOTLAND’S HERPETOFAUNA**

In Scotland we have six native amphibian species and three or four native terrestrial reptiles[[1]](#footnote-1) - modest by continental European standards, but a reflection of Scotland’s northerly latitude and cool, maritime climate. These species and their respective status are listed in Table 1. In addition, one of the marine turtles – the leatherback is a regular visitor to our waters, mainly during the summer and autumn months, but breeds elsewhere in warmer latitudes. It is not considered further as the strategy is restricted to terrestrial species.

Amphibians, in particular, are useful biological indicators of environmental health and important members of healthy functioning ecosystems. Due to their high degree of sensitivity to a range of environmental variables, either during tadpole stage or as adults, amphibians are affected by very slight changes in the environment. These effects have been used to indicate habitat fragmentation, ecosystem stress, impact of pesticides, and various anthropogenic activities.

Several of our amphibians and reptiles play important roles in natural biological control of so-called pest species. Frogs, toads and slow worms help keep many garden pests under control, while adders prey mainly on voles and mice. And because many species hold mid-level positions in food-webs, some amphibians, in particular, play an important role in the food chain as prey for other species, to the extent that in some habitats, both frogs and palmate newts can be amongst the most numerous vertebrates. Indeed, for some predators such as the otter, breeding amphibians form important seasonal prey in the spring when the availability of fish may be restricted.

*Table 1: Summary of the status of Scotland’s terrestrial herpetofauna (excluding known non-natives)*

| **Species** | **Status & distribution** | **IUCN threat category (Scotland), after Foster *et al* (2021)** |
| --- | --- | --- |
| Palmate newt (*Lissotriton helvetica*) | Widespread in a range of habitats throughout the mainland and some islands. | Least concern |
| Smooth newt (*Lissotriton vulgaris*) | Restricted, mainly found in low-lying areas. | Least concern |
| Great crested newt (*Triturus cristatus*) | Rare and restricted, mainly found in low-lying areas. | Near threatened |
| Natterjack toad (*Epidalea calamita*) | Rare and restricted to a few sites on the Solway coast. Declining. | Endangered |
| Common toad (*Bufo bufo*) | Widespread in a range of habitats throughout the mainland and some islands. | Near threatened |
| Common frog (*Rana temporaria*) | Widespread in a range of habitats throughout the mainland and some islands. | Least concern |
| Viviparous lizard (*Zootoca vivipara*) | Widespread in a range of habitats throughout the mainland and some islands. | Least concern |
| Slow worm (*Anguis fragilis*) | Widespread in a range of habitats throughout the mainland and some islands. | Least concern |
| Adder (*Vipera berus*) | Widespread but apparently localised throughout the mainland and some inshore islands. Generally thought to be declining. | Near threatened |
| Grass snake (*Natrix helvetica*) | (Native) status unclear. Records from Dumfriesshire may indicate the persistence of a small, very restricted population (Cathrine, 2014). Several introductions are known, e.g. Loch Lomondside and Argyll. | Not assessed |

## EVIDENCE OF DECLINE

Long-term declines have been identified in the British herpetofauna since the early-mid 20th century but quantitative information on population trends is not available (Beebee *et al.*, 2009)2. Trends for most species in Scotland are less clear, however, pointing to the need for better information to inform conservation action. Undoubtedly there has been loss and degradation of ponds during the second half of the 20th century, attributed largely to agricultural practices, along with mismanagement or infilling[[2]](#footnote-2) (Swan *et al.*,1994), but the lack of long-term systematic monitoring means that the evidence base for population declines and the effects of perceived threats and pressures is often inadequate.

Much of the available information is now quite dated or limited to distribution data from the NBN and other recording schemes. A lot of the historical information on trends is based on questionnaire surveys from the 1980s and 1990s, e.g. Cooke & Scorgie (1983) and Hilton-Brown & Oldham (1991); importantly, there has been no systematic survey of the widespread species in Scotland since the early 1990s. More recent information exists in the form of the National Amphibian and Reptile Recording Scheme (NARRS) (Wilkinson & Arnell, 2011), but this has limited coverage in Scotland and sample sizes are small. In 1993 an SNH report (Reading *et al.*, 1994) focussing on adders suggested that they were widespread but with localised population declines and a decline in range. Data from the GB-wide *Make the Adder Count* surveillance scheme has confirmed a significant decline, on average, across sites with small populations, while the few with large populations are weakly increasing. If these trends continue, within 15‒20 years, adders will be restricted to a few large population sites, significantly increasing their extinction risk (Gardner *et al*., 2019). Public pressure/ disturbance was reported as the most frequent negative factor affecting sites, followed by habitat management and habitat fragmentation. Data from NARRS also suggest a decline in adders, generally, but the limited coverage in Scotland restricts the conclusions that can be drawn and underlines the need for further work.

Two species have been reasonably well surveyed, however, namely the natterjack toad and great crested newt. The former has experienced a decreasing range, i.e. a contraction in range of about 80% since 1849 for the population west of the River Nith from Carsethorn to Southerness (Fleming *et al.* 1996). The total population in the 1970s was estimated to be several thousand, but is now unlikely to be more than few hundred with only 49 breeding females recorded in 2018 (Joint Nature Conservation Committee, 2019). The decline is apparent at most of the Scottish sites but there has been an increase where habitats have improved or undergone change, such as at the RSPB Mersehead reserve. The decline has been linked to changes in terrestrial land use such as lack of grazing[[3]](#footnote-3), increased land drainage, aquatic habitat succession, coastal squeeze, increased tidal inundation and disease. Great crested newts have also been subject to more intensive study in recent years and is recorded from over 200 breeding ponds (Joint Nature Conservation Committee, 2019), but overall trends are unclear as new breeding ponds are continually being discovered, largely within the established species range.

## GAPS IN OUR UNDERSTANDING OF SPECIES STATUS

An up-to-date understanding of amphibian and reptile distribution and status is at the heart of their conservation, but existing information on the distribution of Scottish species is patchy. There is good information on great crested newt and natterjack toad, but for the other species, our understanding of their recorded distribution often reflects where the greatest recording effort has been focussed rather than true presence/absence. In common with various other taxonomic groups, this is a particular challenge in rural areas where the number of active recorders is very limited and localised and, likewise the number of new recruits is similarly constrained. The existing data are held in a variety of locations although not all of it is publicly accessible, e.g. via [Scotland’s Environment Web](https://www.environment.gov.scot/) (SEWeb).

The recorded distributions (since 2000) of terrestrial Scottish amphibians and reptiles are mapped in *The Amphibians & Reptiles of Scotland* (see footnote 1). These maps, while informative, also illustrate the patchy nature of recording for many species, despite the considerable contribution made by volunteer-based recording and monitoring schemes such as *NARRS* and *Dragon Finder*.

We need better information and/or an improved understanding of:

* species occurrence, especially in the more sparsely populated under-recorded areas.
* the location of any geographical “hotspots” and whether the populations in these areas exist in isolation or are likely to be connected to others elsewhere.

* population trends; reliable trend data for all species are essential and needed to inform conservation action. Trend information is limited for all species except the natterjack toad.
* the value and applicability of new technologies in detecting cryptic and elusive species, such as environmental DNA (eDNA) analysis of water or soil samples to enable species detection without requiring direct observation of reptiles or amphibians.

## PRESSURES AND THREATS

The following are considered to represent the most significant pressures and threats facing Scottish amphibians and reptiles, although the extent to which they affect these animals at the population level is still poorly understood.

## Habitat loss and fragmentation

Amphibians and reptiles require a diverse range of habitats that are well connected to ensure dispersal and associated gene flow between populations. Some species can flourish in the urban environment provided there are suitable pockets of habitat such as breeding ponds for amphibians within a wider network of green space. Habitat loss and fragmentation are considered by the IUCN to be the “most pervasive threats to amphibians globally” and the loss of ponds in rural areas due to natural succession is an on-going issue as many are no longer needed to water livestock and, without adequate replacement elsewhere, there is thus an overall decline in the resource. For reptiles, afforestation, inappropriate (early spring) muirburn[[4]](#footnote-4), scrub removal, over-grazing of rough grassland and heather, peatland restoration (if lacking measures to protect key herp features), agricultural intensification and cutting/mowing road verges and embankments when reptiles are likely to be active, are all examples of widespread practices that can be harmful and are likely to be particularly detrimental at sites where there is little or no connectivity with suitable habitat elsewhere. In Scotland, this may be most significant in lowland areas, where patches of semi-natural habitat exist within an intensively-farmed landscape, often with few or no links to other such patches, and the pressure on land for agriculture and urban development is at its greatest. Improved measures specifically targeted at herp conservation in future agri-environment and forestry schemes would help reverse some of these impacts.

A key factor contributing to habitat fragmentation is our network of roads and, while it is unclear to what extent road casualties may affect local populations of amphibians and reptiles, the magnitude of frog and toad mortality near some breeding ponds in the spring is very likely to be unsustainable, even if breeding populations continue to persist over the short-term.

## Climate change

All of our native amphibians and reptiles are widely distributed in Europe and exist across a range of climatic conditions. Climate change modelling undertaken in 2012 (Dunford & Berry, 2012) and based on both high and low emissions scenarios, suggests that an improving climate in northern Britain may provide new climatically appropriate spaces in Scotland, with all native species currently present in Scotland predicted to benefit in terms of new available climate space. If correct, these predicted changes couldlead to Scotland having a more important role in the future for the conservation of some species. However, issues such as connectivity and ease of movement may limit a species’ ability to adapt such that without connections to suitable alternative sites, some are likely to be negatively impacted. For example, two designated sites notified for natterjacks on the Solway Firth have been identified as being amongst the most vulnerable to the effects of climate change, reinforcing the need for adequate connectivity to enable dispersal to other unoccupied suitable habitat elsewhere. Other potential negative effects include a likely increase in the frequency of heathland fires which can lead to local extinction of reptiles and pollution of water bodies where amphibians breed. Higher temperatures may also lead to premature drying-up of ponds before amphibian larvae can metamorphose and have secondary consequences involving the spread of pathogens.

## Disease

In recent years several diseases affecting amphibians have spread globally and have led to catastrophic declines in some countries. Such declines have not been observed in Scotland but some of the most virulent pathogens such as chytrid (*Batrachochytrium dendrobatidis*) and *Ranavirus* have been found here, although both remain very rare. Monitoring effort has so far focused mostly on chytrid, principally on natterjacks in view of their scarcity and proximity to the Cumbrian population where the fungus appears to be widespread. Increased temperatures associated with climate change are associated with higher mortality from *Ranavirus* and the disease itself has now been recorded spreading northwards in England, leading to the possibility that it may become more prevalent in Scotland.

The recently discovered newt chytrid (*B. salamandrivorans*), widespread in British captive amphibians, presents a potential threat to all three native newt species if it became established in the wild. So, while there is no indication that an outbreak is imminent, effective on-going surveillance of this (and other key pathogens) is essential to facilitate early detection and the implementation of an appropriate response. It is therefore important for those working on amphibians and in freshwaters generally to be careful and adhere to the agreed [biosecurity protocol](https://www.arc-trust.org/Handlers/Download.ashx?IDMF=ff5aaa14-3ca6-4a99-b813-4dcc99489f64). On-going vigilance and increased awareness is required amongst all those whose activities may risk spreading water-borne diseases that are harmful to amphibians.

## Non-native species

Non-native species can impact on our native fauna in a variety of ways, e.g. through predation, competition and the spread of disease. In Scotland it is an offence to release non-natives into the wild and to release naturally-occurring species out with their native range. The [Scottish Government Code of Practice on Non-Native Species](https://www2.gov.scot/Resource/0039/00393567.pdf) details the legal requirements concerning invasive non-native species and provides a framework for how everyone can play their part in preventing releases. At least three non-native herps are known to be locally established in Scotland: the alpine newt (*Ichthyosaura alpestris*), North American slider (*Trachemys scripta*) and sand lizard (*Lacerta agilis*)[[5]](#footnote-5). There is no evidence of spread of the latter two species, although the situation is less clear for alpine newt due to a lack of systematic monitoring. The sliders (terrapins), whilst able to persist for many years in the wild, are unable to breed successfully anywhere in the UK.

The importance of preventing further introductions (e.g. as potential carriers of chytrid or other pathogens) is paramount and cannot be over-emphasised; so we need to maintain vigilance to detect invasive non-natives before they become established. A risk assessment has been undertaken to identify those species considered most at risk of becoming established. The list[[6]](#footnote-6) includes one amphibian, the American bullfrog (*Lithobates catesbeianus*) assessed as being medium risk, but no reptiles.

A more widespread and immediate threat exists in the form of fish introduced to ponds where they did not naturally occur, which can lead to local extinctions of amphibians, either through predation or disease transmission. Fish introductions, even small species like sticklebacks, can exterminate great crested newts within a few years because their larvae, swimming in the open water are vulnerable to attack (Baker, 1999)1. Even some species thought to be no threat to amphibians in later life-stages have been shown to predate amphibian eggs Leu *et al*., 2009). Unfortunately, as many fish introductions are unrecorded and may take place illegally (fish introductions must be licensed in Scotland), evidence is lacking as to the true scale and impact of this practice on Scottish amphibians, although fish have been strongly linked with great crested newt population loss in the Highlands (Miró *et al.*, 2017). Irrespective of this, such activity is widely regarded as detrimental because of its impact on wild fish stocks and biodiversity generally, so the underlying message is primarily one of education and increased awareness amongst anglers and fishery managers. Fish introductions are also believed to be one of the main causes of the spread of *Ranavirus*.

Predation on reptiles, in particular, from domestic (and feral) cats can be an issue close to some urban areas, sometimes leading to suppression of local reptile populations (Edgar *et al.* 2010). This can be difficult to address and education may be the only realistic option.

## Pollution, eutrophication and pesticides

Scotland has some of the cleanest waters in Europe, but there are issues with water quality in some areas, leading to the eutrophication of water bodies surrounded by intensive agriculture, or the acidification of some upland sites where there is low pH buffering capacity. In these areas, pollutants, including acidification, can reach levels known to cause harm to amphibians. Eutrophication of water bodies can lead to oxygen depletion with resultant fatalities amongst tadpoles. Pesticide use can reduce the availability of invertebrate prey and some chemical compounds, particularly those used to control rodents, insects, slugs and snails can bioaccumulate in herps through ingestion.

## Persecution and exploitation

Over-exploitation is not believed to be a significant factor in Scotland although the taking of spawn by children may be a local issue, particularly in urban settings. However, if undertaken responsibly, collecting *limited* amounts of spawn can foster an interest and enthusiasm for amphibians amongst children with potential conservation benefits in the longer term. Persecution is thought to be mainly focussed on adders and possibly also the harmless and superficially snake-like slow worm. Disturbance of adders can also be a problem at some sites. Education is the most effective way to deal with these issues.

In recognition of these threats and historic concerns relating to the sale of some species, all our native amphibians and reptiles receive varying degrees of legal protection, although this is restricted to sale for the more widespread amphibians[[7]](#footnote-7). As a consequence, little or no effort is made to protect the majority of these species during developments and construction projects, unless their habitat happens to be retained for wider biodiversity conservation reasons. The highest level of protection is afforded to our two European Protected Species (EPS) – the great crested newt and natterjack toad. The remaining species (i.e. the native reptiles) are protected against intentional or reckless killing and injury, but their places of shelter are not. In practice, this means that the effectiveness of the legislation covering these species can be limited. For example, in land development, even if appropriate mitigation measures are taken to avoid killing or injury to non-EPS species, there is no legal requirement to ensure that suitable habitat is retained (or created) in the affected areas afterwards. Importantly, killing or injuring our native reptiles does not need to be intentional to be an offence; recklessly doing so would also be illegal. This can have implications for certain development and land management-related activities, whereby a damaging activity in an area where reptiles are known to be present should only take place at an appropriate time of year or according to an agreed method. However, enforcement of the legislation is difficult in practice and prosecutions are rare.

## PROTECTED SITES

Scotland has 6 designated sites for which the herpetofauna is part of the notified interest (Table 2):

Table 2

| **SAC** | **SSSI** | **Local authority** | **Great crested newt** | **Natterjack toad** | **Amphibian assemblage** | **Reptile assemblage** |
| --- | --- | --- | --- | --- | --- | --- |
| Turflundie Woods | Turflundie Woods | Perth & Kinross | X |  | X |  |
| Burrow Head | Burrow Head | Dumfries & Galloway | X |  | X |  |
| Luce Bay and Sands\* |  | Dumfries & Galloway | X |  |  |  |
|  | Upper Solway Flats and Marshes\*\* | Dumfries & Galloway |  | X |  |  |
|  | Royal Ordnance Powfoot | Dumfries & Galloway | X |  | X |  |
|  | Ardgour Pinewoods\*\* | Highland |  |  |  | X |

\* But not an SSSI feature

\*\*But not an SAC feature

The management objectives for these sites need to take account of the requirements of the resident herpetofauna and activities undertaken according to best practice and in a way that maintains the interest and, where necessary, enhances it.

There are many more protected sites that support a thriving herpetofauna which is not part of the qualifying interest or mentioned on the citation. Here, management objectives are focused on maintaining or improving the status of the qualifying interest and therefore may not always be compatible with the requirements of the resident herps. Management activities therefore need to be undertaken sympathetically and according to best practice that takes account of the requirements of herps. Site management plans/statements need to make provision for herps, e.g. by maintaining hibernacula, clearings, wetlands and suitable habitat corridors where native woodland regeneration is the primary objective.

## CURRENT HERPETOFAUNA CONSERVATION

The Scottish Rural Development Programme (SRDP) includes specific advice on [pond creation](https://www.ruralpayments.org/publicsite/futures/topics/all-schemes/agri-environment-climate-scheme/management-options-and-capital-items/pond-creation-for-wildlife/guidance-for-pond-creation-for-wildlife), [great-crested newts](https://www.ruralpayments.org/media/resources/GCN-leaflet-SRDP-AECS-2016.pdf) and [natterjack toads](https://www.ruralpayments.org/media/resources/Natterjack-leaflet-SRDP-AECS-2016.pdf) to support targeted measures for these and other amphibians. The latter has such specific requirements that it requires a bespoke, collaborative approach, with agreed management objectives for all occupied sites, coupled with an effective mechanism for enabling dispersal and colonisation of other suitable areas nearby, if the species is to survive in the long term. Cooperative, landscape-scale management action can be particularly beneficial for many species and is enabled through the Environment Cooperation Action Fund. Similarly, the *Scottish Land Use and Forestry Strategies,* provide opportunities and potential management challenges to amphibians and reptiles and the *National Planning Framework 3 (NPF3)* includes priorities for greening vacant and derelict land areas, and creating green infrastructure. A national priority under NPF3 is the Central Scotland Green Network (CSGN), which focuses on the legacy of disused post-industrial land, poor quality green space and fragmented habitats in the region.

There are also many herp-focused projects led by non-governmental organisations and other government bodies across Scotland, including the following (since 2010):

Species Action Framework (great crested newt – see McKinnell *et al.* 2015).

Amphibians in drains (ARC-Trust)

The Big Swab – surveying for chytrid disease in amphibians (Zoological Society of London, ARG-UK & DEFRA)

Garden wildlife health (Froglife)

Glasgow Green Pathways (Froglife)

Glasgow and North Lanarkshire Living Water 2009-2013 (Froglife)

National Amphibian and Reptile Recording Scheme (ARC-Trust & ARG-UK)

Natterjack toad conservation (ARC-Trust & RSPB)

Record Pool (ARC-Trust & ARG-UK)

Scottish Dragon Finder (Froglife)

Strathpeffer pondscape (Forestry Commission)

Toads on roads (Froglife)

Come Forth for Wildlife (FrogLife)

## CHALLENGES TO DELIVERING HERPETOFAUNA CONSERVATION

To date, herp conservation in Scotland has largely been the focus of a small and dedicated community of enthusiasts comprising several active interest groups operating in various parts of the country, notably the Central Belt, the Highlands and around the Solway Firth. It faces similar challenges to those of other lower profile taxonomic groups and their respective “champion” organisations, namely competition for ever diminishing public funds, restricted membership and limited support out with the major population centres. The available funding tends to be directed towards time-limited projects tailored to meet the requirements of existing funding streams. With no one organisation tasked and equipped with a central coordinating function, or an agreed strategic framework for action within which to prioritise resources and focus effort, this situation is predicted to continue for the foreseeable future.

Current constraints on the availability of resources mean that we must think creatively and look at options for collaborative working, so that benefits to a range of wildlife are possible and opportunities for bringing people closer to nature can be realised. But first we need to identify our strategic priorities: where do the major gaps in our knowledge lie? What actions are required to achieve our objectives? The following section sets out our current understanding of the issues and provides a basis for proposed action.

# PART 2: THE STRATEGY

## Our aim:

## *To maintain healthy, self-sustaining populations of all native amphibians and reptiles and reverse previous declines*

To support this overall aim, the strategy has three **objectives**:

1. *To improve our understanding of the current status of Scottish amphibians and reptiles and the threats they face*
2. *To reverse any previous declines in populations, range and genetic diversity and address the pressures and threats faced by Scottish amphibians and reptiles*
3. *To set in place a more inclusive and proactive conservation management approach for the future.*

These are not independent of one-another, or sequential, but are considered as three facets of the same issue that need to be tackled in concert. The activities required to deliver these objectives are detailed in the implementation plan.

## ADDRESSING DEFICIENCIES IN SPECIES INFORMATION

To address the gaps in our knowledge of species distribution and status, thereby supporting our objective *to improve our understanding of the current status of Scottish amphibians and reptiles and the threats they face*, we need to:

* develop plans for a national assessment of the widespread Scottish herps, involving citizen scientists, NGOs, academics and, potentially, novel techniques for detecting species, thereby updating previous assessments.
* promote greater involvement with existing recording schemes and consider how best to build volunteer capacity in the more thinly populated areas of Scotland. A systematic review of the various recording and monitoring schemes, their level of uptake and the distribution of contributors, would provide a basis on which to focus effort and direct resources towards building capacity in the future. A more systematic approach to recording should aim to address the need for better validation, enabling unreliable records to be rejected.

## ADDRESSING THE PRESSURES AND THREATS

Underpinning our objective to *reverse any previous declines and address the pressures and threats faced by Scottish amphibians and reptiles,* we need to:

## Reverse habitat loss and fragmentation

European legislation requires measures to be taken to improve connectivity between sites supporting our two EPS and this remains a priority. More generally, there is a need for a strategic approach to addressing broad-scale habitat fragmentation that can affect *all* of Scotland’s amphibians and reptiles to a greater or lesser extent, harnessing wherever possible the potential of existing linear features such as former railway lines, canals and long distance paths/cycleways. If appropriately managed, many of these have the potential to act as dispersal corridors between otherwise isolated populations.

A systematic review of these features[[8]](#footnote-8) in relation to known important locations for amphibians and reptiles (and other biota, including pollinators) initially in lowland Scotland, would help identify where important strategic linkages can be made, and thereby help prioritise action on the ground.

To achieve this enhanced connectivity and deliver wider benefits to Scotland’s herpetofauna, habitat improvement proposals need to capitalise on existing environmentally-focused initiatives, incentive schemes and policies wherever possible. Coordinated action under NPF3 can help create habitat corridors of value to herps and other wildlife. Likewise, the *National Walking and Cycling Network (NWCN),* comprising the development of a strategic network of long-distance paths and trails through Scotland has the potential for improving habitat connectivity for many species.

Where habitat loss and fragmentation is associated with development pressure and mitigation is required, technical guidance informing best practice is available, although some of it requires updating and refocusing specifically to the situation in Scotland. New, bespoke reptile mitigation guidance would help promote a more consistent approach to addressing the needs of reptiles at Scottish development sites.

## Counter the effects of climate change

Our overall approach to helping nature adapt to climate change is set out in [Climate change and nature in Scotland](https://www.nature.scot/sites/default/files/Publication%202016%20-%20Climate%20change%20and%20nature%20of%20Scotland.pdf), which identifies eight adaptation principles. Existing climate envelope modelling provides an insight into how the Scottish herpetofauna may respond to warming, but this is just one model and others may generate different, possibly conflicting outputs in terms of individual species responses. With a better understanding of such responses, the most appropriate remedial measures can then be developed and implemented. Irrespective of this, improving habitat connectivity is likely to be beneficial to most, if not all species in any scenario, unless there are specific issues around the containment of disease and/or invasive non-native species, for which greater connectivity would be discouraged. Other measures that may help mitigate the negative effects of climate change, such as Sustainable Drainage Systems (SUDS) and building fire breaks and fire ponds, can also benefit reptiles and amphibians by the creation or improvement of habitat.

## Monitor and prevent the spread of disease

On-going vigilance and increased awareness is required amongst all those whose activities may risk spreading water-borne diseases harmful to amphibians. It is essential for those working on amphibians and in freshwaters generally, to adhere to the agreed biosecurity protocol concerning the spread of pathogens.

## Monitor and prevent the spread of non-native species

To prevent the establishment of any new non-native amphibians and reptiles, ongoing monitoring of those already established, involving local volunteer groups, the GB Non-Native Species Secretariat and SNH should continue, especially where there is evidence that climate change may alter the existing *status quo*.

## Maintain an overview of the effects of pollution, eutrophication and pesticides on Scottish herps and promote appropriate conservation measures

Environmental pollution and pesticide usage affect many forms of wildlife although the regulations and best practice guidance covering them are beyond the scope of this strategy. Poor water quality, for example as a result of acidification or elevated levels of nitrate, and pesticide usage can be harmful to amphibians, whilst reptiles are more likely to be affected by the latter. There are no regulations concerning these that are specific to amphibians and reptiles, so the generic guidance that is widely available to protect wildlife generally applies. Details can be found on the SEPA website, see [Diffuse pollution in the rural environment](https://www.sepa.org.uk/regulations/water/diffuse-pollution/diffuse-pollution-in-the-rural-environment/).

## Tackle persecution and exploitation

Although incidents of these are likely to be localised and unlikely to influence the overall population status of most Scottish herps, they should not be ignored. The extent of adder persecution is unknown, but it still takes place. We need to use all available communication channels to help people value these animals as part of our natural heritage and to recognise that, for the most part, their fears about them are unfounded.

## A MORE INCLUSIVE AND PROACTIVE APPROACH FOR THE FUTURE

To date, much of the effort directed at helping Scotland’s amphibians and reptiles has focussed on our two native EPS, the great crested newt and natterjack toad. In recognition of the lack of reliable information on population trends for almost all species, we need to improve our knowledge and understanding of the other more widespread species. This should be combined with improved monitoring, habitat creation and a concerted effort to improve habitat connectivity.

Education and awareness-raising are key to getting people interested and involved in conserving wildlife, and reversing centuries of prejudice is a gradual process, so it is vital to build public interest and support. Without this, negative attitudes will prevail and support for conserving amphibians and reptiles will remain at a low level, with little or no progress made towards achieving conservation objectives.

Improving habitat connectivity is likely to benefit all herps and many other forms of wildlife, but we need a better understanding of where the most important linkages would be, so that practical options for creating dispersal corridors can be considered systematically and prioritised. In addition, GIS mapping of key populations can feed into predictive mapping to identify potential new sites, underpinned by a programme of baseline population surveys.

Our vision of future herp work in Scotland centres on *collaborative* working towards agreed common goals. We need to think creatively about how the collective efforts of all relevant organisations can contribute to these goals, for example by identifying synergies between unrelated species-focused projects and strategies of potential benefit to amphibians and reptiles, as illustrated by the [Roots of Rockingham project](https://naturebftb.co.uk/the-projects/roots-of-rockingham/), the [Pollinator Strategy for Scotland](https://www.nature.scot/pollinator-strategy-2017-2027) and the new Challenge Fund project from BugLife *Central Scotland B-Lines*. They may have rather different foci, but the methods or habitat management involved may have beneficial spin-offs. Partnership working towards common species goals will also help minimise competition for the available sources of funding. This, and the shortage of local authority biodiversity staff to promote biodiversity action at the local level emphasises the need for different approach in the future – one that takes a more strategic approach to guide the overall priorities, whilst identifying opportunities to develop new partnerships for achieving local delivery.

To facilitate this shift to a more coordinated approach to herp conservation, an inclusive forum for Scottish herp workers is proposed to promote improved liaison between interest groups, information exchange and as a mechanism for helping to implement this strategy. Annual meetings would assess progress against the objectives. Consideration should also be given to the establishment of an associated Scottish herpetofauna conservation steering group with representation from the key stakeholder organisations (including representatives of government and non-governmental organisations), access to expert external funding advice and close links with other relevant initiatives such as work on pollinators, green infrastructure and long-distance footpaths/cycleways. The steering group would be responsible for finalising the draft implementation plan to support this strategy and monitoring progress against it, securing commitment from the respective organisations tasked with delivery and providing support and assistance with delivery, wherever possible.

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1. See McInerny, C. & Minting, P. (2016) *The Amphibians & Reptiles of Scotland.* Glasgow Natural History Society, for full details of the Scottish herpetofauna. [↑](#footnote-ref-1)
2. See [SNH ponds trend note](https://www.nature.scot/sites/default/files/2017-06/Trend%20Note%20-%20Fresh%20water%20-%20Ponds%20-%20PDF%20-%202012%20Reformatted%20version.pdf) (2002) [↑](#footnote-ref-2)
3. Populations on the South Solway coast have declined despite suitable grazing regimes and other factors such as tidal inundation, a run of poor weather or disease have been implicated [↑](#footnote-ref-3)
4. A time when reptiles are emerging from hibernation and, because of low body temperature, unable to move quickly when fire approaches. How moorland management may affect adders is discussed in [Effects of moorland management on adders](https://sefari.scot/document/part-4-biodiversity-considerations-on-grouse-moors) [↑](#footnote-ref-4)
5. Native to parts of England and Wales, but not Scotland. [↑](#footnote-ref-5)
6. See list of Scottish non-native [prevention priority species](https://www.nature.scot/doc/scottish-list-inns-priorities-prevention-priority-species) [↑](#footnote-ref-6)
7. These include: palmate newt, smooth newt, common toad and common frog. With respect to the latter, there is a further requirement under EU legislation to prevent over-exploitation and to maintain the species at favourable conservation status. [↑](#footnote-ref-7)
8. See [Scottish Natural Heritage Commissioned Report 380](https://www.nature.scot/sites/default/files/2017-07/Publication%202010%20-%20SNH%20Commissioned%20Report%20380%20-%20Developing%20the%20network%20of%20longer%20distance%20routes.pdf) for a review of long distance paths. [↑](#footnote-ref-8)