Smooth Newt eDNA

Technical White Paper

SureScreen Scientifics

Smooth Newt Ecology

The smooth newt (*Lissotriton vulgaris*) is the most common newt species in the UK, widespread across Britain and Ireland, often found in garden ponds. Up to 10cm long, and usually brown in colour, they have yellow/orange bellies with small black spots which extend onto the throat. Males develop a wavy crest along their back during the breeding season. Most active at dusk and dawn, adult smooth newts mainly feed on frog tadpoles and a wide range of invertebrates, with larvae feeding on zooplankton. Found in a variety of habitats outside of breeding season, such as deciduous woodland, heathland, marshes, gardens and farmland, during breeding season they prefer standing water with weed coverage such as ponds and lake edges.

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During the breeding season (February to June), adults spawn in ponds, with males performing an elaborate courtship dance before the eggs are laid. Each individual egg is wrapped in a leaf of pond weed by the female to provide some protection. Newt larvae hatch after two to four weeks, distinguished from frog and toad tadpoles by the feathery gills around their heads. After a few months, they grow front legs, followed by back legs, before absorbing their gills and leaving the water as newtlets.

Later in the summer and into autumn, newts leave the pond and find shelter under wood, rocks and paving slabs, feeding on invertebrates. Smooth newts overwinter sheltering under rocks, log piles, buried down in mud or very occasionally in ponds. During milder weather throughout the winter, smooth newts may come out to forage, before emerging fully in early spring to breed.

Terrestrial stage adult smooth newt

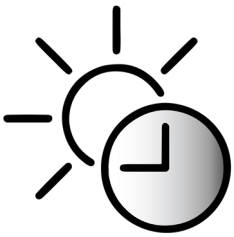
Aquatic stage adult smooth newts

Population Decline

Although widespread across Britain, Ireland and most of Europe, populations of smooth newts in the UK have declined. Adults are preyed upon by fish, grass snakes, ducks, kingfishers and occasionally adult great crested newts, with larvae being eaten by fish, dragonfly nymphs, water beetles and even adult smooth newts. However, the largest threat to smooth newts is the loss of habitat, pollution and reduced connectivity between suitable breeding sites. Urbanisation and agricultural change across the UK has destroyed habitat suitable for the smooth newt, with a reduction in ponds in the countryside being considered a key factor.

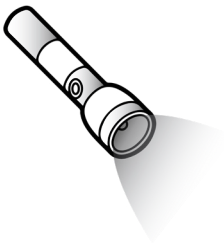
All native species of newt are afforded legal protection under UK and/or EU legislation. Smooth Newts are protected under the Wildlife and Countryside Act, 1981. It is illegal to sell or trade them in any way, and are fully protected against killing, capturing, disturbing, possession or trade in Northern Ireland.

Traditional Survey Methods

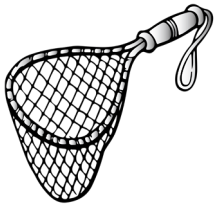


Visual Daytime Searching
This simple method involves travelling around the perimeter of the water body, stopping after a set distance and examining the water body for evidence of newts at all life stages.

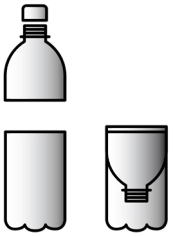
Egg searching
Although they can lay hundreds of eggs, newts deposit a single egg on a leaf at a time. They then fold the leaf over and the egg adheres to the leaf, giving protection from predation. Egg searching is a relatively effective method of detecting newt presence used by ecologists during April and June. The surveyor must unfold the leaves from plants within the pond to check for eggs, however once unfolded, eggs will not re-adhere therefore leaving them exposed and at risk.



Torching
Torching should be done from mid-March to mid-June, between dusk and midnight. It is not recommended whilst raining (due to poor visibility in the water), during cold conditions (newts are more likely to be inactive at low temperatures), or in ponds with a high density of vegetation. Surveyors need to walk slowly around the perimeter of the pond shining the torch back and forth with attention to vegetation and the bottom of the pond in order to get a visual sighting of any newts that are present.



Netting
Netting can be done from March to June for adult newts and in August for larvae. Fifteen minutes of netting per 50 metres of pond shoreline is recommended, moving the net in a figure of eight motion. This technique is not as efficient as egg searching, torching or bottle trapping, and care must be taken as netting can cause damage and disturbance to ponds as well as risk the transfer of invasive non-native species between ponds.



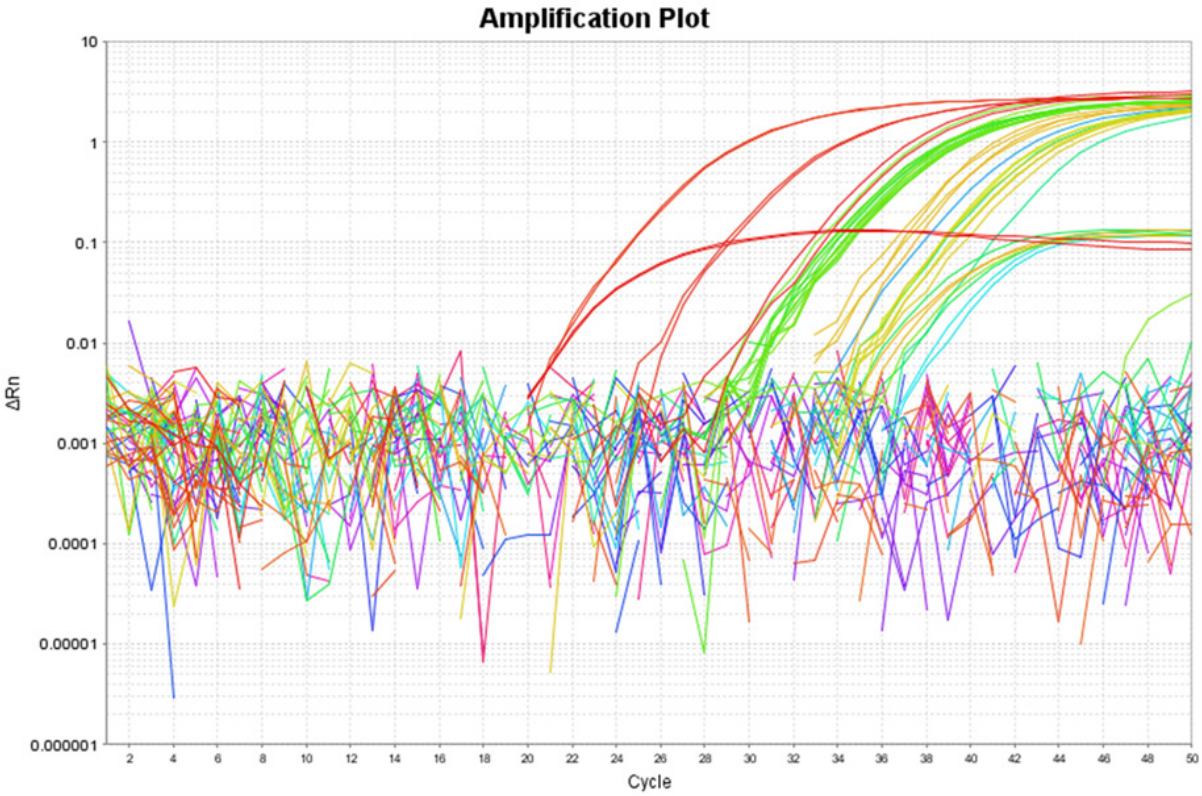
Bottle trapping
An effective yet highly invasive technique, bottle trapping can prove difficult and the risk of harm to newts and small aquatic mammals is relatively high. A large plastic bottle with an inverted neck attached to a stick is placed with the opening submerged, at an angle and secured into the sediment. It is crucial that enough air is in the part of the bottle that is out of the water or there is a risk of newts and aquatic mammals drowning. Traps are set in the evening and checked and removed early the following morning. This survey method should only be undertaken after thorough training, due to the high risk of mortality if incorrectly executed.

eDNA Survey Method

Organisms release DNA into the environment constantly in the form of urine, faeces, gametes, shedding skin or hair etc., remaining present in aquatic environments for up to three weeks. This DNA can be extracted from water samples and analysed to determine the presence or likely absence of a target species.

SureScreen Scientifics have developed an eDNA analysis which works in a similar way to the popular great crested newt eDNA test. Our smooth newt service can even be run alongside your GCN test, using the same sample, saving both time and money on buying sampling kits, collecting further samples and the total cost of analysis.

Like the GCN analysis, we will provide you with a positive result out of 12 - 0/12 suggesting a likely absence of smooth newts from the area and a positive result confirming the presence of smooth newts in the water source.



Typical output from qPCR analysis. Upper red curves represent known positive control sample, lower red curves represent spike DNA control, upper multi-coloured curves represent positive detection in eDNA samples, lower multi-coloured curves represent positive detection of spike DNA, 'noise' lines across centre of graph represent negative samples and negative control samples.

eDNA Analysis

eDNA analysis of water samples is a quicker, cheaper and more reliable method to determine presence/absence of smooth newts than traditional survey methods. This is a non-invasive method which removes any harm, stress, exposure to predation and even accidental death that can occur from more invasive methods.

Our smooth newt eDNA-based presence/absence detection service is now available to ecologists, conservationists and environmental groups in an effort to help control the spread of this damaging, invasive species. Order your kit on our website today. Alternatively, get in touch to add smooth newt detection to your GCN sample analysis using the exact same sampling kit.

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