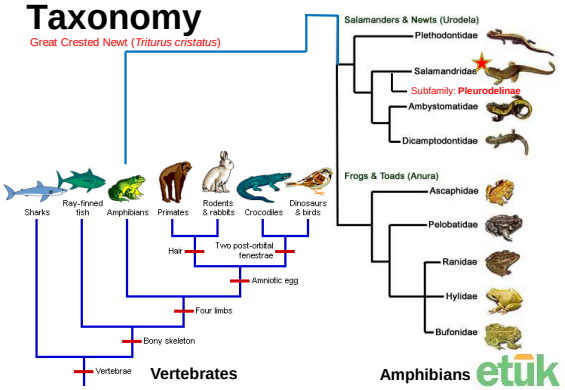
Great Crested Newts Ecology and Surveying

Course content

- Taxonomy and distribution
- Identification
- Ecology/lifecycle
- Threats/mortality
- Legislation
- Surveying
- Habitat management

Taxonomy

Great Crested Newt (*Triturus cristatus*)



Distribution

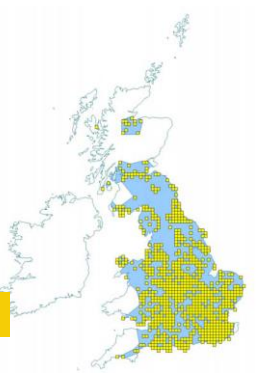
Great crested newt range covers most of Europe, although the species is **not** found in Southern Europe. The northern edge of its range runs through northern France, UK and southern Scandinavia to Russia; the southern margin runs through central France, South west Romania, Moldavia and Ukraine, central Russia to western Siberia.

Distribution

In Britain they do not occur in Ireland and are scarce in the South West of England, Scotland, the Lake District and most of Wales.

Seem to prefer neutral to alkaline water (chalk and limestone).

Population estimate:
400,000 individuals in 18,000 breeding sites



Identification

Did you know?
GCN's live 15 years (28 in captivity)

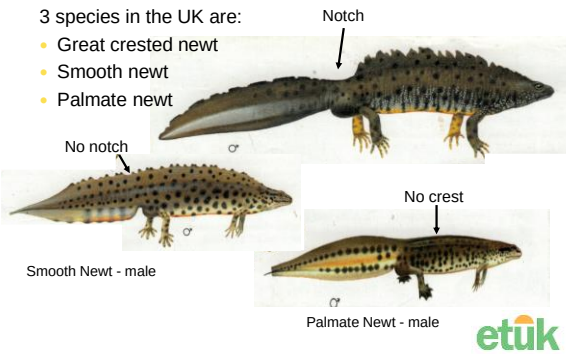
- Most distinctive and largest of 3 UK newt species (140-170 mm).
- Skin is textured and colour is dark brown or black. Often black blotches over back, sides and tail during the breeding season.
- The male develops a large crest along the back with a notch at the beginning of the tail and white stripe in tail during the breeding season.

Belly orange with black spots and stripes – each one an individual. Stripey toes, dark chin with white spots.

Identification

3 species in the UK are:

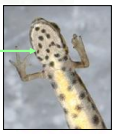
- Great crested newt
- Smooth newt
- Palmate newt



Identification

Smooth Newt ID

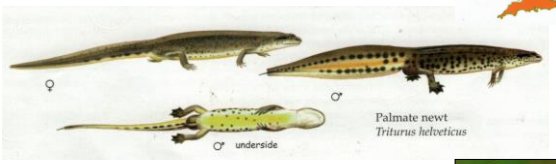
Males and females have spots on the underside of their throat.



Smooth Newt – male – continuous crest on the back. Females paler. Grows to 110mm. Common throughout Britain and Ireland.

Identification

Palmate Newt ID



Pale to translucent underside and few or no spots on throat.

Smooth Newt – male – webbing between the toes on their rear legs and a thread-like filament at the tip of the tail. Absent from Ireland and parts of East Anglia. Grows to 90mm.

Ecology - population

Numbers fluctuate considerably for natural reasons:

- Drying out of ponds.
- Predator numbers high – fish, dragonfly larvae, water beetles.
- Cannabalism.
- Competition – less food the more aggressive the larvae become.

Ecology - population

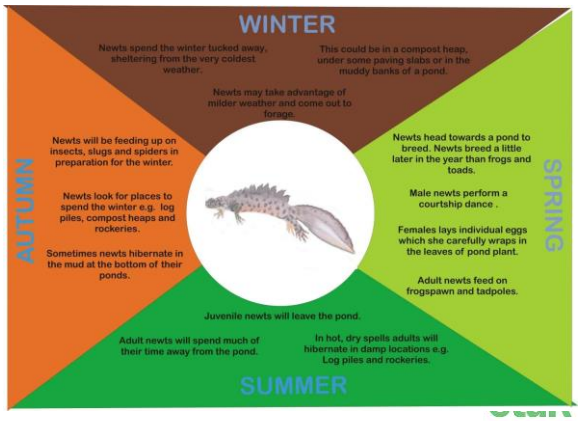
Live in Metapopulations:

- A group of associated populations occupying a cluster of ponds.
- Some interchange of adults between ponds.
- Much less vulnerable to extinctions than if they rely on one pond.
- Some ponds much more productive and produce many young.

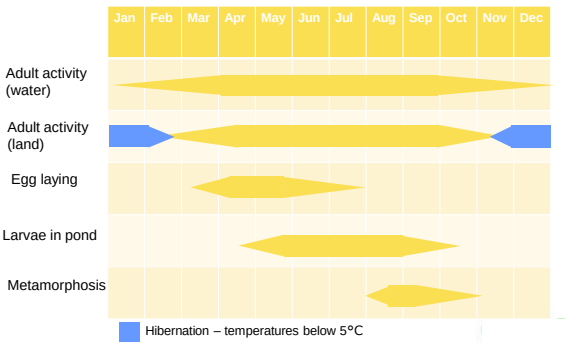
Ecology - population

Dispersal:

- Most only use habitat within 250m of the breeding pond.
- Can travel up to 120m in one night.
- Small numbers disperse as colonisers up to 1000m.
- Most likely to colonise a new pond if within 300m of an existing one.



Ecology – annual cycle



Ecology – annual cycle

- Use ponds for breeding between March and June.
- Use terrestrial habitat including grassland, woodland, scrub, log/rubble piles as well as ponds – March to October.
- Hibernate in winter when temperatures below 5°C.

Ecology - food

- Predators.
- Adults eat slow-moving invertebrates – earthworms, insects, spiders and slugs in terrestrial habitat and amphibians, invertebrate larvae, frog spawn and tadpoles, and small fish in ponds.
- Larvae eat aquatic invertebrates and amphibian larvae.
- Either actively hunt or 'sit and wait' predators.
- More active at night.

Ecology - breeding

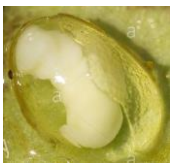
- Elaborate courtship.
- Males have large crest on back and pale tail stripe in the breeding season.
- Males display in an open area of the pond up to 1m deep.
- Fan the tail to waft sexual pheromones towards the female.
- When the female is receptive the male deposits a spermatphore on the bottom of the pond.
- Female positions herself over it to receive it.
- Internal fertilisation takes place.
- Female lays around 250 eggs per season. Up to around 10 a day.

Ecology – development

- Eggs are individually deposited under water on a leaf close to the surface.
- The leaf if folded over the egg which is sticky and this holds the leaf over it, sometimes several on a leaf forming a concertina effect.
- Hatching dependent on temperature. 2-6 weeks.

Ecology - development

- Shortly after the eggs are laid a head and tail bud appear.
- 50% of newt embryos die due to a chromosomal abnormality when the embryo reaches tail bud stage.
- Gills and balancers appear in week two and striping over a cream background starts to appear. Eyes develop.



Ecology - development

- Hatch around 3-4 weeks.
- Newly hatched larva is a poor swimmer attached to capsule or vegetation by the balancers.
- Forelimbs, gills and mouth develop.
- Hind limbs develop.
- Now better at swimming.
- Predatory on aquatic invertebrates and amphibian larvae.

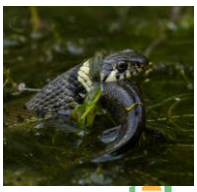
Ecology - development

- In late stages of development they become darker and live on the bottom of the pond (benthic) or in the margins.
- Orange belly starts to appear in mid summer and the gills gradually resorb. Skin texture becomes more granular.
- At around 16 weeks the larva has completely metamorphosed and can emerge from the pond onto land.

Mortality

Highest mortality in egg and larval stage

- Eggs eaten by water beetles, snails, newts, fish, birds.
- Fungi can affect eggs.
- Larvae eaten by water beetles, dragonfly larvae, fish and other GCN.
- 50% of newt embryos die due to a chromosomal abnormality.
- Adults eaten by herons and other birds, grass snakes, also likely to be predated by nocturnal mammals such as rats, hedgehogs, foxes, badgers in their terrestrial habitat .
- *Chytridiomycosis* – fungal infection.



Mortality - Chytrid fungus

- *Batrachochytrium dendrobatidis (*or *Bd*) develops into the disease chytridiomycosis which is linked to devastating population declines and species extinctions. Can affect ALL species of amphibians worldwide. Affects the skin causing problems with oxygen and water absorption, and electrolyte imbalance. Symptoms are reddened or discoloured skin, peeling skin, holding belly skin off the ground. Can wipe out colonies in weeks.

- *Batrachochytrium salamandrivorans* discovered in 2014. Originated in Thailand, Vietnam, China and Japan spread by the pet trade. Only occurs in Netherlands and Belgium where it has already caused the collapse of fire salamanders in the Netherlands. Does not harm frogs or toads.

Ecology - habitat

Terrestrial habitat requirements:

- Permanent shelter from extreme weather – drought in summer and freezing in winter.
- Daytime refuges.
- Foraging opportunities.
- Dispersal opportunities.

Ecology - habitat

Permanent refuge habitat:

- Rough (especially tussocky) grassland.
- Scrub.
- Woodland – broadleaf better than conifer.
- Under fallen tree trunks.
- In mammal burrows.

Need moisture as vulnerable to dessication.

Ecology - habitat

Hibernation habitat - need protection from winter conditions.

- Underground crevices.
- Tree root systems.
- Mammal burrows.
- Rubble piles.
- Old walls.

Example of a hibernaculum

Ecology - habitat

Ponds:

- Prefer small to medium sized ponds 50-250m².
- Prefer smaller ponds if in clusters.
- Needs aquatic vegetation for egg laying – submerged about 2/3rds of the pond and emergent ¼ - ½ of the pond.
- Open spaces for males to display during breeding.
- No shading on the south side.
- Neutral to alkaline water (pH 4.4-9.5).
- Can be temporary ponds – less likely to have fish.
- Must support healthy invertebrate fauna.

Threats

- Deliberate filling or destruction of ponds.
- Pond loss due to natural succession.
- Introduction of fish into ponds.
- Chemical pollution and nutrification of breeding ponds.
- Loss of terrestrial habitat.
- Habitat fragmentation.
- Habitat management which renders sites unsuitable for GCN.
- Deterioration of ponds through misuse or neglect.
- Agriculture, forestry, developments.
- Chytrid fungal infections.

Threats

To counter threats we need to conserve and enhance GCN populations through:

- **Survey** – more needed to establish populations – estimated that only one sixth of breeding ponds have been identified.
- **Habitat management** – favourable management, incentives for landowners, creation of terrestrial habitat and ponds, connectivity of habitats.
- **Planning procedures** – ensure LPA's recognise and protect GCN sites.
- **Legislation** – lack of correct interpretation and enforcement. Licensing.
- **Biosecurity** – ensuring we do not spread Chytrid through our surveys. Sterililse boots and equipment between ponds.

Legislation

GCN have full protection under the Wildlife and Countryside Act (1981) (as amended) **and** under Conservation Habitats and Species Regulations 2019.

Offences include:

- capturing, killing, disturbing or injuring great crested newts deliberately or recklessly.
- damaging or destroying a breeding or resting place.
- obstructing access to their resting or sheltering places (deliberately or by not taking enough care).
- possessing, selling, controlling or transporting live or dead newts, or parts of them.
- taking great crested newt eggs.

You could get an unlimited fine and up to 6 months in prison for each offence if you're found guilty.

https://www.gov.uk/guidance/great-crested-newts-protection-surveys-and-licences

Licensing

To carry out a GCN survey you need a personal licence from Natural England or Natural Resources Wales or NatureScot.

For this you need:

- Experience of surveying and handling GCN.
- Two signatures from two licence holders.

To carry out developments or farming/forestry activities that would otherwise be unlawful you would need a Protected Species Licence.

For this you need:

- To be a licenced GCN worker
- Complete and application which includes a method statement with detailed avoidance, mitigation and enhancement measures.

https://www.gov.uk/guidance/great-crested-newts-protection-surveys-and-licences

GCN Survey Methods

- Survey all ponds within 500m of the perimeter of the development.
- Start with Habitat Suitability Index (HSI).
- Presence of GCN determined by four separate survey visits.
- If present, GCN population size class determined by an additional two visits (six in total).
- Standard survey techniques include netting, bottle-trapping, egg searching and torching.
- 3 out of the 4 techniques need to be used over the survey period mid March – June.
- Most survey techniques require a licence.

GCN Survey Methods

Biosecurity

Chytrid fungus had been found to be spread by human activity, and amphibian fieldworkers therefore have a particular responsibility to prevent its spread.

Wherever possible, dedicated survey equipment (bottle traps, canes and pond nets) should be used for each separate survey site/pond.

Following each survey visit, footwear should be disinfected and allowed to dry before next use using Bleach or Vircon (see ArgUK advice note)

If survey equipment is re-used at another site, it should be similarly disinfected.

https://www.arguk.org/info-advice/advice-notes/324-advice-note-4-amphibian-disease-precautions-a-guide-for-uk-fieldworkers-pdf-2/file

Habitat Suitability Index

10 factors:

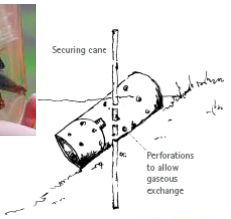
HSI		Pond suitability
< 0.5	=	poor
0.5-0.59	=	below average
0.6-0.69	=	average
0.7-0.79	=	good
> 0.8	=	excellent

- Geographic location
- Pond area (nearest 50m²)
- Permanence – does it ever dry out?
- Water quality – polluted or not?
- Shade - % over pond
- Waterfowl – present or not
- Fish – present or not
- Pond count – how many within 1km
- Terrestrial habitat – grassland, woodland, scrub, rubble/log piles
- Macrophyte cover - % occupancy in pond

http://www.narrs.org.uk/documents/HSI%20guidance.pdf

Survey Technique: Bottle Trapping

- Involves submerging funnel shape 2-litre plastic bottles around the perimeter of a pond.
- Bottles should be spaced every 2m during the evening and then checked early the next morning.
- Bottles should be held firmly in place with a cane with an air pocket left to prevent drowning.
- GCN Licence required.



Survey Technique: Torch Counting

- Slow walk around pond, scanning with a powerful torch.
- Record all sightings of GCN – look for displaying males (white tail stripe).
- The score is expressed as the total number of GCN observed during a circuit of the pond
- Less useful in rainy or windy conditions or in murky water
- *GCN Licence probably required*

Male GCN in mating colours

Survey Technique: Egg Counting

- Female GCN lay their eggs on the leaves of aquatic vegetation.
- They fold and seal the vegetation with their rear feet.
- 'Concertina' appearance to the vegetation, which can be easily identified.
- Manual searching is best carried out during the day and is used to determine which ponds are utilised for breeding.
- *GCN Licence required*

Can use strips of plastic bag as a substitute for vegetation.

Eggs

It is important to be able to distinguish between great crested newt and other newt eggs.

Great crested newt eggs

White or cream with jelly surrounding. Capsule around 4.5-6mm.

Smooth/Palmate newt eggs

Beige or dirty white colour with jelly surrounding. Capsule around 3mm.

Survey Technique: Netting

- A long-handled dip net is used to sample areas around the pond.
- 15 minutes of netting should be employed for every 50 metres of shoreline.
- This technique is less effective than bottle-trapping, egg searching or torch counting and more disruptive and potentially injurious.
- Only use when other methods not suitable e.g. pond liner means you cannot use bottle traps.
- *GCN Licence required*

Juvenile newts

It is important to be able to distinguish between great crested newt and other newt larvae.

Great crested newt larvae

Bold spotting and feathery gills.

Smooth/palmate newt larvae

No difference between species. Fine spotting and feathery gills.

GCN Population Estimates

The maximum adult count per pond per night gained through torch survey or bottle-trapping.

- **Small= for maximum counts up to 10,**
- **Medium= for maximum counts between 11 and 100**
- **Large= for maximum counts over 100**

Where there is regular interchange of animals between ponds (typically, within 250m and with an absence of barriers to dispersal), counts can be summed across ponds to give total site count.

GCN eDNA

- The use of eDNA testing detects newts by taking water samples.
- A water sample can be collected from a pond and tested. It will pick up traces of faeces, mucous, gametes or shed skin for around 7-21 days after GCN have been present. It has currently only been tested in the breeding season and is still undergoing further testing but is expected to reduce initial costs by up to 80%.
- As a new technique to determine presence or absence for GCN it is 91.2% effective (compared to bottle trapping at 76%) and has been approved by Natural England.
- **Problem: it doesn't give a population estimate so if GCN are present still need to do full suite of surveys.**

Sources of Information

Gent, T. and Gibson, S. (2003) *Herpetofauna Worker's Manual*. Joint Nature Conservation Committee.

Langton T, et al (2001) *Great Crested Newt Conservation Handbook.* Froglife

Baker J, et al (2011) *Amphibian Habitat Management Handbook*. Amphibian and Reptile Conservation.

Websites:

Conservation of Habitats and Species Regulations 2017
http://www.legislation.gov.uk/uksi/2017/1012/contents/made

Wildlife and Countryside Act 1981
http://www.legislation.gov.uk/ukpga/1981/69/contents

Government guidance pages: https://www.gov.uk/guidance/great-crested-newts-protection-surveys-and-licences

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