

Hop To It Frog Book

Survey Frogs and Become
a Citizen Scientist

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The common frog (*Rana temporaria*) is Ireland's only species of frog. Citizen science is the collection of data from the natural world by members of the public. Beginning in 1997, the Hop To It Frog Survey, co-ordinated by the Irish Peatland Conservation Council, is Ireland's longest-running frog survey. This book explores the fascinating world of frogs and encourages you to record frogs in your locality and become a citizen scientist.

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Join the Hop To It Irish Frog Survey



Image: E. Delaney



Image: E. Delaney



Image: C. O'Connell



Image: C. O'Connell

Amphibians in Ireland



Natterjack Toad
Image: B. Dupont



Common Frog
Image: E. Delaney



Smooth Newt
Image: J. Early



Common Toad
Image: G. Chernilevsky

Amphibians were the first group of animals with a back bone to live on land. Most amphibians spend the first part of their lives in water, swimming and breathing like fish. As adults, they can move between land and water. They are cold-blooded animals, which means that their body temperature changes as the temperature of their surroundings changes. It is thought that amphibians arose over 350 million years ago from a fish-like ancestor. They can, in general, move, feed and breathe equally well on land and in fresh water, but nearly all amphibians return to water to breed. Amphibians are categorised into three groups:

- * Urodela (newts and salamanders)
- * Apoda (worm-like caecilians)
- * Anura (frogs and toads).

Found worldwide, the Anura group (meaning tail-less) is the largest amphibian group, with over 3,500 species.

Four different species of amphibian have been recorded in Ireland:

Native Irish Amphibians

- * Natterjack Toad (*Bufo calamita*)
- * Smooth Newt (*Triturus vulgaris*)
- * Common Frog (*Rana temporaria*)

Non-Native Amphibian

- * Common Toad (*Bufo bufo*)

Common frogs and smooth newts are found nationwide. Natterjack toads are found in counties Kerry and Wexford (they were introduced by the National Parks and Wildlife Service to Raven Point, Co. Wexford, in the 1990s). The common toad was first recorded in the Republic of Ireland in 2011 in Long Lough, Rathmullan, Co. Donegal. This toad is believed to have been introduced, and is the only amphibian in Ireland that is non-native. Under the Wildlife Act, it is a crime to introduce non-native amphibians to Ireland. There are concerns that, if the common toad was to become established in Ireland, it could result in the displacement, reduction, or elimination of the native natterjack toad.

The Common Frog



Image: T. Whyte

The common frog has smooth, moist skin and powerful hind legs that allow them to jump great distances. Frogs begin their lives as eggs, known as 'frog spawn'. In Spring, after the eggs hatch, tadpoles emerge. Tadpoles live in water and breathe through gills. As they grow, however, their bodies undergo many changes, and by the time they have become adult frogs (early Summer) they are able to live on land and breathe air through lungs. The great change that takes place during the development of a frog is known as 'metamorphosis'.

Common Frog Foods

Tadpoles are vegetarians, but as they grow their feeding habits change completely; by the time they are adult frogs they have become carnivores. Frog tadpoles eat algae, helping regulate blooms in ponds. Adult frogs,

meanwhile, feed mainly at night around the edges of ponds, using their long, sticky tongues to capture flying insects and beetles or to ensnare slugs and snails - their staple foods.

Habitat of the Common Frog

Frogs like natural damp habitats in woodlands, bogs, fens and gardens. They need freshwater to breed and prefer ponds that have good plant cover and shallow water at the edge so that they can easily climb out unseen. However, they also use streams, bog pools, drains and ditches as breeding sites. The terrestrial habitat is also important; the land around the breeding site needs to be rough with long grass and some woodland scrub to give cover for foraging. Frogs also require habitats for hibernation. Large stones, old logs, piles of autumn leaves and compost heaps are perfect.

Sight

Large eyes bulge out of the top of the head, allowing the frog to keep a sharp lookout for food and danger. The eyes are very sensitive to movement. When frogs leap, they draw their eyes back into their sockets to protect them from damage. Each eye has special moisture-producing glands that prevent the eye from drying out in the air.

Permanent markings
Dark bars behind and in front of the eyes are the only regular markings.

Hearing

Frogs have good hearing. Just behind the eye is a large eardrum that leads to the rest of the ear, which is located inside the head.

Breathing

Nostrils for breathing air when the frog is on land.

Sticky tongue

The frog's long sticky tongue is attached to the front part of the mouth so that it can flick out to catch flies.

Vocal sac

Each time the frog croaks, this loose skin on its throat expands. Frogs make lots of different sounds, especially during the breeding season.



Strong muscles

The frog's hind legs are used for swimming in the water and leaping on land.

Webbed feet

These are like flippers, and help the frog to quickly swim away from danger.

Coat of many colours

The colourful patterns on the frog's skin help to disguise it from enemies such as rats, herons and hedgehogs. A frog can also make its skin become darker to match its surroundings. This colour-change takes about two hours to effect.

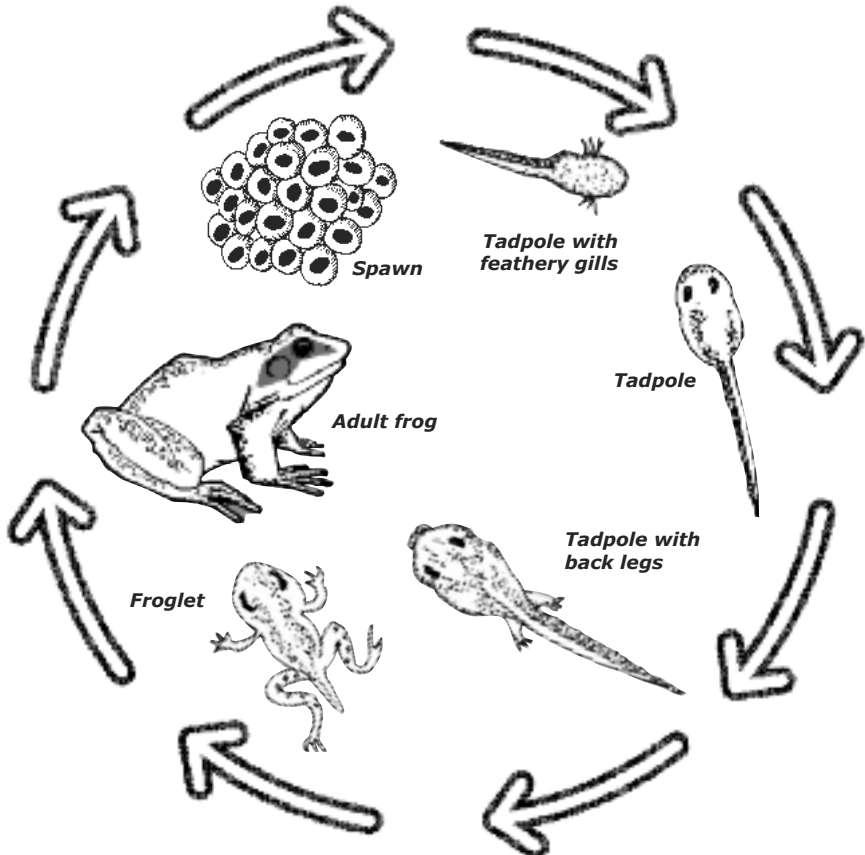


Frog camouflage in action
Image: N. Madigan


Frog Life-Cycle

When adult frogs emerge from hibernation, they migrate and congregate in large numbers at various breeding sites. Each year, they can travel as far as 1km to return to their breeding ponds. The males always arrive first and strike up a chorus of loud croaking to attract females. Frogs do not have any elegant courtship rituals; the eager male simply grabs the nearest female as she arrives at the spawning site. Jumping onto the female's back, the


male wraps his forelimbs around her body and grips her using nuptial pads on his forelimbs - a position called 'amplexus'. Spawning can take place any time during amplexus and lasts only a few seconds. During spawning, the female lays up to 4,000 black eggs while the male releases sperm. The eggs are fertilised immediately before their gelatinous capsules absorb water, swell and rise to the surface.




Growing up - from egg to adult, the life-cycle of the Common frog (*Rana temporaria*) takes over a year to complete.

A circular photograph showing several male frogs in a pond. They are gathered together, and their croaking is visible as ripples on the water's surface.

Male frogs gather in ponds in spring and begin croaking to attract females.
Image: E. Delaney

A circular close-up photograph of frog spawn. It shows a cluster of small, dark, spherical eggs, each surrounded by a clear, jelly-like substance.

A clump of frog spawn.
Image: L. Tisjima

A circular photograph of an adult frog sitting on a rock. The frog is dark-colored with some lighter markings. It is surrounded by a large amount of frog spawn.

Adult frog with spawn.
Image: A. Murphy

Eggs & Jelly Babies

Known as 'frog spawn', frog eggs are 2-3mm in diameter and are surrounded by jelly. When the eggs are deposited in the water, the jelly swells to a diameter of 8-10mm, insulating the egg from the water. The egg develops into a tadpole in 10-21 days (higher water temperature shortens the development time).

Tadpole Terrors

The tadpole 'hatches' by using a special secretion to digest the spawn jelly. The newly hatched tadpole has specific adhesive organs that allow it to fasten to other spawn or plants in the pool. At this early stage, the tadpole has no mouth, and until its mouth organs form it feeds on an internal yolk sac attached to its stomach. At approximately two days old, the external gills, mouth and eyes are formed. At this stage, the tadpole moves like a fish and begins to eat algae. At 12 days, spiracles and internal gills are formed. At five weeks, the hind legs begin showing and the lungs begin to form; at this stage, the

tadpole needs to swim to the surface of the water to gulp air and has developed fleshy lips with rows of teeth for rasping away at water plants. By seven weeks, it has begun to eat insects and even other tadpoles.

Froglet

At 10 weeks, the forelegs are growing, the hind legs are fully grown and the tail is reducing. At 14 weeks, the tail is nearly fully absorbed. At this stage, the froglets are usually starting to spend time on rocks or in nearby damp grass. Many are eaten by predators before they are fully grown. In winter, frogs hibernate in frost-free refuges, under tree stumps, in compost heaps, in stacks of turf, in leaf piles or in rock piles, where they enter a state of 'torpor' until the following spring. During torpor, the frog slows its breathing and heart rate, conserving energy.

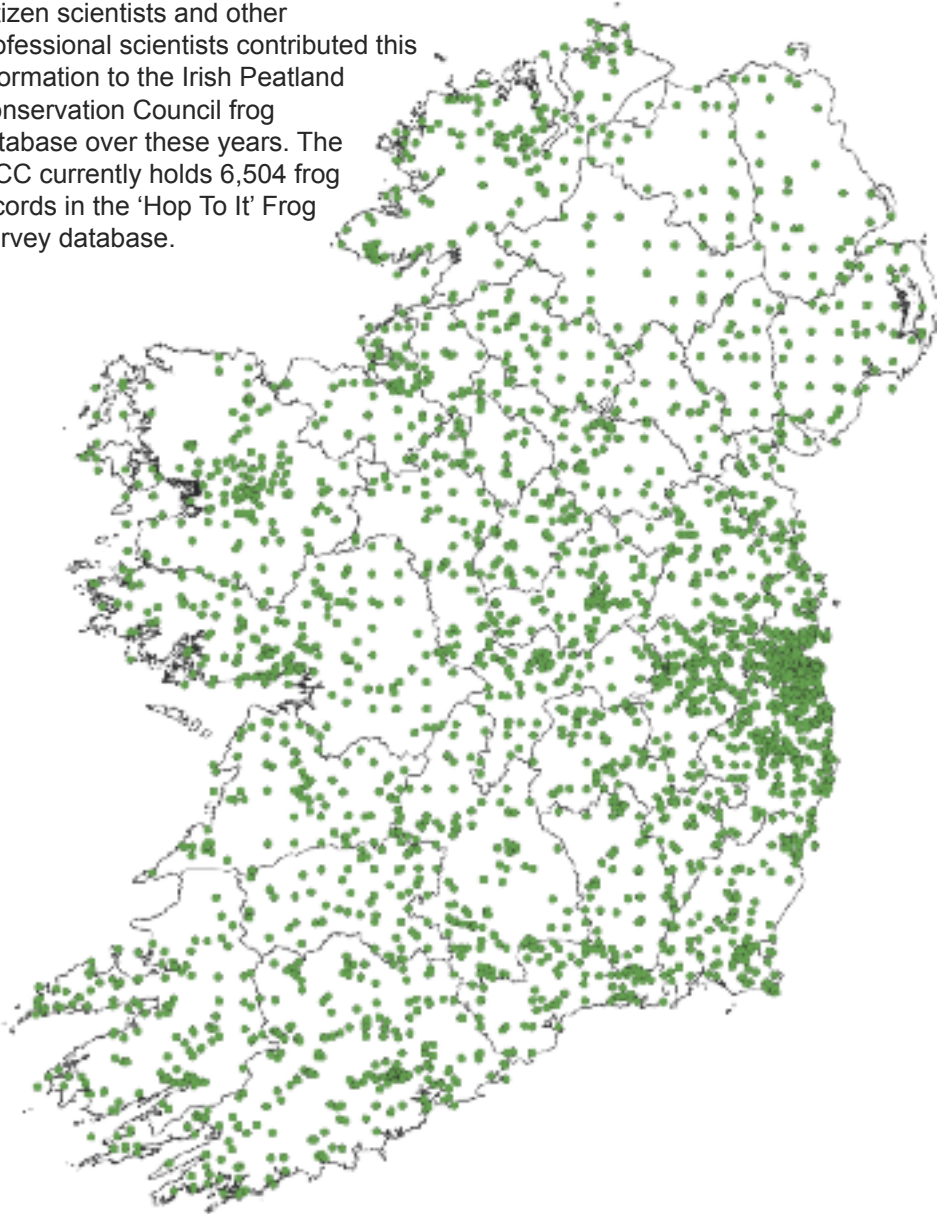
Young frogs usually double in size by the following autumn, and they reach sexual maturity in their third year. They can live for 7-8 years.

Frog Distribution in Ireland

This map shows the distribution of the common frog in Ireland. Frogs are found in every county in Ireland. The frog records used to compile this map cover the years from 1997 to 2018.

Citizen scientists and other professional scientists contributed this information to the Irish Peatland Conservation Council frog database over these years. The IPCC currently holds 6,504 frog records in the 'Hop To It' Frog Survey database.

The common frog is a protected species in Ireland and is listed in Annex V of the European Union Natural Habitats Directive.



What Threatens Amphibians?

Amphibians are indicator species. This means that they are very sensitive to changes in the environment around them, such as pollution and global warming. They make good indicator species because they live in two environments - land and water, and have thin skin that can absorb toxic chemicals and diseases. If amphibians disappear from an ecosystem, it may be a sign that it has become polluted. Similarly, if there are lots of amphibians in an area it can mean that the ecosystem is healthy.

- ☛ Amphibians are an important food source for predators such as birds, fish, foxes and otters. They are not threatened by natural predators provided their populations remain in balance.
- ☛ Over the past 100 years, over 50% of Ireland's amphibian wetland habitats have been lost to drainage, industrial peat extraction, pollution and natural degradation.
- ☛ Accidental/deliberate burning of habitats such as bogland also represents a danger to amphibians.
- ☛ Exposure to chemical fertilisers, pesticides, herbicides and heavy metals can poison amphibian populations.
- ☛ There have been global declines in amphibians since 1989, herpetologists have attributed this to increasing UV radiation levels as a result of damage to the

ozone layer. UV radiation damages DNA, causing cell mutations and death.

- ☛ During warm, damp nights in spring, thousands of amphibians follow traditional migration routes to return to spawning ponds. Unfortunately, hundreds can be squashed and killed by traffic on roads as they make for the ponds in which they were born.
- ☛ The fungus *Batrachochytrium dendrobatidis* parasitises amphibians and has caused frog and toad population declines throughout the world since the 1980s. Several mass deaths of frogs have been blamed on a disease known as 'red leg'. A new virus - *Ranavirus* - has also been found to be responsible for killing frogs.
- ☛ It takes 14 weeks for a tadpole to develop and emerge on to land. Summer drought and extreme weather events caused by climate change reduces breeding success.
- ☛ The keeping of exotic frogs as pets can represent a danger to native species, as they may escape or be introduced to the wild. Report sightings to www.biodiversityireland.ie



Frogs are dying from the effects of pollution, climate change and habitat loss.

Frog-Friendly Gardens



Frog-friendly Pond.
Image: C. O,Connell



Ragged Robin
Image: C. O'Connell



Bog Bean
Image: C. O'Connell



Flag Iris
Image: A. Butler

The best way to make your garden frog-friendly is to create a garden pond. Immature and female frogs hibernate under logs, piles of stones and amongst leaves under hedges, so don't be too tidy in the garden and the frogs will thank you for it. Here are some more tips to help you keep your garden pond frog-friendly.

- 1 The pond should have an irregular perimeter and the sides should be very shallow so frogs can get in and out easily.
- 2 There needs to be plenty of algae for tadpoles to eat. However, don't include fish, because they eat tadpoles.
- 3 There must be plants near the edge of the pond for spawn to be laid in and for tadpoles to hide and feed in.
- 4 One part of the pond should be at least 60cm deep so that hibernating frogs won't freeze to death.
- 5 The pond should be dug in October/November in a sunny, open place away from trees, because tadpoles need warm water to develop into frogs. Don't have the pond too near your house, as the constant movement of people will disturb frogs and other wildlife.
- 6 If there are young children around, incorporate protective grilling just under the water surface of the pond.
- 7 Let the grass grow long around the edge of the pond because froglets need long grass to hide in when they first emerge from the pond.
- 8 From mid-Spring to Summer, plant the pond with insect-loving plants for feeding frogs and other animals. Source your pond plants from your local garden centre.

- 9 Introduce wildlife two weeks after planting; e.g., water snails, pond skaters, dragonflies, flatworms.
- 10 If the pond freezes for a long time in winter, frogs may suffocate. This can be rectified by using a pan of water to melt the ice - smashing the ice can cause shock waves and harm the pond's inhabitants.
- 11 During dry weather, top-up the pond regularly with small volumes of rain water from a water butt.
- 12 Provide hibernating sites for frogs and other pond animals in the garden surrounding the pond; for example, create a log pile, compost heap or a pile of stones or autumn leaves.
- 13 Avoid using chemicals and non-organic fertilisers in and around your garden as they may harm frogs, who drink and breathe through their skin.

Frog-Friendly Plants

Submerged: Grow under water; e.g. water starwort, hornwort, willow moss

Floating: Drift on pond surface; e.g. frogbit, duckweed, water soldier

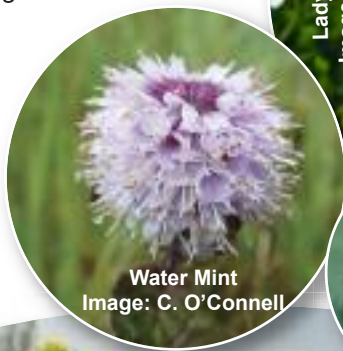
Deep Water: Roots on pond floor with leaves floating on pond surface; e.g. water violet, yellow pond lily, white water lily, pond weed.

Marginal: Grow in the shallows; e.g. marsh marigold, yellow flag iris, bog bean, water mint, water plantain.

Marsh: Grow in waterlogged ground; e.g. bugle, ragged robin, lady's smock, meadow sweet, valeriana, purple loosestrife.



Lady's Smock
Image: N. Madigan



Water Mint
Image: C. O'Connell



Yellow Water Lily
Image: C. O'Connell



Marsh Marigold
Image: C. O'Connell

Amphibian Facts

- ☛ People who study amphibians are called 'herpetologists'. Herpetology is the study of amphibians and reptiles.
- ☛ Amphibians must shed their skin as they enlarge in size. The old skin is discarded like a piece of clothing that has become too tight. Usually, the shed skin is eaten.
- ☛ Amphibians' eyes come in all shapes and sizes. Some even have square or heart-shaped pupils. However, amphibians only see in black and white.
- ☛ Under the water, a frog's eyes are protected by an extra transparent eyelid called a 'nictitating membrane'.
- ☛ Frogs cannot live in the sea or any salt water.
- ☛ Frogs are found in every continent of the world except Antarctica. Tropical regions have the greatest variety of species.
- ☛ There are 4,000 types of amphibian in the world, but Europe only has 45 species.



Frog bones form a growth ring every year while the frog is hibernating. Scientists can count these rings to determine the age of a frog.

- ☛ Frogs don't need to drink, as they absorb water through their skin.
- ☛ Frogs lay up to 4,000 eggs at one time. The jelly around the eggs helps keep them warm. The temperature inside a clump of eggs is often much higher than the temperature of the pond water around them.
- ☛ The eyes and nose of a frog are on top of its head, which allow it can breathe and see when most of its body is under the water.
- ☛ Frogs can live equally well in water or on land.
- ☛ Some frogs can survive in conditions well below freezing. The grey tree frog can survive even when it becomes so cold that its heart stops beating. It does this by making its own antifreeze, which prevents its body from freezing completely.
- ☛ The IPCC's species-adoption scheme allows you to symbolically adopt a frog. This helps the IPCC protect peatland habitat for frogs and carry out the Hop To It Frog Survey. Frog adoption costs €20. You receive a 'thank you' card, an adoption certificate and some frog postcards to send to family and friends. Adopt a frog today by visiting www.ipcc.ie or call 045-860133.

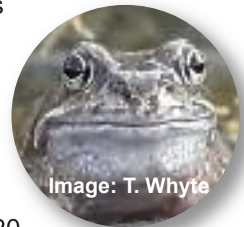
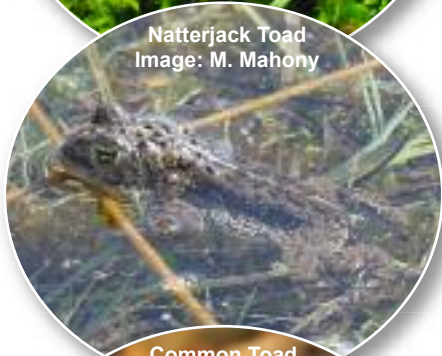


Image: T. Whyte

Spot The Difference



Here are some tips to help you distinguish the amphibians found in Ireland:

- * Common Frog (Loscán)
- * Smooth Newt (Earc Sléibhe)
- * Natterjack Toad (Cnádan)
- * Common Toad (Buaf Coitianta)

Movement

The common toad and smooth newt move only by crawling. In contrast, common frogs can jump and crawl while natterjack toads can run and crawl.

Body Size

The common frog and natterjack toad are 60-80mm long, the smooth newt can be up to 100mm long, while the common toad is 110-170mm.

Courtship Rituals

From late January, male common frogs croak to attract females. From March, male smooth newts perform a courtship dance underwater to impress females. Similar to common frogs, male natterjack toads croak loudly from March onwards. Finally, between March and June common toads fight to secure dominance and breeding opportunities with females.

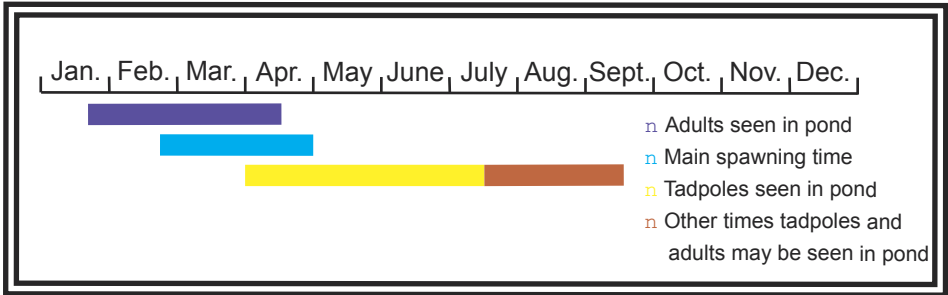
Tail or Not

The smooth newt is the only amphibian in Ireland with a tail.

Skin

The common frog has smooth, moist shiny skin, whereas both the common and natterjack toads have warty skin. Smooth newts have smooth skin in water and rough skin on land.

How to Frog-Watch



Here are eight tips to help you find and record frogs safely.

- 1 Young people should always go frog-watching with a parent or guardian. Make sure you are dressed for the weather. Ponds can be cold and deep, so be careful. Don't stand or wade into water. Never splash other people. Cover any cuts or scratches with waterproof plasters. Don't get water, or anything that has been in the water, in your mouth; it could make you ill. Take all litter home with you.
- 2 You should start looking for frog spawn from the middle of January onwards. Small tadpoles can be found from the end of February onwards.
- 3 Ponds, pools and stagnant water are the best places to look for frog spawn, but you may find it in streams, bog pools or even in old bathtubs.
- 4 When you find spawn or tadpoles, fill in the frog survey form opposite and post it to IPCC, Lullymore, Rathangan, Co. Kildare, R51 V293. Remember to tell us where and when you found the different stages in the life-cycle
- 5 of the frog. To help us determine how successful different places are for breeding frogs, we would like you to re-visit (if possible) the place where you found spawn and tell us if tadpoles have developed and what stage they have reached. Even if no froglets or tadpoles are seen, we would like you to tell us on the survey sheet - this will help us to identify which are the best and worst breeding habitats for frogs.
- 6 You can visit and record more than one pond - just make a photocopy of the survey sheet opposite for each site you visit.
- 7 If you want the latest information about the Hop To It Irish Frog Survey, please visit www.ipcc.ie. You can print extra survey sheets and access a lot more information about frogs on the website. You can also submit your frog records online.
- 8 Take care of frogs - don't move frogs or frog spawn from one pond to another. This can transfer disease. Take care not to disturb the edge of the pond - it's the frog's home.

Hop to It Irish Frog Survey Recording Sheet

Become a Citizen Scientist. Please tell us where you have seen frogs or any of the stages in the frog's life-cycle for our on-going Hop To It Irish Frog Survey. Please photocopy a new page and complete for every site where you find frogs. Thank you.

Name of Frog Site Location:.....

Nearest Town: **County:**

Coordinates for Site: (Can be found by dropping a pin on maps.google.com)

Location of Frog Site: inner city city suburb country

Numbers Seen: Please record the date of your sighting and the number of frog spawn clumps, individual tadpoles, froglets and/or adult frogs you spotted by using the following codes: **A:** 1 **B:** 2–9 **C:** 10–29 **D:** 30 or more

Frog Life Cycle Stage	Date	Number Seen
1 Frog spawn clumps		
2 Swimming tadpoles		
3 Tadpoles with back legs		
4 Froglets with four legs and stumpy tail		
5 Adult frogs		

Type of Site:

- Pond (please give diameter: m)
- Bog Pool
- Ditch or Drain (please indicate whether water is still or moving)
- Stream
- Other(please specify)

Habitat Surrounding Breeding Site:

- Garden/Park Woodland/Forest Sand Dune
- Farmland/Grassland Bog/Heathland Lake/Marsh
- Other(please specify)

Potential Threats:

- Predation Pollution
- Habitat drying out Fire (e.g. deliberate burning of bogs)
- Habitat loss Evidence of disease/infection
- Tick if this is the first record you are sending in for this site.**

Name:.....

Address:.....

E-mail:.....

Telephone:.....

Tick if you would like to receive a digital Hop to It Citizen Scientist certificate of participation

Please return to IPCC, Lullymore, Rathangan, Co. Kildare R51 V293 or submit your record online at www.ipcc.ie

Have you seen a frog or any of the stages of its life-cycle?

Image: T. Whyte

Its time to join Ireland's Hop To It Frog Survey



Hop To It Frog Book - Survey Frogs & Become a Citizen Scientist

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NPWS

An tOifig Náisiúnta
Máil agus Tuaiscirt
Músaicéil agus Oidhreachta

The Irish Peatland Conservation Council's mission is to conserve of a representative sample of Irish peatlands for people to enjoy now and in the future. Established in 1982, the charity's longest-running campaign, 'Save the Bogs', includes conservation, restoration, management, monitoring, community engagement and raising awareness of the beauty and value of Ireland's wet and wild peatland habitats. The Save the Bogs Campaign supports the United Nations Sustainable Development Goals. Follow the Irish Peatland Conservation Council at www.ipcc.ie or on social media.

