Ontario
the chorus

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Call of the Bullfrog

Male bullfrogs have eardrums, known as tympanic membranes, that are 50% larger than the eardrums of equal sized females. Male bullfrogs can produce up to 90 % of their croak volume by vibrating their eardrums, so much so that the shaking can be visible to the human eye, says Dr. Alejandro Purgue of the University of California at Los Angeles. Dr. Purgue, who developed a sensor to measure the source of bullfrog calls, found that energy generated by a bullfrog's vocal cords passes almost unimpeded through the tissue and causes its eardrums to vibrate. Other parts of the bullfrog anatomy that are used in sound generation include low-frequency bass sounds resonating from the lungs and body wall, and mid-frequency sounds that radiate from the vocal sac.

Adapted from The Globe and Mail, 28 Feb. 1998
from: Purgue, A.P. 1997. Tympanic sound radiation in the bullfrog Rana catesbeiana. J. Comparative Physiology 181: 438-445.

Volunteers are heard!

[We have not included all the comments we received, but, in general, many people noted the lack of rainfall this year, and its effects on the local amphibian choruses.- Editor]

May 28. Full moon on River! Warm! So many frog voices-wonderful, special evening! *Mary Davis, Combermere, Ontario.*

My apologies to whoever has to try to read these. Can't find a minute to re-copy so what you see is what you get. Good Luck! *Lil Anderson, Kenora, Ontario.*

Seems to be an increase in leopard frogs. Many young-of-year seen as of mid-August (1-1.5 inches long). Several leopards over 5 inches long. Snakes have hibernaculum in area and are feeding well. *Lil Anderson, Kenora, Ontario*.

May 3. First spring rain this afternoon. The peepers and loons on the lake are almost deafening. May 7. Believe the frogs went back to sleep. So cold - don't blame them. *Elizabeth Gauthier, Vermilion Bay, Ontario.*

June 26. Toads were so noisy. 14 hours after heavy, heavy rainstorm which lasted 12 hours, washed out roads and flooded houses. The toads were happy. *Elizabeth Gauthier, Vermilion Bay, Ontario.*

During the last week we have seen a dozen wood frogs (about normal) in the garden and 5 half inch toads. Several friends had standing room only (leopard frogs mostly) at their garden ponds. *Jeff Bryant, Stirling Village, Ontario.*

Editor's Note:

In response to suggestions by our volunteers, we are including a little more technical information in our newsletter this year. We outline an initial analysis of your backyard surveys, and describe some of our findings about the impact of fertilizers on amphibians and what Environment Canada has been doing about this problem. We haven't forgotten about you though! You can read about the experiences of your fellow volunteers because we have included comments about amphibians and the surveys that were sent to us on the data sheets this year. Special thanks also to Susan Trowbridge's Grade Three and Four class at Primrose Elementary School in Shelburne. They wrote to us about their froggy thoughts from the Wacky Warty Wetland and we are sharing some of these.

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For more information on amphibian monitoring, contact:

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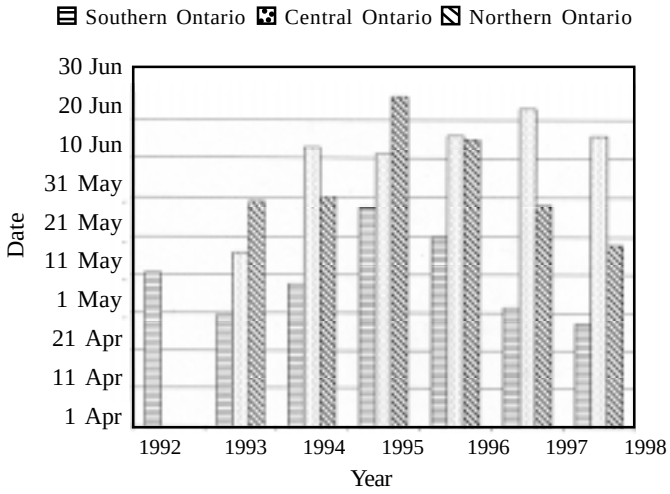
Calling trends for spring peepers, gray treefrogs and bullfrogs in Ontario

Volunteers conduct amphibian road call counts and backyard surveys. The road call counts are conducted under standardized conditions from year to year and site to site across Ontario. The road call counts survey a wider variety of habitats than the backyard surveys. However, the backyard survey data allows us to determine the trends in frog calling in response to temperatures in Ontario over time because this survey documents first, last and peak calling periods for each species. Because the backyard data can be used to identify the peak calling period for each species, this allows us to determine if the road call counts, which are only conducted three times per year, were done within the proper time periods. The two programs complement each other and can be used to double-check trends seen for each species. If both programs show increases or declines in occurrence of a species then we can be more confident that a change is really occurring.

Figure 1. Median Call Dates for spring peepers in Southern, Central & Northern Ontario, 1992-98



Note: Surveys not conducted in Central & Northern Ontario in 1992

Figure 2. Calling Periods for spring peepers in Central Ontario, 1993-98

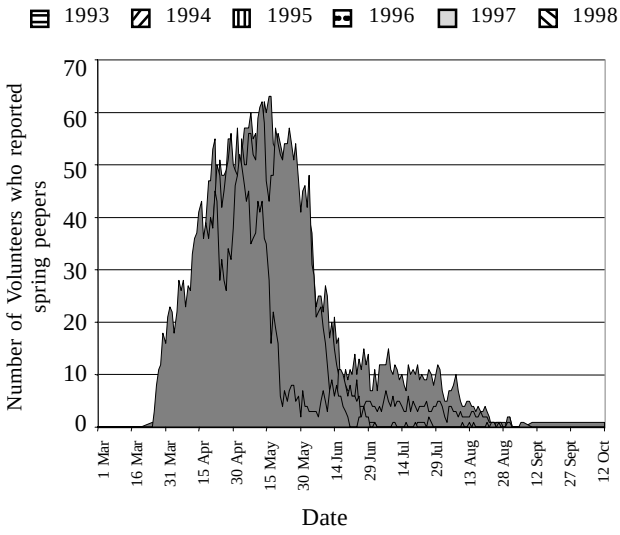
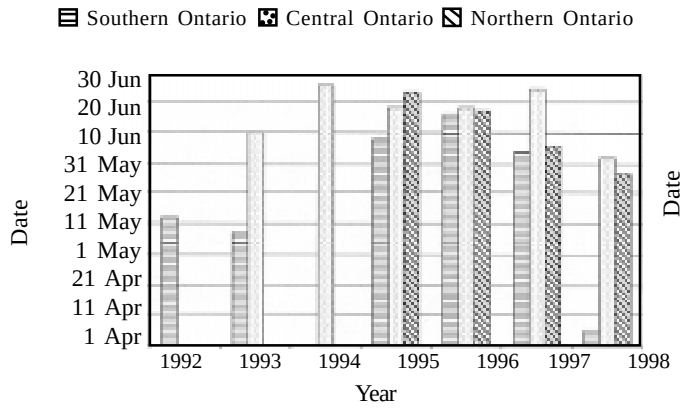
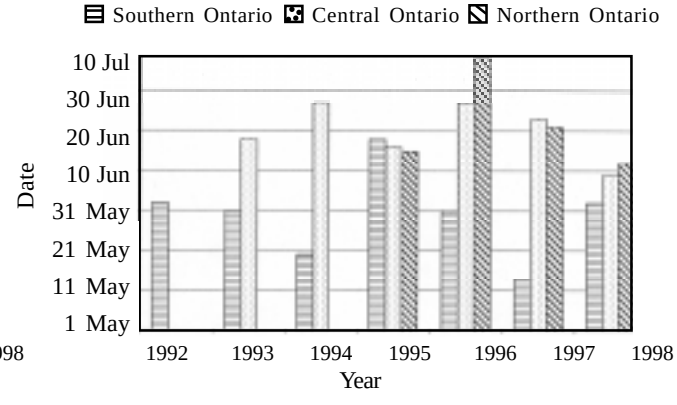


Figure 3. Median Call Dates for gray treefrogs in Southern, Central & Northern Ontario, 1992-98



Note: Surveys not conducted in Central & Northern Ontario in 1992; in 1993 gray treefrogs were not recorded in Northern Ontario and in 1994 they were not recorded in Southern & Northern Ontario.

Figure 4. Median Call Dates for bullfrogs in Southern, Central & Northern Ontario, 1992-98



Note: Surveys not conducted in Central & Northern Ontario in 1992; in 1993 & 1994 bullfrogs were not recorded in Northern Ontario.

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Nitrate Pollution:

An Unseen threat to Amphibian Populations

Threats to Amphibian Survival

- Loss of amphibians on our planet is mainly due to the destruction of habitat.
- Pollution is a less visible and potentially insidious threat to amphibian survival.
- Nitrate is an example of a pollutant which now occurs in many watercourses around the world at concentrations which can kill amphibians.

Nitrate: What is it?

- Nitrate is a natural compound present in all ecosystems. It is one of the chemicals essential to plant life but too much can be a problem for plants and animals. It is also a component of chemical and manure based fertilizers.
- Nitrate can enter watercourses and ponds from sources such as areas of high fertilizer use, livestock feedlots and pastures, and sewage treatment areas.
- Nitrate is applied to fields and lawns as a nutrient for plants but during rainstorms it can be washed directly into nearby ponds and streams via surface flow or through tile drainage systems.
- Nitrate and ammonia are components of manure that can also run-off into amphibian habitats.
- Sewage treatment areas often release high levels of nitrate into water courses.

How are Amphibians Exposed to Nitrate?

- Amphibians are at the highest risk of exposure and are most sensitive to nitrates when they are in the egg and tadpole stage of the amphibian life cycle.
- For most amphibian species, the egg and tadpole life stages occur in the water during the months when fertilizers and other chemicals reach their peak application levels.

How Toxic is Nitrate to Amphibians?

- Studies examining nitrate toxicity to selected native North American amphibian species indicate that nitrate concentrations required to kill 50% of the tadpoles are in the range of 13 to 40 parts per million (ppm).
- Although studies have not been conducted on amphibians outside North America, it is suspected that species from other parts of the world are also being affected.
- Chronic effects on amphibians (reduced feeding, reduced swimming, and developmental deformities) occur at concentrations as low as 2-5 ppm in some species.

What is "ppm"?

"Parts per million" (ppm) is a term used to express pollutant measurements in air, soil, water, or tissues. By way of example, one ppm is equivalent to one ice cube (5 grams) in 5 tonnes of ice. Many of the vitamins we require for survival are effective at ppm concentrations in our body. Similarly, pollutants can be toxic at these low concentrations.

What Concentrations of Nitrate are Found in Watercourses?

- Of the 8545 water samples collected in the 1990s from states and provinces bordering the Great Lakes, 19.8% contained nitrate concentrations exceeding 2 ppm which can cause developmental effects in amphibians. Some of the samples (3.1%) contained concentrations of nitrate above 10 ppm that could be lethal to amphibian tadpoles.
- Studies in the United Kingdom indicate that peak concentrations of 30 to 50 ppm nitrate could be expected in many bodies of water.

How Can We Reduce this Problem?

- By reducing the amount of fertilizer being applied to fields and residential lawns, we can reduce the potential for nitrate entering into local watercourses after rainstorms.
- Tile drainage systems could be placed deeper into the soil thereby reducing the chance that nitrate will be carried into them.
- Watercourses can be fenced to prevent livestock from arbitrarily entering the water.

- Fencing also keeps the livestock from flattening the vegetation around the edges of watercourses. This reduces nitrate concentrations in streams by not only eliminating direct deposition of manure, but also by allowing the surrounding area to become revegetated.
- Environment Canada's Great Lakes Clean-Up Fund has funded programs to reduce runoff and fence watercourses in the watersheds of Hamilton Harbour, Big Otter Creek, Wheatley Harbour, Detroit River, Severn Sound, Bay of Quinte, and the St. Lawrence River.
- The use of vegetated buffer zones around watercourses in urban and rural areas reduces the concentrations and loadings of nitrate entering the surface water through runoff by retaining the nitrate in soil and plants.
- Effective vegetated buffer strips can range from mixed woodlands to a strip of grass and can vary in size from a few metres in width to hundreds of metres.
- Examples of actual successes with vegetated buffer zones include a 24 metre grass buffer which reduced nitrate concentrations in water runoff from 10 ppm to below 1 ppm and a 19 metre mixed woodland buffer which reduced concentrations of nitrate from approximately 7 ppm to 0.5 ppm in the water that entered the stream.

Other Benefits of Vegetated Buffer Zones:

- In addition to removing nitrates, buffers can improve shelter and spawning or nesting habitat for amphibians and birds.
- Buffers can also reduce the amounts of phosphorous and sediments that enter watercourses. This helps to keep oxygen levels high so that fish, such as trout and salmon, can survive.
- Forested buffers adjacent to mid-sized streams can moderate temperatures, stabilize banks, reduce erosion, and provide important sources of organic matter to stream communities. This keeps water courses clean and healthy for invertebrates, amphibians, birds, fish, and mammals.

An Example of Success

Before: A landowner contact program in the Hamilton Harbour watershed in Ontario, Canada, recognized that the presence of unfenced livestock and the loss of vegetation near and within a watercourse were contributing to increased levels of nitrate and ruining the habitat for wildlife species such as amphibians, fish and birds.

After: The Hamilton Region Conservation Authority in partnership with the Clean Rural Beaches Project (Ontario Ministry of Environment & Energy) provided monetary subsidies to the farmer for a portion of the fencing cost. The habitat revegetated in one year.

Sources of Information:

Castelle, A.J., Johnson, A.W., and C. Connolly. 1994. Wetland and stream buffer size requirements- a review. J. Environmental Quality 23:878-882. Peterjohn, W.T. and D.L. Correll. 1984. Nutreint dynamics in agricultural watershed: observations on the role of a riparian forest. Ecology 65:1466-1475. Rouse, J.D., Bishop, C.A., Struger, J. 1999. Nitrogen Pollution: An assessment of the impact on amphibians. Env. Health Persp. 107(10): 1-6.

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Using the backyard survey data where volunteers monitor frog calls every evening through the spring and summer, we looked at calling trends from 1992 to 1998. The median call date is the date which falls in the middle of the range of dates when a species is reported by volunteers. When we look at the median calling dates for 1992 to 1998, they provide some interesting insight into the patterns of frog calling. While the data are certainly influenced by the number of volunteers listening each year, they are likely to provide a general estimate of the calling periods each year since our program began. Here we report on three species which are loud callers, and call at different times of the year: the diminutive spring peeper, the colourful gray treefrog, and the mighty bullfrog.

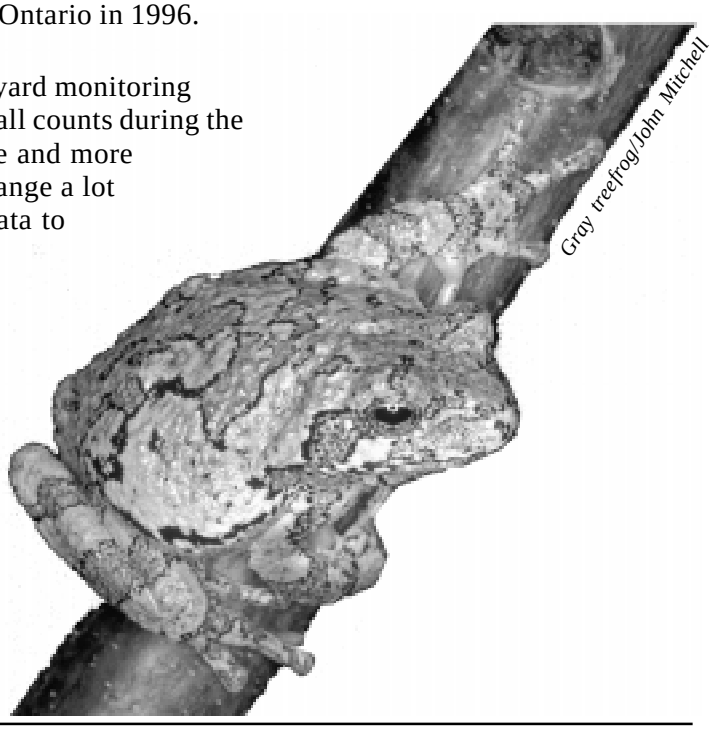
For spring peepers in southern Ontario (south of 43° N latitude), the earliest median call date was 28 April (1998) and the latest was 28 May (1995) (*Figure 1*). For central Ontario (between 43° and 47° N latitude) the corresponding dates were 17 May (1993) and 23 June (1997), and for northern Ontario (north of 47° N latitude), they were 19 May (1998) and 26 June (1995), respectively (*Figure 1*).

There was high variation in the length of the calling period, or the number of days between the first and last calling dates. Spring peepers in Southern Ontario were heard on 29 nights in 1993 compared to 111 nights in 1995. The later median call dates correspond to longer calling periods. For example, the longest calling period for spring peepers occurred in Central Ontario in 1997 when they were heard for 201 nights and the median call date was one of the latest- the 23rd of June. Spring peepers were reported as late as the 12th of October in Central Ontario (*Figure 2*).

Gray treefrogs were heard earliest in 1998 in all three geographical areas. The median call dates for south, central and northern Ontario were: 6 April, 2 June and 28 May (*Figure 3*). The shortest calling period occurred in Southern Ontario in 1993, when they were only reported for three nights although this may have been a function of the low number of surveyors in the first few years of the program. The longest calling period was in Central Ontario in 1995 when they were heard for 136 nights.

For bullfrogs, the earliest median call date occurred in 1997 in Southern Ontario, and in 1998 in Central and Northern Ontario (Figure 4). The longest calling period occurred in Central Ontario in 1998 when they were heard on 137 nights. The shortest calling periods (54 nights each) occurred in Southern Ontario in 1992 and Northern Ontario in 1996.

As the years go by, the importance of ongoing backyard monitoring throughout the calling period and performing road call counts during the correct dates and weather conditions becomes more and more obvious. As you can see, the calling periods can change a lot between years. It requires more than one year of data to confirm that each species still occurs at a location.



Gray treefrog/John Mitchell

From the Wacky Warty Wetland, Susan Trowbridge's grade three and four class of Primrose Elementary school in Shelburne, sent us some suggestions on how to help stop amphibian population declines:

- Hi, my name is Danny Heenan and I'm going to talk about how frogs are getting extincted. My class made reasons what we should try to not make frogs extincted. *Danny Heenan*
- Maybe people should stop keeping frogs for pets. *Garnisha Darar*
- I have some suggestions. I think that people should stop polluting the water where frogs live. We can make a difference by working together. *Allison Stinson*
- We should not pollute the water because their skin swallows water. It pollutes their skin and they die. *Tyler Adam Linger*
- Why do people use frogs for fish bait. I would put a sign up. The sign will say no frog bait. So they will not kill frogs. *Alyssa Mconkey*
- I suggest if frogs are in ponds the fish should be caught. *Sean Magill*
- People who live in the country can dig ponds, so that there is more vegetation for frogs. Tell all the restaurants don't serve frog legs for dinner. *Mellissa Tratt*
- I think you should have a frog day when everybody wears green and they hop around and croak once every leap year. *Heather Halliday*
- Clear out the baseball dome….drive it into the country and put a swampy, damp wetland in it. *Michael*
- We should put the frogs in an indoor enclosure with lots of flies and make the population higher than it is now. *Erin McCarthy*
- I think we should put all the frogs into an aquarium in their own environment, but with no predators. You should put the aquariums all over the place so people wouldn't have to go certain places to see them. *Elizabeth Dziedzieyko*
- Why does the father frog squeeze the mother frogs stomach? Is it because they're choking on something? *Kurtis*
- I learned about that they lay 3000 eggs and only 5 of the tadpoles will live. *Nicole Smith*

Celebrating National Wildlife Week 2000

National Wildlife Week was created in 1947 in honor of the late naturalist Jack Miner who devoted his life to conservation. The week-long celebration raises awareness among Canadians about the importance of wildlife and wildlife conservation. This year's theme is *"Migration…An Incredible Journey"*.

Each year, thousands of Canadians join in with the week's events. National Wildlife Week is more than a celebration of the diversity and importance of wildlife. It's also a great opportunity for community groups and organizations to raise their profile, promote their activities, attract new members, and show their neighbours and friends how to become better environmental citizens.

Join in the fun! It's easy to host or be a part of a Wildlife Week activity. Together we can spread the message — wildlife and wildlife habitat are important to a healthy environment. Visit *www.wildlifeweek.org* for information about this year's events, and to register your event on-line.

For those volunteers who are having difficulty obtaining topographic maps for their locations the following source could be contacted:

Canada Map Office
130 Bentley Road
Ottawa, Ontario K1A 0E9
1-800-465-6277

On the Internet you can find and order topographic maps through Natural Resources Canada at:
http://www.geocan.nrcan.gc.ca

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