

ENVIRONMENTAL Fact Sheet



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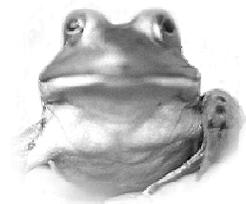
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DES Frog Survey Program

What is the Frog Survey Program?

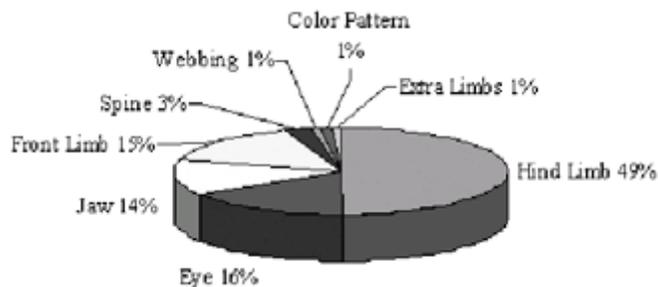
The frog survey program began in 1998 and is designed to determine the rate, distribution, and nature of frog malformations across the state. The surveys are coordinated by the Biomonitoring Program in DES's Watershed Management Bureau and include volunteer teams to gather data. Surveys are conducted from July to September looking at newly metamorphosed frogs, focusing on the most aquatic and abundant species in New Hampshire. The DES methods require 50 "young-of-the-year" frogs of one species, caught during a single survey to ensure that the data collected will be statistically valid.



How and Where Did This All Start?

Frog malformations have been documented in scientific literature for hundreds of years. However, in 1995 a group of school children in Minnesota found an alarming number of malformed frogs, some strikingly bizarre. This raised the awareness of the issue, and since then, malformed frogs have been documented in 44 states, several provinces in Canada, and are being seen more frequently in other parts of the world. These discoveries have prompted the public and scientific community to investigate the cause of the problem.

Why Should We Look At Frogs?



Types of Malformations found in New Hampshire during the 1998-2001 seasons.

Every part of the amphibian lifecycle keeps them intimately linked with their aquatic world. They begin their lives in a gelatinous egg sac, then transform into the familiar "pollywog" or tadpole. The word amphibian actually means *double life*. This is certainly apt, for the metamorphosis brings them from a fish-like existence to a semi-terrestrial adult. Their lifecycle and physiology make them particularly susceptible to habitat disturbances, making frogs a key indicator species of environmental quality.

What Has Been Found In New Hampshire?

With the help of volunteers, the New Hampshire Frog Survey Program has examined over 6,600 frogs. Surveys have been conducted all over the state covering every county. In addition to developmental malformations, frogs have been found that are abnormal due to viral, parasitic, or fungal infections. One of the most intriguing abnormalities found by the program was the "bubble frogs," given the name due to the severe swelling caused by a virus. In response to dealing with potential infectious agents, DES adopted a new procedure of disinfecting all equipment after each survey to eliminate the possibility of spreading pathogens to other waterbodies.

What Is Causing The Malformations?

Investigators of the issue are beyond looking for a single, simple answer. This phenomenon is perplexing but presents a unique opportunity for many branches of science to collaborate. Chemicals in the environment were the first suspected cause of the malformations and several types of chemicals have been shown to cause abnormalities in controlled laboratory studies. However, no single chemical has been found at every site that malformations have been recorded, nor has any one chemical produced all of the different types of malformations seen in the field. Parasites have also been proven to induce malformations but again they usually only produce certain types of malformations and are not found at all sites. Ultraviolet radiation can induce abnormalities in almost every vertebrate including humans. However, the intensity of radiation shown to induce malformations does not correspond to natural levels in the environment. In addition, it is often difficult to distinguish malformations from injuries that result from predation. Synergy -- a combination of factors producing an effect greater than the sum of the individual components -- is considered by many scientists to be the most likely explanation, yet it is the most difficult to understand. What may seem to be an insignificant impact may become heightened as it progresses through the ecosystem with unintentional results.

Volunteer Opportunities

The frog issue has generated a strong public interest. Since the inception of the New Hampshire Frog Survey Program, volunteers have been an integral part of the effort in determining the extent of the problem in our state. Currently, training materials are available at our website, <http://www.des.nh.gov/>. This information includes how to conduct a survey, what equipment you will need, an identification guide for New Hampshire frog species, datasheets, and also a four-year summary of the 1998-2001 seasons.