
CROAKS AND TRILLS

Volume 8, Issue 1



May 2003

From the Editor

We are in the process of streamlining our 'Croaks and Trills' mailing list.

If you would like this newsletter sent to you electronically, please send your full name and e-mail address to:

kris.kendell@gov.ab.ca

Do you require additional data sheets?

You can now download additional data sheets from the Alberta Conservation Association website: www.ab-conservation.com. The data sheets can be found under *Current Projects*, on the Alberta Amphibian Monitoring Program web page. Please see page 6 for further details.

--- Kris Kendell

Amphibian respiration: do hairy frogs breathe with ease?

Kris Kendell

One of the most typical characteristics of amphibians is their thin and highly permeable skin that is well supplied with many blood vessels. This porous skin has the ability to absorb oxygen as well as allow water to be absorbed or lost. Unlike reptiles, mammals and birds, amphibian skin is an effective respiratory organ because of its thinness, moist surface and extensive capillary network.

A variety of adaptations of the skin have occurred in amphibians in relation to breathing. In some amphibians skin, breathing is enhanced by the presence of various folds, wrinkles or appendages of the skin. For example, the hellbender (*Cryptobranchus alleganiensis*) - an entirely aquatic salamander species found in the northeastern United States - has wrinkled, fleshy folds of skin along the flanks of its body. These folds of baggy skin increase the total surface area of skin, improving oxygen transfer from the water of the mountain streams which this salamander inhabits.

In many amphibian species, the ability of the skin to exchange gas is essential to survival. For example, terrestrial salamanders from the family Plethodontidae lack lungs and are commonly referred to as lungless salamanders. Without lungs, these salamanders are highly dependent on skin respiration, although some respiration also occurs through the mucous membranes of the mouth and throat.

Respiration through the skin also plays an important, often vital, role in species with lungs. For example, the northern leopard frog (*Rana pipiens*) respire completely through the skin while hibernating underwater during the winter.

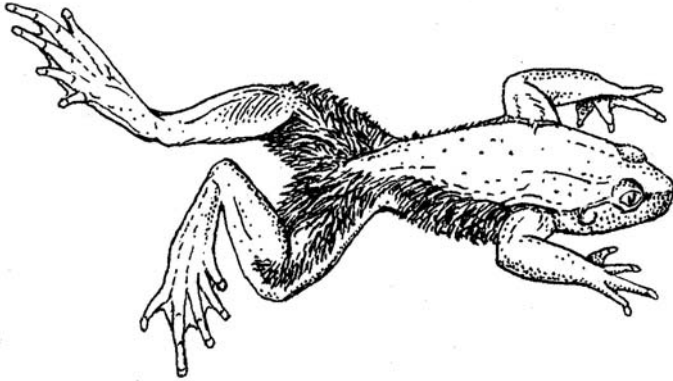
(Con't on page 2)

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Hairy frogs (Con't from page 1)

The African hairy frog (*Trichobatrachus robustus*) of Cameroon and Equatorial Guinea, possesses dense hair-like appendages up to 15 mm long on its flanks and thighs.



A male African hairy frog

(Drawing from Stebbins and Cohen 1995 – after Noble 1931)

The function of these unique thread-like appendages remain somewhat of a mystery, however, it is widely believed that the “hair” increases the body’s respiration surface.

Interestingly, only the male of this species, during the mating season, develops this highly vascularized “hair”. Scientists have put forth several theories to explain this unique feature among amphibians, and gender-specific characteristic. The most likely theory centers on the males role of guarding his clutch of eggs, which are deposited by the female in rapidly flowing water (Hofrichter 2000). The hair-like filaments allow the males to remain submerged for greater periods of time, thus leaving the eggs unguarded less frequently. Hairy frogs do indeed breathe with ease!

- Hofrichter, R. 2000. The encyclopedia of amphibians. Weltbild Verlag GmbH, Augsburg. Key Porter Books Limited, Toronto, ON. 264 pp.
- Noble, G. K. 1931. The biology of the amphibian. McGraw-Hill, New York; printed by Dover Publications, 1954.
- Stebbins, R. C. and N. W. Cohen. 1995. A natural history of amphibians. Princeton University Press, Princeton, NJ. 316 pp. ❖

Program results 2002/2003

A special thanks is owed to the 46 individuals and families who contributed, in total, 333 amphibian observations in the 2002/2003-program year.

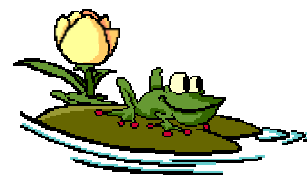
Of Alberta’s 10 species of amphibians, eight species were observed including the boreal chorus frog (n=109), wood frog (n=133), Columbia spotted frog (n=28), northern leopard frog (n=2), boreal toad (n=29), Canadian toad (n=6), long-toed salamander (n=17) and tiger salamander (n=9).

In addition, two species of garter snake were observed including the red-sided garter snake (n=4) and the wandering garter snake (n=3). Also documented on volunteer data sheets in 2002 were two avian species: sora rail (n=10) and osprey (n=1).

No data was collected for the Plains spadefoot or Great Plains toad.

Amphibian data collected by volunteers in 2002/2003 has been entered into the Biodiversity Species Observation Database (BSOD). BSOD is a database maintained by Alberta Fish and Wildlife Division and used to store observational data on wildlife species within Alberta.

The data collected by volunteers through this program will be used by biologists to help in status determination, distribution mapping, management and potential recovery efforts for amphibians and reptiles in Alberta. ❖



Spring is upon us and so it is
once again time to start
monitoring!

Monitoring can begin soon after the ice begins to melt from small waterbodies.

Have fun monitoring for amphibians this spring and summer! ❖

Reptilian Word Search

Use the *Reptile Vocabulary Word List* and find the words in the letter grid below. Look for the words going up, down, across, backwards, and diagonally. Be careful, some letters will be found in more than one word.

Y G O L O T P R E H K S A B N
 T M G N A F Y T I R A P I V O
 I C R E P U S C U L A R I H I
 S E O E V L C I T P Y R C T T
 R U H M H I B E R N A C U L A
 E D O Y M T V E L T R U T R N
 V I G M M U O I T O N G U E R
 I U N K O R N L P A H I D P E
 D R O C O N E A I A T K E I B
 O N S O T S E H L K R I N V I
 I A E R N H E V T I I I B I H
 B L P A I N T E D O Z O T A S
 R E K A N S L L U B T A P Y H
 R E R A E B E V I L M C R I E
 C C L O A C A R A P A C E D D

Reptile Vocabulary Word List

Bask	Fang	Poikilothermy
Biodiversity	Habitat	Rattlesnake
Bullsnake	Herpetology	Rock
Carapace	Hibernacula	Shed
Cloaca	Hibernation	Sinkhole
Communal	Hog-nose	Tongue
Crepuscular	Live-bearer	Turtle
Cryptic	Lizard	Venomous
Den	Oviparity	Viper
Diurnal	Painted	Viviparity
Ectothermy	Pit	

Write the leftover letters below to find solve this clue:
An animal that gets its body heat by basking in the sun is called...

Answer on page 6.

This puzzle was adapted from the new Teacher's Guide for Alberta's Reptiles for Grade Seven Science. ❖

Spadefoots or Spadefect? ~ The plains spadefoot in the Milk River Basin

Brad Taylor

I was watching the first movie of the Lord of the Rings trilogy the other day and one scene really stood out. It's the scene where Bilbo is addressing the crowd at his birthday party. He is thanking all the families that were in attendance when he says "Proudfoots" to which he is quickly corrected "Proudfeet". This made me think of the work we conducted last spring in the Milk River Basin on the plains spadefoot (*Spea bombifrons*). Jokingly, I thought to myself, "Would the plural be spadefoots or spadefect?"



C. Newton

To better understand the biodiversity of the Milk River Basin in southern Alberta, Alberta Fish and Wildlife Division, the Alberta Conservation Association, and the Government of Canada Habitat Stewardship Program for Species at Risk initiated a joint project called the Milk River Basin Project. The Milk River Basin is an "L" shaped basin that runs along the Alberta-US border and is primarily made up of native prairie (~68%).

One of the species that we were looking for during the project was the plains spadefoot. We hoped to learn more about where this species occurred in the project area and what they needed for habitat. To accomplish this we conducted call and visual encounter surveys between May 1st and June 30th, 2002.

The plains spadefoot is an elusive creature. It is relatively small, with a total body length of about 35 to 60 mm, and is dull green or light brown in color.

(Con't on page 4)

Spadefoot *(Con't from page 3)*

It is mostly active at night and spends the day resting in the burrows it makes using two spade-like attachments on its hind feet called tubercles (see photo below).



Like many frogs and toads, the spadefoot is easiest to detect in the spring when males begin calling during breeding, which only occurs for a few days following heavy rains. The spadefoot's call sounds similar to a person snoring. In late summer, they can sometimes be found under yard lights searching for insects to eat in order to gain the necessary fat reserves for hibernation. Before the onset of winter, the spadefoot burrows into the ground (sometimes as deep as 1 meter) where it remains in hibernation until spring rains signal it to emerge again.

Before this project began, only 45 plains spadefoot breeding ponds had been documented in the Milk River Basin. During this project we encountered over 200 breeding ponds. Some of the larger ponds had so many spadefoot that we could hear them from over one kilometer away. Although almost all ponds were in or around native prairie habitat, we found these creatures in pretty much any area that filled up with water following last year's unusually heavy spring rains (ditches, irrigated fields, and little depressions). The water clarity didn't seem to be a factor in pond selection and we found them in clear, tea-colored, and even muddy water.

Most of the ponds were ephemeral, meaning they fill up with spring rains and are dry for the rest of the year. One pond was particularly interesting. It had been dry for the last three years, but given the good rainfall in this area last spring, it turned out to be one of our most productive sites. We found high

biodiversity (many organisms) at this site: fairy shrimp, tadpole shrimp (they look like miniature horseshoe crabs), and numerous spadefoot tadpoles. Amazingly, this pond was only about 50 cm deep. Higher water temperatures, resulting from low water levels, is one of the reasons that the plains spadefoot grows and develops so fast (fastest of all amphibians in Alberta). It can grow and metamorphose from egg to tadpole to toad in about six weeks. However, since these ponds are shallow they have a high potential to dry up before the spadefoot can complete metamorphosis.

During the field season, we were bound and determined to find out where plains spadefoot spend the day after calling activity had begun. Around dusk we went out to a site where we knew plains spadefoot were calling and walked around the pond until calling activity began. We were hoping to see the toads moving into the pond from the uplands; however, they began calling while we were walking so we figured they may spend their days along the periphery of the pond. We monitored this same site on a weekly basis to see how long it takes for the tadpoles to develop. This was difficult to quantify as the tadpoles grew at different rates. This was further complicated by the fact that another rain in June caused another breeding event. By July both fully developed spadefoot as well as new tadpoles were present.

The work we completed last spring immensely expanded the known locations of plains spadefoot in the Milk River Basin, as well as helped to identify some general habitat requirements. Primarily, plains spadefoot prefer native prairie with sandy loam soil. They are capable of using a variety of water filled depressions for breeding provided the water persists until early to mid July to accommodate metamorphosis. It is phenomenal to see how a slight depression in a pasture, that has been dry for several years, yield so many plains spadefoot.

To learn more about the plains spadefoot in Alberta, check out the Alberta Fish and Wildlife website: <http://www3.gov.ab.ca/std/fw/amphib/index.html>.

To learn more about this project contact:
Brad Taylor (ACA): brad.taylor@gov.ab.ca ❖

The boreal chorus frog: groundfrog or treefrog?

Cam Stevens, Sara Eaves, and Cindy Paszkowski

The boreal chorus frog (*Pseudacris maculata*) occurs throughout most of Alberta in prairie grasslands and boreal forests.



It is the only species in the province belonging to the treefrog family (Hylidae). Treefrogs, like the name suggests, climb vegetation and trees to escape predators and to seek intercepted rainfall and ideal microclimates. However, research on the terrestrial habits of boreal chorus frogs is meager even though it is among the most widespread and abundant amphibian species in northern ecosystems.

To understand the ecology of amphibians, researchers typically use visual surveys and pitfall trapping to estimate population sizes and to understand amphibian habitat use patterns. These standard techniques however, have proven ineffective for treefrogs, including the boreal chorus frog. Individuals will often avoid detection by hiding in dense vegetation during visual surveys. In addition, treefrogs are capable of climbing out of pitfall traps and over drift fences during pitfall trapping. A new method for sampling treefrogs uses PVC pipes suspended above ground to provide an attractive sheltered microhabitat. Thus, one objective of our research has been to examine the terrestrial habits of boreal chorus frogs by determining if PVC pipes provide suitable refugia for this species.

In 2002, we addressed this objective by using 150 white PVC pipes (60 cm long; 3.8 cm inside diameter)

adjacent to ponds in Elk Island National Park and Lodgepole, AB, to capture boreal chorus frogs. PVC pipes were arranged in arrays at different orientations (vertical vs. horizontal), at different heights from the ground (0 vs. 3 cm), and at varying distances from the pond (0, 5, and 10 m) (Figure 1).

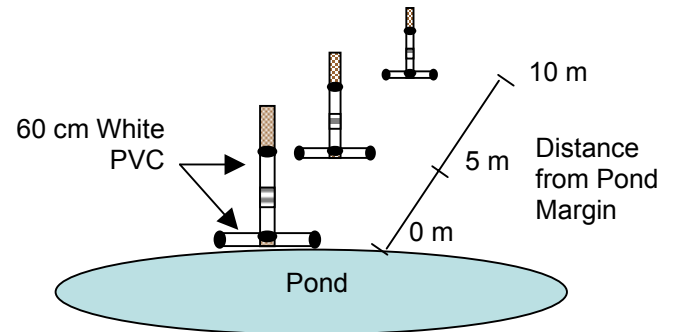


Figure 1. A PVC pipe array.

Although boreal chorus frogs were heard calling on the study ponds during spring call surveys, we did not record individuals in PVC pipes at any pond during multiple visits in the morning, afternoon, or evening in July and August.

Why did we fail to detect boreal chorus frogs? Based on a similar PVC study conducted in Florida, USA, that was successful in capturing a diversity of treefrogs, we ruled out the possibility that our sampling design was ineffective. Rather, we suspect that boreal chorus frogs avoided PVC pipes due to dry prairie and boreal climates that may affect the terrestrial habits of small amphibians in Alberta. Use of elevated structures in these landscapes may expose individuals to unfavorable climates. It may be advantageous for boreal chorus frogs to remain near moist ground and under vegetation in structurally complex microhabitats to avoid desiccation.

Indeed, no research or anecdotal evidence suggests that boreal chorus frogs climb vegetation like treefrogs in other regions of North America. Moreover, morphological evidence suggests that boreal chorus frogs are unable to adhere to smooth surfaces and elevated structures for extended periods because of poorly developed toe-pads (suction cups). In summary, we suggest that the boreal chorus frog is actually a 'groundfrog' within the treefrog family.

For more information on this study contact:
Cam Stevens: stevens@ualberta.ca ❖

Amphibian/Reptile Facts: did you know?

- The Komodo dragon (*Varanus komodoensis*) is the largest of all lizards. Restricted to Komodo and a few neighboring islands in central Indonesia, the Komodo dragon may grow up to 3 m (10 ft) in total length and weigh as much as 165 kg (364 lbs)!
- Frogs are native to all continents except Antarctica.
- There are only two venomous lizards in the world: the gila monster (*Heloderma suspectum*) and the Mexican beaded lizard (*Heloderma horridum*). Unlike venomous snakes, these lizards have venom glands in their lower jaw with individual ducts that lead to each of the lower teeth (venomous snakes manufacture and store venom in glands located in the upper jaw). The venom is primarily used for defense. Although a bite is usually not fatal to humans, it is extremely unpleasant causing severe localized pain.
- The largest turtle is the leatherback with a maximum reported shell length of almost 2.5 m (8.25 ft) and weight approaching 900 kg (1984 lb)! However, most specimens rarely exceed 1.52 m (5 ft) in shell length.
- Many amphibians evidently have good color vision, as may be inferred from their behaviour and the proportion of retinal cones in their eyes. ❖

Obtaining data sheets from the web and/or receiving Croaks and Trills via e-mail:

To download data sheets and receive the newsletter by e-mail you will need to download Acrobat Reader from the Internet. It is free and simple to download – follow the steps below.

Step 1: Go to www.adobe.com

Step 2: ‘Click’ [Get Acrobat Reader](#)

Step 3: Follow the simple directions to download Adobe Acrobat Reader.

Reptilian word search (page 2) answer: *Heliothermic*

CROAKS AND TRILLS is the official information newsletter of the Alberta Volunteer Amphibian Monitoring Program, a program delivered jointly by the Alberta Conservation Association and Alberta Sustainable Resource Development.

For more information on:

- The Alberta Volunteer Amphibian Monitoring Program
- How to submit an article on amphibians, reptiles or wetlands
- How to submit monitoring data or other amphibian and reptile observations

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