CROAKS AND TRILLS

Volume 9, Issue 1 April 2004

From the Editor

Do you need additional data sheets?

Data sheets can be printed directly from the Alberta Conservation Association website: www.ab-conservation.com.

To locate the data sheets on the ACA website, click on the following links: *"Your dollars at work"* followed by "*Current projects"* followed by *"Alberta Amphibian Monitoring Program"*. For further details see page 6 of this newsletter.

Amphibian photo contest – see page 5 for details!

--- Kris Kendell

In This Issue

Frogs… what are they showing us about our wetlands?

By Medea Curteanu

Wetlands! Alberta is fortunate to have many of these rich ecosystems, which are often referred to as the "kidneys" of the earth. Besides filtering our waterways, wetlands provide important habitat for a myriad of mammal, bird, amphibian, reptile and plant species, as well as an array of mollusc and invertebrate species, some of which have yet to be identified. One of the most familiar species found in wetlands are amphibians. Their distinctive calls and fascinating life cycle have meant they have always been in the wetland ecology spotlight.

Recently in North America there has been a focus on amphibians with respect to the widespread occurrence of physical deformities in local populations, which is considered a major environmental issue. A wide range of limb abnormalities has been recorded, ranging from missing digits or portions of a limb to extra limbs and digits (Figure 1).

Figure 1: Two frog specimens (*Rana pipiens*) collected in the wild with missing parts of their hind limbs (Photographed by S.K. Sessions) (Hartwick College website).

(Con't on page 2)

Frogs… *(con't from page 1)*

Numerous theories, including water pollution, increased ultraviolet (UV) radiation, viruses, pesticides, predation, and genetic mutations, have been proposed as the cause of the high frequency of limb abnormalities (Sessions & Ruth 1990). It should be noted that a certain level of limb deformities occur in healthy populations as result of predation, cannibalism, genetic mutations or development disturbances. However, these natural occurrences never exceed more than 5% of the population (Johnson et al. 2000). Also, while UV radiation is known to induce deformities in laboratory amphibians, it has not been shown to cause extra limb growth (Baustein & Johnson 2003).

Research conducted across the western United States revealed that the high frequencies of limb deformities observed in natural amphibian populations are caused by parasitic flatworms (trematodes) (Sessions & Ruth 1990, Johnson et al. 2002). Experiments on laboratory-raised frog larvae exposed to trematodes revealed similar limb deformities recorded in deformed amphibians caught from the wild (Figure 2) (Johnson et al. 2002). It was found that trematodes, specifically *Ribeiroia sp*., use amphibians as an intermediate host to complete their life cycle.

Figure 2: Deformed Pacific Treefrog (*Hyla regilla*) with extra hind limbs after it has been exposed to trematodes (photograph by S. K. Sessions) (From: Hartwick College website).

The trematode life cycle is quite complex and varies widely among species (see Figure 3 for simplification). In general, during its life cycle there are three different hosts or organisms the trematode infests. The life cycle begins with the trematode eggs, which hatch as larvae (miracidium) and invade the tissue of an aquatic snail. Within this first host the trematodes undergo several developmental stages before they are released as free-swimming larva (cercaria).

The cercaria then seek out and attack the larval stage of the amphibian where they penetrate the skin and form cysts (metacercariae) near the tail region (Johnson et al. 2002). As the tadpole develops into an adult, the cysts remain embedded in the hind region disrupting proper leg development and producing abnormal limb structures.

The third stage of the parasite's life cycle is the sexual stage, which cannot be completed unless a bird, mammal or snake ingests the metacercariae (Johnson et al. 2002). Hindered by deformed and extra limbs, the infected amphibian becomes easy prey for the final host thereby ensuring the sexual maturity of the trematode and the release of its eggs in the host's feces, repeating the entire cycle (Blaustein & Johnson 2003).

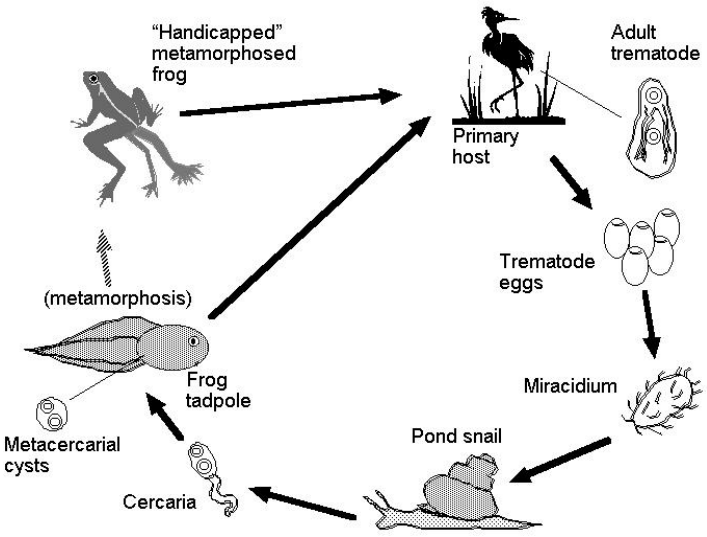


Figure 3: The life cycle of a trematode (Ribeiroia sp.) (From: Hartwick Education website)

Researchers suspect that the increase in trematode infestations is linked to dramatic and wide spread human-alterations of aquatic systems (Johnson et al. 2002). For example, in agricultural areas fertilizers and cow manure that wash into adjacent waterbodies promote the growth of algae, which leads to an

(Con't on page 3)

Frogs… *(con't from page 2)*

increase in snail populations. Because aquatic snails play an essential role in the parasite's life cycle, more snails in the system means a higher rate of trematode survival and therefore infestation on amphibian larvae.

Although more research is needed to conclude the exact links between water quality, snails, parasites and amphibian limb deformities, deformed frogs are providing us some valuable evidence of how changes to our aquatic environments can affect the entire food web and influence the overall health of wildlife populations.

References:

Blaustein, A.R. and Johnson P.T. 2003. Explaining frog deformities. Scientific American Feb: 60-65.

Johnson, P.T., Lunde, K., Truman, E.M., Ritchie, E.G., Wray, S.N., Sutherland, D.R., Kapfer, M., Frest, T.J., Bowerman, J., and Blaustein, R. 2002. Parasite (Ribeiroia ondatrae) infection linked to amphibian malformations in the western United States. Ecological Monographs 72(2):151-168.

Sessions, S.K. and Ruth, S.B. 1990. Explanation for naturally occurring supernumerary limbs in amphibians. The Journal of Experimental Zoology 254:38-47.

Sessions, S.K., Stopper G., Hecker, L., Horner, V. and Franssen, A. Deformed Amphibian Research at Hartwick College. http://info.hartwick.edu/biology/def_frogs/Introduction/Introduction.html (Accessed March 14, 2004)

Fig 1: http://info.hartwick.edu/biology/def_frogs/UsableDFimages/Vermontfrogs.html (Accessed March 12, 2004)

Fig 2: http://info.hartwick.edu/biology/def_frogs/Introduction/MultileggedHyla.html (Accesses March 14, 2004)

Fig 3: http://info.hartwick.edu/biology/def_frogs/Introduction/Riblifecycle.html (Accesses March 14, 2004)

To view map of Canada and United States where maldeformed frogs have been reported visit: http://www.npwrc.usgs.gov/narcam/reports/reports.html ❖

Program Results 2003

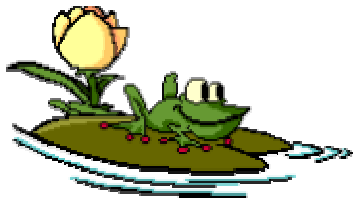
In total, 35 individuals and families contributed 397 amphibian observations and six reptile observations in 2003. An additional 84 amphibian observations were also submitted in 2003, consisting of data collected during 2002.

All ten species of Alberta's amphibians were observed in 2003-04 and included the boreal chorus frog (n=190), wood frog (n=96), Columbia spotted frog (n=41), northern leopard frog (n=3), Plains spadefoot (n=10), boreal toad (n=31), Canadian toad (n=2), Great Plains toad (n=3), long-toed salamander (n=14) and tiger salamander (n=7).

In addition, four species snakes were observed: Plains garter snake (n=1), red-sided garter snake (n=3), wandering garter snake (n=1) and bullsnake (n=1). Also, one red-sided garter snake den site record was submitted in 2003-04.

Data collected in 2002, (submitted in 2003), included four amphibian species: boreal chorus frog (n=3), Great Plains toad (n=31), northern leopard frog (n=5) and Plains spadefoot (n=45).

All amphibian data collected by volunteers in 2003 (as well as the late data from 2002) have been entered into the Biodiversity Species Observation Database (BSOD). BSOD is a database maintained by Alberta Fish and Wildlife Division (Sustainable Resource Development) and used to store observational data on wildlife species within 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! ❖

Suncor's reclaimed lands: providing great real estate for Canadian toads

By Nicole McDonald and Leo Paquin

Suncor Energy Inc. was the first company to start oil sands mining and bitumen production in northeastern Alberta and it has been the first to reclaim mining areas, starting in 1971.

Suncor initiated a wildlife monitoring program in 2002 to gauge how well their reclaimed sites were progressing back to wildlife habitat typical of the area. The monitoring program was designed to evaluate the abundance and distribution of wildlife using these areas, and to allow comparison of that information with information from control sites, or from baseline work completed as part of development environmental impact assessments.

Previous amphibian studies in the area had not detected Canadian toads. However, in 2002 all of that changed as five of the nine ponds surveyed in the reclaimed areas resulted in detection of Canadian toads! Canadian toad surveys conducted in 2003 resulted in abundance numbers that were higher than any other surveys recorded in boreal forest to date. In 2003, a total of 20 plus Canadian toads were recorded at one pond alone and the distribution of toads increased to eight of the 16 ponds sampled.

A Canadian toad calling at a surveyed pond.
Photo by Corey De La Mare (Golder Associates Ltd.).

It appears as though the Canadian toads have found prime real estate in the Suncor reclamation areas, with their sandy soil layers that are perfect for their over-wintering requirements and with an abundance of ponds, have created perfect sites to go a' courting!

Excited by their new neighbors, Suncor has plans to further the study of the Canadian toads on site to determine if the reclaimed habitat can be used as a model for toad habitat restoration or enhancement in the future and to determine exactly why their reclaimed sites are all the rage for the toads and their increasing numbers.

For more information about this study contact: Nicole McDonald (Golder Associates Ltd.) nmcdonald@golder.com or Leo Paquin (Suncor Energy Inc.) lpaquin@suncor.com ❖

Alberta herpetology group - an update

By Lisa Wilkinson

The Alberta Herpetology Group consists of a network of individuals comprising of government and nongovernment scientists and biologists as well as professors and naturalists who are dedicated to the study and conservation of amphibians and reptiles.

Every year, this group of people get together under a workshop type setting that allows for the free exchange of ideas and information on a variety of research and conservation issues relating to amphibians and reptiles in Alberta. The 7th annual meeting was held in February in Red Deer, at which time the group adopted several new initiatives.

One of the groups first priorities is to develop a website to increase public awareness about amphibians and reptiles and improve educational resources. The group has also begun to develop a list of issues and research needs that they hope to address.

By unifying and organizing efforts, the group hopes to tackle the many challenges facing amphibian and reptile conservation in Alberta. The continued support of the numerous volunteers around the province who provide information on amphibian sightings helps to support these conservation efforts.

For more information about the Alberta Herpetology Group annual meeting contact: Lisa Wilkinson (Alberta Sustainable Resource Development): lisa.wilkinson@gov.ab.ca ❖

Amphibian photo contest

The Alberta Amphibian Monitoring Program is holding a photo contest in 2004. Photographs submitted through this contest will be used for education and outreach initiatives associated with the Alberta Amphibian Monitoring Program.

Contest rules

1. Photograph submission deadline is September 30th, 2004.
2. Photographs must be of species native to Alberta.
3. One photograph submission per individual (you can submit more than one photograph, but please clearly indicate which specific photograph you wish to register with the contest).
4. Full name and complete mailing address must be clearly written on the back of the photograph.
5. Amphibians should be photographed in a natural setting (i.e., not removed from where they were first observed).
6. Each contestant must be a volunteer with the Alberta Amphibian Monitoring Program.

IMPORTANT: Disturb habitat as little as possible when photographing amphibians and resist handling the amphibian to avoid possible injuries and stress to the animal.

Prizes

First, second and third prize winners will have their photographs featured in the fall edition of Croaks and Trills and on the ACA website.

Contest prizes are as follows: first place (ACA stainless steel thermos and travel mug prize pack); second place (ACA magna flashlight and ceramic mug prize pack); and third place (ACA hat and multitool prize pack).

The judging panel will consist of three people and all photos will be evaluated on:

- Authenticity (i.e., animals that are in a natural position and pose).
- Sharpness and color rendition.
- Image placement within the frame.

Please note that photographs will not be returned to their owner, unless requested, and all photographs will be scanned into a computer. The author(s) of each photograph will be acknowledged each time the photo is used.

Why photograph amphibians?

Photographing amphibians can be a challenge because of their wary nature and innate instinct to flee and hide when approached. Indeed, capturing an amphibian on film requires stealth, patients and some basic understanding of the discipline of photography – not to mention some luck!

Generally, photographing amphibians can be a useful method of documenting behavior, confirming identification and pattern mapping – a technique that is used in studies where individual-specific marks are required to identify animals. Pattern mapping is possible because the color patterns of some amphibian species vary enough among individuals that they are analogous to fingerprints. Finally, photographing amphibians can be an enjoyable and satisfying pursuit that combines two interests. ❖

Amazing amphibian and reptile facts

- The amazing turtle frog (*Myobatrachus gouldii*) of western Australia burrows deeply underground to deposit its eggs. Its eggs have been found nearly 1.2 meters underground. Here they under go direct development and bypass the free-swimming tadpole stage.

- The males of the Darwin's frog (*Rhinoderma darwinii*) gather up their recently hatched tadpoles into their month and maneuver them into their vocal sac. Here the tadpoles undergo metamorphosis and emerge from the male's mouth as tiny froglets.

- The tongue tip of chameleons may exceed speeds of 5 meters per second during the projection phase, requiring less than one-hundredth of a second for it to reach unsuspecting prey.

- Many lizards that are primarily day-active have a brain structure known as a "third eye", complete with a lens, retina and nerve connection to the brain. This "third eye" is part of a complex organ and is situated on the top of the lizard's brain and lies beneath the roof of the skull. It is not covered by bone but lies beneath a foramen (or window) in the skull, covered by a translucent scale. The purpose of the "third eye" is still largely a mystery, but it may have evolved as a device to determine basking period and regulate body temperature. ❖

Conference Announcement

The 9th annual Canadian Amphibian and Reptile Conservation Network (CARCNet) meeting will be held in Edmonton, Alberta on 24-27 September 2004. The conference will offer a platform to exchange ideas and information between leading scientists in the field of herpetile research as well as educate the public and scientific audience about the biology and conservation of amphibians and reptiles.

Presentations and posters for the CARCNet annual meetings are open to all aspects of the conservation biology of amphibians and reptiles and herpetological research (e.g., population and metapopulation dynamics, genetics, diseases, commercial harvest, status assessment, recovery plans, monitoring, habitat protection, etc.). Presentations on public education projects and ethics are also welcome.

For more information about CARCNet and the meeting please visit the following web site: http://www.carcnet.ca/ OR contact Kris Kendell: kris.kendell@gov.ab.ca / 780-422-4764 ❖

How to obtain data sheets from the Internet

To obtain data sheets from ACA's website you will need to download Acrobat Reader from the Internet if you do not already have it on your computer. Acrobat Reader is free and simple to download. Follow the steps on the following website: www.adobe.com ❖

Website of interest

http://www.livingunderworld.org/netscape.htm This website is a great site that is dedicated to the preservation of amphibians in the wild, as well as in captivity! ❖

Special thanks to the Shell Environmental Fund for funding support in 2003-04

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
- amphibians and reptiles of Alberta
- how to submit monitoring data or other amphibian and reptile observations

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