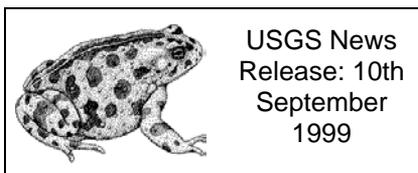




FROGLOG

Newsletter of the Declining Amphibian
Populations Task Force



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**USGS ISSUES WILDLIFE HEALTH
ALERT: CHYTRID FUNGUS
INFECTION ASSOCIATED WITH
DEATHS OF THREATENED
BOREAL TOADS IN COLORADO**

Recent deaths of endangered boreal toads in one of the largest remaining populations in the southern Rocky Mountains have been linked to a chytrid fungus identified last year as being responsible for amphibian die-offs in Central America and Australia, according to pathologists at the USGS National Wildlife Health Center in Madison, Wisconsin.

Sick and dying toads in the Colorado population were first discovered in May of 1999 by Colorado Division of Wildlife researchers, who have been intensively studying the animals for the last 5 years. Since May, dead toads have been found every month at the site, which is on private lands west of Denver. USGS researchers said they have identified chytrid fungus in many of the dead and living toads they examined from the site in 1999. Live toads show few clinical signs of the disease, but some may appear weak, lethargic and reluctant to flee at the approach of humans.

Dr. D. Earl Green, a USGS wildlife pathologist, microscopically examined many of the dead toads and identified myriads of minute chytrid fungi in the skin of the abdomen and toes of the toads. His microscopic identification of this fungus is being

confirmed in collaborative work by Dr. Joyce Longcore, a world-renowned chytrid expert at the University of Maine. In addition, USGS researchers will continue to work closely with researchers from the Colorado Division of Wildlife to monitor further die-offs.

Secretary of the Interior Bruce Babbitt calls these recent die-offs of boreal toads a "poignant reminder" that amphibian populations in this country and in many other parts of the world are undergoing severe, unexplained declines. In the past decade, the international scientific community has increasingly expressed concern over global population declines in all amphibian groups and on many continents. These losses are now well documented and have occurred in a wide range of habitats, including remote and pristine areas in Oregon, California, Arizona, the Rocky Mountain states, Costa Rica, Panama, Puerto Rico and Australia.

"These incidences are disturbing and raise questions about why this fungus is proving so deadly at this time and what other factors might be at work behind the scenes," Secretary Babbitt said. "We need to better understand the inter-relationships in this environmental puzzle and what we can do to fix the situation."

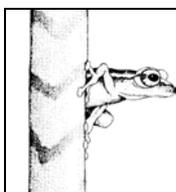
Chytrid fungus in amphibians was first identified in 1998 by Green and other researchers from the U.S., Great Britain and Australia, who discovered that this fungus had been responsible for large amphibian die-offs in Panama and Australia. The fungus also has been identified in some amphibian populations in Arizona and has caused the death of many zoo-kept amphibians in the United States.

Scientists don't know how this fungus is transmitted from one area to another, let alone why the fungus is affecting amphibian populations around the world. Whether the chytrid fungus is responsible for the frog or

toad mortality or the declines of frogs and toads in many western states is still unknown. Green emphasizes that diagnostic tests on the boreal toads are still being completed, and that additional infectious diseases or other possible causes of death may yet be found in this population. Because fungal infections are often considered secondary infections in other vertebrates, USGS is completing further tests for viruses, parasites and bacteria to rule out other factors that could predispose the animals' susceptibility to the fungus.

Two other Colorado populations of boreal toads in Rocky Mountain National Park have also undergone serious declines this summer and previously in 1996, according to zoologists at the USGS Midcontinent Ecological Science Center in Fort Collins, Colorado, who have been studying these populations for the past 9 years. Although dead or dying toads have not been found in association with these declines and the chytrid fungus has not yet been identified from toads or tadpoles in the park, USGS researchers are considering the possibility that the chytrid fungus is linked to these declines as well. The boreal toad (*Bufo boreas boreas*) is listed as endangered by Colorado and New Mexico, although no known populations exist in New Mexico now. The southern Rocky Mountains population - Colorado, New Mexico and southeastern Wyoming - is listed as a federal candidate species. These toads were once common around lakes, ponds and streams in the mountains of Colorado, northern New Mexico and southern Wyoming, but the population numbers dropped precipitously in the last 20 years. Biologists from the U.S. Geological Survey are helping determine why amphibians are disappearing. Research by these scientists and others have identified many deadly virus infections and chytrid fungi as causes of some amphibian die-offs and population declines. Scientists are

actively investigating other hypotheses that could help explain these worldwide declines, including increased exposure to ultraviolet radiation due to ozone thinning, the spread of non-native predators, contamination from pesticides and other chemicals, and rising temperatures. Many biologists suspect that a combination of factors may be responsible. As the nation's largest water, earth and biological science and civilian mapping agency, the USGS works in cooperation with more than 2000 organizations across the country to provide reliable, impartial, scientific information to resource managers, planners, and other customers. This information is gathered in every state by USGS scientists to minimize the loss of life and property from natural disasters, contribute to the sound conservation, economic and physical development of the nation's natural resources, and enhance the quality of life by monitoring water, biological, energy and mineral resources.



Changes in Amphibian Composition in Altered Habitats of Eastern Cuba

By Ansel Fong G.

During December 1997 and April 1998, scientists from the Centro Oriental de Ecosistemas y Biodiversidad (BIOECO) and its Natural History Museum, both in Santiago de Cuba, carried out studies on the biodiversity of Eastern Cuba as a part of the research project "Diversidad Biológica de los macizos montañosos Sierra Maestra y Nipe-Sagua-Baracoa".

With reference to amphibians, we evaluated the impact of altered habitats on amphibian community composition in the Sagua Baracoa mountains, Eastern Cuba. We sampled frogs in each area by day and by night by actively searching from floor to canopy, including some microhabitats such as fallen trunks and bromeliads. The research was conducted in two kinds of forest: evergreen forest and microphyllic semi-deciduous forest. In each one, we sampled an area with conserved natural vegetation and areas in which natural vegetation had been substituted by coffee plantations, timber forests and pastures.

Five species were found in the evergreen forest, all of them in the family Leptodactylidae, genus *Eleutherodactylus*: *E. atkinsi*, *E.*

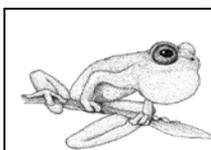
cuneatus, *E. dimidiatus*, *E. limbatus* and *E. ricordi*. In the microphyllic semi-deciduous forest we found seven species of three families and three genera: *Eleutherodactylus atkinsi*, *E. auriculatus*, *E. limbatus*, *E. ionthus* and *E. ricordi* (Leptodactylidae); *Osteopilus septentrionalis* (Hylidae) and *Bufo taladai* (Bufonidae). In the first kind of forest all the species were endemic and in the second kind of forest only *O. septentrionalis* was not endemic (85.7% endemism).

A coffee plantation was sampled in the zone of microphyllic semi-deciduous forest. Only two species were found in this area (*E. atkinsi* and *E. ionthus*); both of them were also recorded in the natural forest. A timber forest was sampled in the zone of tropical evergreen forest, and only two species were found in this area (*E. atkinsi* and *E. dimidiatus*), and both of them were recorded in the undisturbed evergreen forest. Two pastures were sampled, one in microphyllic semi-deciduous forest and one in evergreen forest. Both areas of pasture yielded no species of amphibians.

These results show a diminution in species richness in coffee plantation, timber forest and pasture in comparison to areas with natural vegetation. This is the impact of the reduction or total disappearance (in pastures) of bushes and arboreal strata, with a consequential reduction of space and food niches and the generation of microclimatic changes (an increase in temperature and insolation, a decrease in relative humidity). These results were obtained in the initial year of work in the above-mentioned project. In the next three years we hope to increase the information on the composition of amphibian communities of natural and altered habitats by working in other mountain areas of eastern Cuba (Sierra Maestra mountains), and by collecting amphibian population data.

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The Status of Some Amphibians of Bangladesh

**By Sohrab Uddin Sarker
DAPTF Working Group Chair for Bangladesh**

Family Bufonidae

The toad, *Bufo melanostictus* Schneider, 1799 is less common than previously; although it remains widely distributed. It breeds in summer and winter. Thousands of juveniles are found in the grasses around the pond of Curzon Hall, Dhaka University. Most of them are killed under human feet and by predators.

Family Microhylidae

The china frog, *Microhyla ornata* (Dumeril & Bibron, 1841) is infrequently found on the leaves of lotus, nymphaea, water hyacinth, arum, etc. in hail haor (a saucer-like depression with a large shallow water body) and paddy fields and is widely distributed. Its population is declining and its distribution is becoming more limited due to the destruction of habitats and the use of agrochemicals. It is vulnerable in Bangladesh.

The red frog, *M. rubra* (Jerdon, 1854) is the smallest frog in Bangladesh. It is rarely found on the leaves of atashari, a herb of 1m in height, in the rain water area in the Madhupur National Park. It is endangered nationally.

Kaloula pulchra Grey, 1831 is fairly common and widely distributed in the hilly deciduous moist forests of Chittagong, Chittagong Hill Tracts and Sylhet forests.

Uperodon globulosus (Gunther, 1864) is uncommon and found in open grassland and sal forest (*Sorea robusta*).

Family Ranidae

The skipper frog, *Euphlyctis cyanophlictis* (Schneider, 1799) is usually seen floating on any water surface; it is common and widely distributed. Recently its population has declined in certain areas due to the drying of water areas and use of insecticides.

The green frog, *E. hexadactylus* (Lesson, 1834), is a commercial species; it is scarce and found mainly in freshwater ponds along the fringe of the Sundarbans and occasionally in other areas. It is endangered nationally.

The bullfrog, *Haplobatrachus tigerinus* (Daudin 1803) is fairly common and widely found in rural and urban areas and less often in forests. It has been used as a commercial item for a long time. This frog has been heavily exploited from nature which has resulted in a rapidly declining population to the threatened level. The Government has been obliged to impose a ban on its export. It is also one of the important agricultural species and breeds more than once in a summer.

The cricket frog, *Limnonectes limnocharis* (Boiein & Wiegmann, 1835) is fairly common and has a wide distribution mainly in irrigated, cultivated fields which have created a new habitat for feeding, sheltering and breeding.

Rana temporalis, Gunther, 1864 is less common and is little-known.

The goat frog, *R.tytleri*, Theobald is scarce in the sal forest of the Madhupur National Park.

Family Rhacophoridae

The climber frog, *Rhacophorus maximus* Gunther, 1858 is fairly common and has a wide distribution in wood, jungle and bushes in villages of open land. Hanging foamy nests are found at 2-2.5m height on bushes at the water's edge.

Another species of climber frog, *R. maculatus* (old name) is smaller in size and more common than *R. maximus* and is widely distributed. Its habitats are similar to those of *K.pulchra*.

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Ecosystem Health Paradigm for Amphibians: Start Habitat Rehabilitations Now and Keep Doing Research on a Prioritized Basis

By Val Beasley

In the beginning of this century, through systematic common-sense preventive medicine strategies, rapid improvements occurred in public health. Scientists worked with politicians, planners, engineers, and even economists to do what was necessary to change things for the better for our species. Acting on a comparatively limited understanding of the needs for human health, they built improved drinking water systems and sewage treatment plants, and these greatly limited human exposures to pathogens. Also, people were educated about food safety and proper food handling as well as nutrition. A product of these efforts was that human health burgeoned. Human health researchers were then, and still are, trying out what they believe is most effective and monitoring the response of their objects of interest - their fellow man. This coordinated effort has increased the efficiency of research by prioritizing studies to focus on areas where the problems remain out of

control - despite the best efforts based on current knowledge.

Environmental research in the latter half of this century could learn from human health research of long ago. Although wildlife and ecological research is becoming more sophisticated, it could be more problem driven, it could include more health components, and it surely could include more efforts to do what we think is best as we monitor the response of the objects of interest - in this case amphibian communities and the ecosystems on which they depend. If we were witnessing unprecedented declines in human populations as are occurring in amphibians, we would most certainly undertake low risk actions to bring them under control now, while we continued our research.

The current tragedy befalling amphibian species around the world is undoubtedly a reflection of the impacts of stress factors, acting individually and in concert. Considering the ongoing (i) radical restructuring (some would say destruction) of essential habitat; (ii) atmospheric/climatic changes induced by human activities; (iii) releases of a myriad of contaminants in concentrations toxic to a range of organisms; (iv) releases of exotic species; and (v) outbreaks of various infectious diseases (including macroparasites) in amphibian species which may be lethal or cause incapacitating developmental deformities that increase susceptibility to predation, we should intervene with vigorous ecological rehabilitation efforts now. It seems that already we collectively understand that, for recovery of amphibian communities to take place, we need to decrease contamination of the environment to concentrations that do not interfere with the microbial environment, the plants or the animals, to provide ample food and to eliminate waste products. Tree frogs need trees, and trees as well as plants in the water can surely offset some of the effects of increased UV. Different populations can no longer be isolated from one another without an expectation of genetic impoverishment, outbreaks of disease and periodic unsustainably high predation rates, or a climatic extreme that can eliminate local populations altogether.

There is no excuse for waiting while we study more about the demise of amphibians; we have to start now. We should try enhancement of naturalization of multiple sites - with ample corridors with wide buffer strips to protect amphibians and other native species, not just the birds and

raccoons. This is not to suggest that we know enough to do everything well or that we should in any way delay research efforts to understand and rank the various risk factors involved.

Together, researchers focused on amphibians are rapidly discovering the way things work - the causes of the problems - and their relative importance. Some day, hopefully soon, we should be adept at providing habitats that ensure that widespread declines in amphibians are a problem of the past. Working concurrently to understand the problem and to offset it at the same time is both basic and applied science linked to desired outcomes (in this case fewer deformed, diseased, and dying individuals, and more diverse, vibrant and sustainable amphibian communities). This is the job and we are all most fortunate to be able to be involved.

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Val Beasley's contribution is a timely reminder that the DAPTF was not set up solely to investigate the causes of amphibian population declines. The second part of our Mission Statement reads: "to promote means by which declines can be halted or reversed". To further this aspect of our Mission, we are currently engaged in discussions with Fauna and Flora International with a view to setting up a Seed Grant fund to support projects that specifically address the conservation of amphibians.

Tim Halliday, DAPTF Director.



Froglog Shorts

DONATIONS from 1 October will be acknowledged in Froglog 37.

HISTORICAL FIELD NOTES NEEDED A group of DAPTF scientists working on the relationship between global change and amphibian declines needs to obtain access to field notes of observations of amphibian populations and possible declines dating back to 1900. Any individual, particularly museum curators, with knowledge of the existence of field notes about historical amphibian populations is urged to contact Cyndy Carey at careyc@spot.colorado.edu

Organization for Tropical Studies - Peace Frogs Herpetological Research Fellowship

General Information: Fellowship provides funding for herpetological research, particularly with threatened or endangered species. Fellowship is open to Latin American and US graduate students enrolled in degree programs at OTS member institutions and OTS course alumni. Awards are intended to assist thesis research and are available in amounts up to \$3000. Pilot awards for exploratory research are available in amounts up to \$1000. Proposals for research at OTS field stations (La Selva, Palo Verde and Las Cruces) are encouraged and will receive priority. However, outstanding proposals for research at other locations will be considered. Proposals for work at non-OTS sites must be accompanied by appropriate documentation such as collecting permits and research permission if needed. Awards are intended to cover budget items such as travel, food and lodging. Capital expenses such as equipment will receive lower priority. Salaries or stipends for the investigator are not allowable, but salaries for field assistants will be considered. Proposals will be reviewed twice a year. The next deadline for receipt of proposals is January 15, 2000. Notification of decisions will be approximately two months after each deadline; please plan accordingly.

Proposal Guidelines: Submit seven copies consisting of the following items. Items 1-9 should be no more than seven pages for research fellowship awards and no more than four pages for pilot awards. All pages should be numbered. Proposals may be submitted in Spanish or English. Incomplete proposals, or proposals that do not comply with guidelines, will not be processed. 1. OTS Fellowship Cover Sheet (visit the OTS web site at www.ots.duke.edu to download a copy or call (919) 684-5774 to request a copy by regular mail); 2. Project abstract; 3. Project objectives; 4. Project methods; 5. Project significance; 6. Project schedule and expected outputs; 7. Project budget; 8. Budget justification; 9. Literature cited; 10. Curriculum vitae; 11. Letter of endorsement from thesis advisor; 12. Name, address, telephone, fax and email of four people who can comment on the scientific merit of the proposal.

Proposals and/or questions should be directed to: Academic Director, OTS - North American Office, Box 90630, Durham, NC 27708-0630, USA.

Tel: (919) 684-5774

Fax: (919) 684-5661

nao@duke.edu

About Peace Frogs: This fellowship was created in 1995 by Peace Frogs, a Washington, D.C. based clothing company and provides funding for graduate students interested in conducting herpetological related research. For more information on Peace Frogs visit the Peace Frogs web page <http://www.peacefrogs.com>

About OTS: The Organization for Tropical Studies (OTS) is a nonprofit consortium of 56 universities and research institutions in the United States, Latin America and Australia. Founded in 1963 to provide leadership in education, research, and the responsible use of natural resources in the tropics, OTS conducts graduate, undergraduate and professional education, facilitates research, actively participates in rain forest conservation, maintains three biological stations in Costa Rica, and conducts environmental education programs.

The Sixth Annual Meeting of the Southwestern USA Working Group of the DAPTF will be held on January 7, 2000, at the Arizona-Sonora desert Museum, 2021 Kinney Road, Tucson, AZ 85743. For the latest information on registration etc., visit the SUSWG website at

<http://leopold.nmsu.edu/rana/>

or contact: Michael J. Sredl, Nongame Branch, Arizona Game & Fish Dept, 2221 West Greenway Rd, Phoenix, AZ 85023-4312, USA.

Viruses, Frogs and Fishes Wild sticklebacks (*Gasterosteus aculeatus*) and tadpoles of the red-legged frog (*Rana aurora*), both collected in Redwood Creek National Park, California, have been found to be carrying the same iridovirus. This is the first time that the same virus has been found in both vertebrate groups. The significance of this finding is twofold. First, it suggests that fish may be a reservoir for amphibian disease (and vice versa). Secondly, because non-native fish, such as trout, are commonly artificially introduced to lakes and rivers in many parts of the world, they may provide the means by which viral diseases are carried to previously unaffected amphibian populations.

Mao, J., Green, D.E., Fellers, G. & Chinchar, V.G. (1999) Molecular characterization of iridoviruses isolated from sympatric amphibians and fish. *Virus Research* **63**: 43-52.

Tim Halliday

Rapid Response Fund We remind readers that the DAPTF maintains a Rapid Response Fund, and that we invite bids, at any time, for grants from

this fund to meet emergency situations (see *Froglog* 31). We have recently awarded a grant from this fund for a project investigating a suspected outbreak of chytridiomycosis in Ecuador.

Tim Halliday



Publications of Interest

Boone, M.D. & Bridges, C.M. (1999) The effect of temperature on potency of carbaryl for survival of the tadpoles of the green frog, *Rana clamitans*. *Envtl. Toxicol. & Chem.* **18**: 1482-1484.

Bunnell, J.F. & Zampella, R. A. (1999) Acid water anuran pond communities along a regional forest to agro-urban ecotone. *Copeia* **99**: 614-627.

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Daszak, P., Berger, L., Cunningham, A.A., Hyatt, A.D., Green, E. & Speare, R. (1999) Emerging infectious diseases and amphibian population declines. *Emerging Infectious Diseases* **5**: (No 6, Nov-Dec.)

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Salas, A.W., Tello, G.V., Arizabal, W.A., Sehgelmeble, P.J. & Neira, D.H. (1999) Monitoring leaf-litter amphibians in Manu National Park,

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Young, B.E., Sedaghatkish, G., Roca, E. & Fuenmayor, Q.D. (1999) *El Estatus de la Conservación de la Herpetofauna de Panamá. Resumen del Primer Taller Internacional sobre la Herpetofauna de Panamá.* ANCON & The Nature Conservancy.

FROGLOG is the bi-monthly newsletter of the Declining Amphibian Populations Task Force.

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