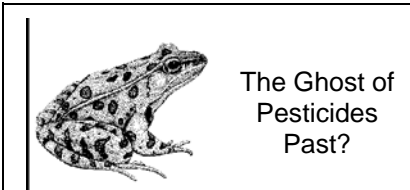




FROGLOG

Newsletter of the Declining Amphibian Populations Task Force
of the World Conservation Union's Species Survival Commission.

November 1996, Number 19.



The Ghost of
Pesticides
Past?

By Ronald W. Russell and
Stephen J. Hecnar

Habitat loss is a major cause of amphibian population declines in the Great Lakes basin of North America. However, specific locations around the Great Lakes are also contaminated by anthropogenic chemicals which pose an additional threat. Many of these industrial and agricultural chemicals have demonstrated physiological, developmental and behavioural effects on amphibians. For example, recent concerns have been expressed regarding the role of organochlorine contaminants acting as endocrine disrupters. Although organochlorine pesticide use in North America has decreased since the 1970s, they may still pose a threat to biota because of their toxicity, environmental persistence and tendency to bioaccumulate in food chains. We surveyed a number of parks and wildlife reserves along the north shore of Lake Erie and found a relationship between local extinctions of amphibians and the degree of site contamination with chlorinated pesticides.

At Point Pelee National Park, Canada, DDT was frequently applied until 1967 for mosquito control. Since the mid-1960s, improvement of terrestrial habitat in the park has proceeded by eliminating campgrounds, private dwellings and agriculture, as well as limiting access to natural areas. No wetland habitat has been lost in the park in the past century. However, since 1972, *Acris crepitans* (Blanchard's cricket frog), *Hyla versicolor* (Eastern gray treefrog), and *Rana catesbeiana* (bullfrog) have become extirpated at Point Pelee. The last observation of

Bufo woodhousii fowleri (Fowler's toad) in the park coincides closely with the inception of DDT application for mosquito control. Currently, only 5 amphibian species remain at Point Pelee National Park.

We measured DDE, the primary breakdown product of DDT, in Point Pelee amphibians. Even though over 25 years have passed since DDT use has stopped, mean DDE concentrations were 5000 µg/kg lipid in *Rana clamitans* (green frog) and 47000 µg/kg lipid in *Pseudacris crucifer* (spring peeper). In contrast, the mean DDE concentration in green frogs at Hillman Marsh, which was connected to the Point Pelee marsh before 1900, was 300 µg/kg lipid. DDE concentrations in green frogs at Holiday Beach Conservation Area, approximately 40 km east of Point Pelee National Park, were 6 µg/kg lipid.

Long Point and Rondeau Provincial Parks are similar areas to Point Pelee National Park and are also located on the north shore of Lake Erie. Both of these parks have essentially complete amphibian faunas (10 and 12 species respectively), and have not experienced recent local extinctions of amphibians as have occurred at Point Pelee. DDE concentrations in Long Point and Rondeau green frogs were measured at 250 and 100 µg/kg lipid respectively. Historic differences in past land-use among these 3 sites are factors affecting amphibian species diversity.

Amphibian declines are a complex and multifaceted problem which defy simple explanations. Although our evidence implicating contaminants in amphibian decline is correlational, the role of such contaminants should not be overlooked. Because of long environmental persistence, continued toxicity and the potential for long distance atmospheric transport, the effects of organochlorine

contaminants can be remote in both space and time. Our research to determine contaminant levels in other amphibian species in the Great Lakes area continues.

Russell, R.W., Hecnar, S.J. and Haffner, G.D (1995) Organochlorine pesticide residues in southern Ontario spring peepers. *Environmental Toxicology and Chemistry*, **14**: 815-817.

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The
Amphibians of
Bangladesh

A preliminary report has been submitted to the DAPTF office on the status of amphibians in Bangladesh. The information was collected by Md. Mohsinuzzaman Chowdhury by means of area surveys, communication with other Bangladeshi herpetologists and through contacts with local people. It will be used in due course for the DAPTF's second "Status of Amphibian Populations" document. We welcome further submissions containing appropriate national and/or regional information for this ongoing project.

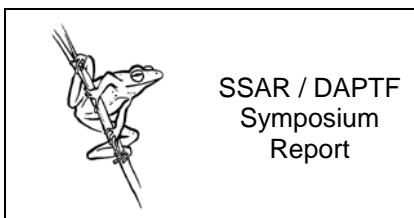
22 species of amphibian have been recorded in Bangladesh to date. These include: Ranidae (11 species),

Bufoidea (2 species), Microhylidae (5 species) and Racophoridae (4 species). Of these, 6 species are common or very common (*Rana cyanophlyctis*, *R. hexadactyla*, *R. limnocharis*, *R. tigerina*, *Bufo melanostictus* and *Racophorus leucomystax*); 2 species are rare (*Nyctophryne kempfi* and *Uperodon globosum*); 2 species are commercially threatened (*Rana hexadactyla* and *R. tigerina*) and 3 species are in decline (*Rana hexadactyla*, *R. tytleri* and *Racophorus leucomystax*) with a further 2 possibly so (*Rana limnocharis* and *R. tigerina*). Only populations of *Rana cyanophlyctis* are thought to be on the increase.

Particular threats to amphibian populations in Bangladesh apparently include illegal capture for the frogs legs trade, habitat destruction and deforestation, as well as (for *Rana tigerina*) their use in some districts by fishermen as food for captive otters. Mr. Chowdhury stresses in his report the need for further surveys of little-known areas of the country in order to produce a full picture of the situation.

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SSAR / DAPTF
Symposium
Report

By Michael J. Lannoo

On July 27th, 1996, the Society for the Study of Amphibians and Reptiles presented a symposium on Population Status and Conservation of Amphibians, in conjunction with the annual meeting of the DAPTF.

Papers presented were as follows: Tim Halliday, *Declining amphibian populations: a global view*; Michael Tyler and Graham Watson, *Beneficial aspects of human changes to frog habitats in Australia*; Gary Fellers, *Status of declining amphibians in California*; Stephen Corn, *Ambient UV-B radiation does not cause mortality of boreal toad embryos in the Rocky Mountains*; Michael Sredl, *Conservation and management zones - an innovation approach to conservation of candidate species or quarterway technology?*; Robert Brodman, *The use of an anuran breeding call index in a county amphibian survey*; Michael Redmer,

Lauren Brown and Ron Brandon, *Recent range expansion of the green treefrog (Hyla cinerea) in Illinois*; Eugenia Farrar and Jane Hey, *Carnivorous spadefoot (Spea bombifrons) tadpole morphs in western Iowa - how common are they?*; Laura Monti, Jack Witham, Malcolm Hunter Jr., Alan Kimball, and Elizabeth Moore, *The use of artificial refugia to monitor the redback salamander (Plethodon cinereus) population at the Holt Research Forest*; Michael Lannoo, *Amphibian conservation and wetland management in the upper midwest - a catch 22 for the cricket frog?*; Raphael Jogl, Patricia Burrowes, and N. Rios, *Declining amphibian populations or natural population fluctuations? The case of the Puerto Rican frogs*; Richard Vogt, *Status and conservation of anuran populations in Estación de Biología Tropical Los Tuxtlas, Veracruz, Mexico*. Andy Price was scheduled to present *Conservation biology of the Houston toad*, but unfortunately could not attend.

The symposium reflected a range of perspectives from global to local, and, as is to be expected, the news concerning the status of amphibian populations was mixed. From my perspective there were at least two take-home messages from the symposium: 1) that a large number of people throughout the world have recently become interested in the status of amphibian populations; and 2) that the results and conclusions of these studies are just now coming in. Many of us came away from the symposium energized, and with a better feeling for where our research fits into the research being conducted by others. I recommend that a follow-up symposium be conducted in another few years.



Amphibians
Under
Pollution
Impact in
Ukraine

By Andrew N. Misyura

The impact of pollution on amphibians is the main subject under investigation for the DAPTF Working Group for Ukraine. In our research we try to answer two questions: where have declines occurred? and why are they happening?

In the last few decades, amphibian populations in the Ukraine have suffered considerably from anthropogenic impacts. These are primarily chemical pollution with heavy

metals, pesticides, aromatic hydrocarbons, oils, radioactive matter and acid reagents. The impact has led to a disturbance of the natural chemical composition of water in aquatic ecosystems where amphibian reproduction and larval development take place. As a result, declines in amphibian populations have been observed.

The data obtained concerning heavy metals as inorganic ecotoxicants have allowed us to determine their influence on individuals and populations. Some mechanisms of increasing resistance to the toxicants have been found in adult amphibians. Strong anthropogenic impacts of heavy metals which occur in most regions of Ukraine result in the ruin of spawn and damage to larvae and metamorphs. Surviving amphibians have been found to have a specifically modified metabolism. This is reflected in an increase in the glutamic acid content of liver proteins, and increases in the levels of phospholipids, cholesterol and total protein in the liver and skin. The content of glycogen decreases in the liver but increases in the skin. These data may be used in the future for the prognosis and assessment of amphibian populations in industrial regions.

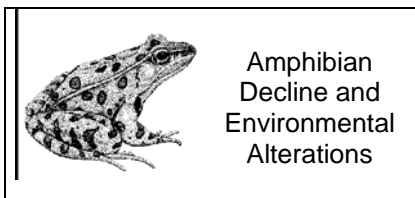
Taking into account the considerable pollution by organically-derived chemicals in Ukraine, it is very important to investigate our amphibians' reactions to these ecotoxicants. Moreover, our goal is to determine the state of enzymatic systems of animals under strong organic contamination, especially with respect to cytochromes P-450 and b5. To our regret, amphibian research in Ukraine is no longer funded, but we hope that we shall still be able to conduct these studies.

We are particularly keen to develop international collaboration in the field of pollution impact. For instance, it would be very interesting to compare amphibian populations suffering from pollution impacts in other countries with those in Ukraine. We would be very grateful for any proposals, methodological assistance and help with literature, which we are badly in need of. We would be particularly pleased to hear from any potential collaborators.

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Amphibian Decline and Environmental Alterations

By Lara Hansen

Most reports of problems observed in amphibian populations have come after declines have occurred, which exacerbates the task of identifying causes. Development of bioassays that can identify whether a population is experiencing, or has recently experienced, environmental stresses will greatly aid the search for causes. These bioassays would be most valuable if they measure the ecological costs associated with selected stresses by documenting increased susceptibility to disease, depressed physiological functions, and/or reduction in reproductive success. Assays of immune system function are one such method. They have been used extensively to measure exposure to and effects of stress with fish, birds and mammals, but little work has been done to apply these tests to amphibians.

This project is composed of a combination of field and laboratory experiments measuring traditional endpoints (survival, hatching, growth, etc.) and conducting immune system function assays to identify sublethal effects of environmental stressors on selected populations of native California amphibians. The goal is to correlate levels of stress as measured by degree of immunocompetency, reduction in hatching success or survival, and changes in growth rates with levels of environmental contaminants. In order to explore as many perturbations as possible, the Pacific Treefrog *Hyla regilla* was selected as a model species due to both its broad range and its annual breeding and development cycle. Site characterizations (measuring UV, pesticides, metals, pH, etc.) are conducted at selected sites.

In this first year of field research, a number of the project goals have been met: 1) an enclosure system was developed which can maintain eggs in situ through hatching to pre-metamorphosis (emergence of rear

limb buds); 2) an immunocompetency assay, traditionally used with fish, was adapted for use with the extremely small quantities of blood that can be collected in the field from a species the size of *H. regilla*; 3) a series of initial transplant experiments were conducted in the Sierra Nevada Mountains, comparing low and high elevation responses to assorted environmental stresses; 4) sampling of water and tissue was undertaken for metal and pesticide analysis to facilitate characterizing what stresses are impinging on native amphibian populations; and 5) quantification of the UV doses received by these anurans for comparison in future laboratory exposures.

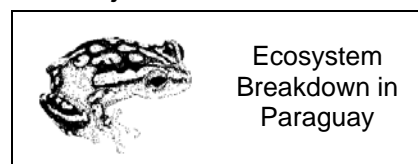
Due to *H. regilla's* long reproductive and developmental season, actual data collection was only completed in mid-September. As a result, data analysis is just beginning for items 3, 4 and 5. Included in the transplant experiment are data on hatching, growth (weight, length and width), size at development of limb buds and survival. Additionally, individuals from the enclosures are being used to assess the amount of genetic diversity within and between populations of *H. regilla* around the state. This information, when coupled with toxicological data, can provide valuable information about possible tolerances, which would be extremely beneficial to conservation efforts, especially those involving reintroduction plans.

This initial year of work has led me to a collaboration examining the uptake of polychlorinated biphenyls (PCBs) by *H. regilla* eggs in the environment. I hope to incorporate this information into laboratory exposures also including ultraviolet light. My next two years of research will include a season of laboratory experiments comparing population tolerances and another year of field experiments.

This work is supported under the DAPTF Seed Grant Scheme. Contact:

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E-mail: ljhansen@ucdavis.edu



Ecosystem Breakdown in Paraguay

From Pär Brännström
(Par.Brannstrom@zool.lu.se)

A project known as HIDROVIA has been instituted in Paraguay and neighbouring South American

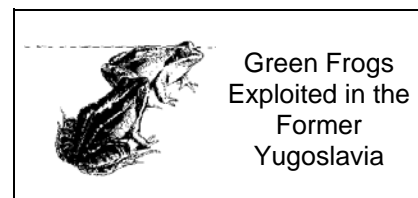
countries. It is set to widen and straighten the Rio Paraguay into Amazonian Brasil in order to facilitate the passage of large freight vessels into the continental interior. The project entails the draining of wet areas alongside the river and will result in drying of the whole wet Chaco ecosystem. Some fifteen native tribes will also have to be relocated.

Paraguay has a rich and impressive amphibian fauna, with no doubt many species remaining to be discovered in systems like the wet Chaco. The impact which this project will have on amphibians, other fauna, flora and the climate is expected to be enormous. An Environmental Impact Assessment was carried out in 1993 by Wetlands for the Americas, in conjunction with Woods Hole Research Centre. Copies of the assessment and further information can be obtained from them at:

Wetlands for the Americas, Wetlands International, 7 Hinton Ave. North, Suite 200, Ottawa, Ontario K1Y 4P1, Canada.

Phone: 613 722-2090

Fax: 613 722-3318



Green Frogs Exploited in the Former Yugoslavia

From the DAPTF Working Group for Serbia and Montenegro

The recent news from Austria on the subject of exporting frogs was surprising for Yugoslavian herpetologists: 20,000 (2,000 kg) green frogs were exported from Serbia to Italy for commercial purposes. According to the national journal ("Politika", 26th Aug. 1996), the Republic Institute for Nature Protection (RINP) gave permission for the export of 100,000 kg (1 million individuals) of green frogs this year! By comparison, the allowed quantities per year during the period 1975-1980 (for the whole of the former Yugoslavia) were from 5,579 kg to 11,997 kg. An important fact is that many of the frogs were of a lower weight (as low as 30g per individual) than the recommended figure (about 80g per individual).

Rana ridibunda, *R. lessonae* and *R. kl. esculenta* are on the list of species under the control of collection, exploitation and trade in Serbia (Official Register of the Republic of Serbia # 50/93). Their sale is permitted in limited quantities which are regulated by RINP. So far, there has been no serious research on the

population structure and dynamics of anurans in Serbia and Montenegro. The national institutions responsible have calculated the allowed quantities of frogs for sale very roughly. An indirect indication that populations of green frogs in Serbia and Montenegro are declining is the migration of commercial "frog-hunters" long distances from their home areas.

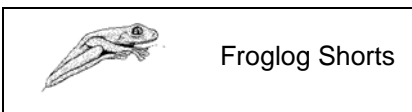
Herpetologists from the Biological Institute in Belgrade have suggested to the authorities a halt on the exploitation of frogs for at least five consecutive years, but the (obviously very profitable) business continues. Also, all information regarding the frog trade is treated as a "business secret" and is unavailable to scientists. We acclaim the action taken following the incident at Vienna airport when society rose up in defense of Yugoslavian green frogs.

SEMO (the DAPTF Working Group for Serbia and Montenegro) would much appreciate any further information about the trade in amphibian species from this area. We should all bear in mind that the futuristic novel "Do Androids Dream of Electric Sheep?" by F.K. Dick (1968) is no longer science fiction.....

Dr. Georg Dzukic is the Chair of the new DAPTF-SEMO working group. Dr. Milos Kalezic, Ivan Aleksic and Jelka Crnobrnja-Isailovic are also part of this working group. *Contact them at:* DAPTF-SEMO, Department of Evolutionary Biology, Institute for Biological Research, 29. Novembra 142, 11060 Beograd, Serbia. Fax: (381) 11 -761 -433 E-mail:

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Dr. Michael E. Dorcas is the new Chair of the Monitoring Protocols Working Group. *Contact:* Michael E. Dorcas, Savannah River Ecology Laboratory, Drawer E, Aiken, SC29801, USA. E-mail: dorcas@srel.edu

Les Minter is now the DAPTF Working Group Chair for Southern Africa (South Africa, Swaziland and Lesotho). He is also responsible for the Southern African Frog Atlas project. *Contact:* Les Minter, P.O. Box 2960, Pietersburg 0700, South Africa.

From Michael J. Tyler: Residents in the catchment of the River Torrens in South Australia pay a levy to clean up

the river and restore it. To promote their objectives, the management board has adopted the frog as a symbol for improvement: people accept that if the frog populations are thriving, then the water quality must be good! To obtain copies of stickers advertising this theme write to: Torrens Catchment Water Management Board, 4 Greenhill Road, Wayville, South Australia 5034, Australia.

3rd Annual Tennessee Herpetology Conference: This event will be held at the Keathley University Center Theater, Middle Tennessee State University, Murfreesboro, TN, USA on **14th-16th of November, 1996**. DAPTF Chair, Dr. W. Ron Heyer will be the keynote speaker. *For more information, contact:*

David Ian Withers, Division of Natural Heritage / TDEC, 8th Floor L&C Tower, 401 Church St., Nashville, TN 37243-0447, USA.

E-mail: toadranger@juno.com

From Katja Paboljsaj: Societas Herpetologica Slovenia, a brand new society concerned with the ecology and conservation of Slovenian herpetofauna, has begun to survey amphibian and reptile populations in that country. One result of this work will be a preliminary atlas of "Amphibians of Slovenia", due to be finished next year (1997). Katja is currently working on the surveying of amphibian populations and on amphibian environmental impact assessments, including proposals for conservation measures of *Rana latastei*.

E-mail: katja.paboljsaj@guest.arnes.si

Dr. John Halley has been appointed as the DAPTF's official liaison with the SSC's Conservation Breeding Specialist Group. His expertise in theoretical population modelling will be a valuable contribution to the initiatives of both groups. *Contact:* John Halley, RUWPA, Mathematical Institute, North Haugh, University of St. Andrews, Fife, KY16 9SS, U.K.



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