Bufo calamita by Robin Moore

ISSN 1026-0269

FROGLOG

Newsletter of the IUCN /SSC Amphibian Specialist Group (ASG)

Special British Isles edition

August 2006, Number 76

A reflection: mercury and amphibian declines

By Tim Halliday

The closure of the DAPTF is a time to reflect on what we have achieved. Undoubtedly, our most important contribution has been our Seed Grant programme and the many papers that have emerged from it; my most rewarding task as International Director of the DAPTF has been to track down and read these papers. Several of our Seed Grants have, as intended, enabled young researchers to set up new and productive lines of research into amphibian declines and their causes. Selecting one from the many new innovative research programs that the DAPTF has helped to develop is an invidious task, but I have become particularly interested in Michael Bank's and Cynthia Loftin's work on mercury pollution, based on Seed Grants awarded in 2002 and 2003, not least because of its implications for future efforts to conserve amphibians.

Michael and his co-workers have documented a dramatic decline in the steam-living dusky salamander (*Desmognathus f. fuscus*) in Acadia National Park in Maine (Bank *et al*. 2006). They have also detected high levels of mercury in the tissues of larvae of the two-lined salamander (*Eurycea bislineata*) in the same streams (Bank *et al*. 2005).

These findings raise a number of issues of general importance to the amphibian decline phenomenon. First, mercury is a new factor identified as a cause of amphibian declines, suggesting that we may not yet have a complete list of the threats to amphibians. Second, mercury is dispersed in the atmosphere, shows bioaccumulation in aquatic food chains and is very persistent, and so could be affecting amphibians over very large areas. Third, it is highly toxic and could be having adverse effects on other components of aquatic systems, affecting amphibians indirectly as well as directly. Fourth, mercury has serious effects on human health and amphibians may be good 'sentinels' for a pollutant of increasing concern to those working on environmental aspects of human health. Amphibian biologists have much to do to convince the wider world that amphibian declines have serious implications for both environmental and human health.

Most importantly, the implications of mercury for the world's water resources place amphibians in a much wider context, in which efforts to conserve amphibians may be in conflict with efforts, by organisations such as the WHO and the UN, to improve human access to safe water supplies. One estimate suggests that, by 2025, at least 3.5 billion people, nearly 50% of the world's population, will face water scarcity unless remedial actions are taken (WRI 2000). In addition, the greatest demand placed on nature water reserves is irrigation, which is bound to increase enormously as agriculture expands to feed the expanding human population. In my view, it is vital that, while amphibian conservation efforts must be focussed on the animals we love, we must engage much more effectively than we currently do with the many agencies engaged in the exploitation of the Earth's water resources.

References

Bank, M. S., Crocker, J. B., Davis, S., Brotherton, D. K., Cook, R., Behler, J. & Connery, B. (2006) Population decline of northern dusky salamanders at Acadia National Park, Maine, USA. *Biol. Conservation:* **130;** 230-238.

Bank, M. S., Loftin, C. S. & Jung, R. E. (2005) Mercury bioaccumulation in two-lined salamanders from streams in the northeastern United States. *Ecotoxicology:* **14;** 181-191.

WRI (World Resources Institute) (2000) *World Resources 2000-2001: People and ecosystems: the fraying web of life.*

Apparent introduction of the causative agent of amphibian chytridiomycosis to Britain

By Andrew A. Cunningham
Institute of Zoology London

Cutaneous chytridiomycosis is a fungal disease of amphibians which has caused severe population declines and local extinctions in many amphibians and the total extinction of a growing number of species. Some species, such as the North American bullfrog (*Rana catesbeiana*) and African clawed frogs (*Xenopus* spp.), however, appear to be unaffected by *B. dendrobatidis* infection and these species might act as transport hosts, introducing the infection to new areas and to new host species and populations.

During the summer of 2004, as part of an eradication programme of this introduced species, 14 juvenile North

American bullfrogs were killed at their primary site of establishment in Britain. A toe clip and femoral skin were sampled from each animal, taking care to avoid any possibility of cross-contamination, and the samples were tested for *B. dendrobatidis* infection using real-time PCR and primers specific for *B. dendrobatidis*. Two of the bullfrogs tested positive and these results were confirmed when the tests were repeated.

Although chytridiomycosis has been found previously in Britain in captive exotic frogs in captivity, various examinations, including microscopic and electron microscopic examinations of 170 native amphibians from 1992-1996, have failed to detect evidence of chytrid infection in wild amphibians in Britain. Retrospective analysis of a subset of this cohort of native amphibians using *B. dendrobatidis* – specific PCR has also failed to detect chytrid infection.

The site where the chytrid-positive bullfrogs were found in the wild provides good habitat for amphibians, with at least four of the six extant amphibian species native to Britain being known to inhabit the site: *Rana temporaria*, *Bufo bufo*, *Triturus vulgaris* and *T. cristatus*. It is presumed that *B. dendrobatidis* was co-introduced with either the bullfrogs or the *Xenopus* sp.: one adult and several hundred *Xenopus laevis* tadpoles were removed from this site in 2001.

The pattern of widespread mortality and catastrophic declines of amphibians due to chytridiomycosis repeated in Australia, Central America and Spain, suggests that the introduction of *B. dendrobatidis* to Britain could present a major threat to native amphibian populations. Populations of the common toad (*Bufo bufo*) in Spain, for example, are known to be susceptible to declines from *B. dendrobatidis* infection and this is one of Britain's most common and widespread species of amphibian.

Work is now underway at the index site to determine if *B. dendrobatidis* infection has spread to any native amphibian species and, if so, to assess any immediate effects (e.g. mortality) this infection might have on these species. Results from this study will be used to inform recommendations on biosecurity and disease control for consideration by U.K. nature conservation bodies.

For further information please contact: *a.cunningham@ioz.ac.uk*

Detecting amphibian presence: more visits or more methods?

By David Sewell
The Durrell Institute for Conservation and Ecology (DICE)

Since Heyer *et al*'s. (1994) benchmark volume on standardised sampling procedures for amphibians there has been continuing work to refine sampling methodologies for amphibians. Fundamental to many of these methodologies is how reliably they can measure population increase, decline or stability. Unless the detection rate is known, simple counts may be an unsuitable method for assessing and comparing amphibian populations (Schmidt 2003, 2004; Dodd & Dorazio, 2004). Variation in detection rates may make the comparison of seemingly similar habitats difficult, and may result in some populations being missed altogether (Mackenzie *et al.,* 2002, 2003, 2004; Edwards *et al.,* 2005; Schmidt, 2005). Where simple presence-absence is being recorded, false absences can therefore arise as a result of low detectability.

The difficulty is compounded when the purpose is to detect all amphibian species present rather than just one. The practical question that arises is therefore how many visits, or methods, are needed to detect all the species present? Missing species that are, in fact, present may not only give a false idea of amphibian population declines, but may also result in a failure to identify areas with a high amphibian diversity. This may in turn lead to a failure to adequately protect existing amphibian populations during development and accelerate the rates of isolation, decline and extinction. Current guidance for surveys of great crested newts (*Triturus cristatus*) for mitigation purposes in the U.K. (English Nature, 2001) recommends at least six visits, if the purpose is assessing the size of the population in the pond being sampled. For simple presence-absence surveys fewer visits are likely to be adequate, even if other species are involved. Recent work at the University of Kent has suggested three visits are sufficient for the purpose, provided a suitable range of methods is used.

The results arise from a survey that took place in the Blean, an area of arable farmland and woodland in north Kent, U.K., surrounded by Canterbury, Herne Bay and Whitstable. The area has a high density of small ponds, averaging over three per square kilometre. The survey took place in 2004 and 2005 and examined a sample of 74 ponds for all amphibian species present. Each pond was surveyed three times by a combination of funnel traps and visual encounter surveys by means of torch counts.

Six species of amphibian were located in the ponds, five native and one introduced. The results showed at least one amphibian species in 60 of the 74 ponds surveyed. The number of species most likely to be recorded in a pond was two, with one pond containing five and another all six species. Palmate newt (*Triturus helveticus*) with 42 occurrences was marginally more frequent than smooth newt (*Triturus vulgaris*) with 39. The remaining species were great crested newt with 22; common frog (*Rana temporaria*) with 14 occurrences; alpine newt (*Triturus alpestris*) with 7 and common toad (*Bufo* bufo) with 3.

The three initial torching/trapping visits were followed by three netting sessions for invertebrates at all ponds. Additionally, at 4 of the study ponds, weekly trapping and

torching sessions continued as a part of another programme.

The netting sessions, although not aimed primarily at amphibians, yielded one more occurrence of great crested newt and two of common frogs, bringing the number of known occurrences to 23 and 16 respectively. In all cases these extra occurrences were through the identification of larvae, also confirming that breeding was taking place in the ponds concerned. The ponds where netting revealed additional species were larger in surface area than the average in the locality, perhaps also suggesting that larger ponds should have more visits than average or smaller ones.

The ponds subject to extended trap and torch surveys also yielded extra species over a longer period, with two additional occurrences of both common toad and great crested newt. Up to an additional 40 surveys over two years took place at each of these ponds to yield a very small number of extra species. The effort appears disproportional to the result, especially if compared to the netting sessions that yielded three extra species occurrences with three visits per pond.

For British species this suggests that additional methods may have a greater impact on detection rates than additional visits. Griffiths, Raper & Brady (1996), found for British newts that three methods gave a 2% chance of not detecting species, whilst four methods reduced the non-detection rate to 1.2%. Netting sessions, along with egg surveys, can be added on to visits being made for other purposes. The results suggest that three visits will detect most amphibians present at a site, assuming that the visits are made at an appropriate time of year and that appropriate methods are used. A minimum of three visits is therefore recommended, but in combination with at least three, and preferably more, detection methods.

References:

Dodd, C.K. & Dorazio, R.M., (2004) Using counts to simultaneously estimate abundance and detection probabilities in a salamander community. *Herpetologica* 60: 468-478

Edwards, T.C. Jr., Cutler, D.R., Zimmermann, N.E., Geiser, L., & Alegria J. (2005) Model-based stratifications for enhancing the detection of rare ecological events. *Ecology* 86: 1081-1090

English Nature (2001) Great crested newt mitigation guidelines. Peterborough, English Nature

Griffiths, R.A., Raper, S.J. & Brady, L.D. (1996) Evaluation of a standard method for surveying common frogs *Rana temporaria* and newts *Triturus cristatus, T. helveticus and T. vulgaris*. JNCC Report no. 259. Peterborough: Joint Nature Conservation Committee.

Heyer, W.R., Donnelly, M.A., McDiarmid, R.W., Hayek, L.A.C. & Foster, M.S. (1994), Measuring and monitoring biological diversity. Standard methods for amphibians. Washington, Smithsonian Institution Press.

MacKenzie, D.I., Nichols, J.D., Lachman, G.B., Droege, S., Royle, J.A. & Langtim, C. A. (2002) Estimating site occupancy rates when detection probabilities are less than one. *Ecology* 83**:** 2248-2255

MacKenzie, D.I., Nichols, J.D., Hines, J.E., Knutson, M.G. & Franklin, A.B. (2003) Estimating site occupancy, colonization, and local extinction when a species is detected imperfectly. *Ecology* 84: 2200-2207

MacKenzie, D.I., Bailey, L.L. & Nichols, J.D. (2004). Investigating species co-occurrence patterns when species are detected imperfectly. *Journal of Animal Ecology* 73: 546-555

Schmidt, B.R. (2003) Count data, detection probabilities, and the demography, dynamics, distribution and declines of amphibians. *Comptes Rendus Biologies* 326: S119-S124

Schmidt, B.R. (2004) Declining amphibian populations: the pitfalls of count data in the study of diversity, distributions, dynamics and demography. *Herpetological Journal* 14: 167-174

Schmidt, B.R. (2005) Monitoring the distribution of pond-breeding amphibians when species are detected imperfectly. *Aquatic Conservation: Marine and Freshwater Ecosystems* 15: 681-692

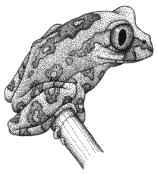
For further information please contact David Sewell at: *dls20@kent.ac.uk.*

Reports on DAPTF Seed Grants

Recipients of DAPTF Seed Grants are generally expected to publish the results of their projects in refereed journals, or as articles in *Froglog*. They are also required to send us reports, so that their results can be made available to DAPTF members. Below is a list of reports that we have received recently. Anyone wanting a copy of a report should contact the author in the first instance; we can supply copies if you cannot reach the author.

S. V. Krishnamurthy & Richard A. Griffiths (2004) **Progress Report:** Identifying agents of amphibian decline in the central Western Ghats: the impact of nitrate fertilizers on reproductive success. (*r.a.griffiths@kent.ac.uk*)

Tim Halliday



Amphibian Biodiversity Conservation Course, 2006

By: Kay Bradfield
Hamilton Zoo, New Zealand

The inaugural Amphibian Biodiversity Conservation (ABC) course was held at the Durrell Wildlife Conservation Trust's International Training Centre on Jersey, in the British Channel Islands, from June 19 – 30, 2006. Lecturers included Professor Tim Halliday, Professor Trevor Beebee, Dr Richard Griffiths, Dr Andrew Cunningham, and Gerry Marantelli.

Amphibian conservation biologists from more than a dozen countries attended, including both

field biologists and captive managers. As someone who has worked with amphibians both in the field and in captivity, I found the course to be invaluable from both points of view. Topics covered included the threats facing amphibians, with an emphasis on chytridiomycosis as an agent of decline, how to prioritise and plan amphibian conservation actions, ways to study amphibian ecology and monitor populations, how to manage the risks associated with field work, the role of captive facilities in amphibian conservation, the bio-security issues associated with captive facilities, and issues that need to be considered in order to successfully manage both wild and captive amphibian populations. As well as lectures, there were practical and field-based sessions, small group activities, and frequent opportunities for whole group discussion. I think all who attended the course would agree that we benefited not just from the expertise of the lecturers, but also from the opportunity to discuss concepts and issues in amphibian conservation, as well as our own experiences working with amphibians, with the other participants. We all made valuable contacts that will assist us in our future amphibian conservation efforts.

For further information regarding the ABC course please contact: *Jamie.Copsey@durrell.org.*

Froglog Shorts

The Amphibian Conservation Research Trust (ACRT)

The Amphibian Conservation Research Trust (ACRT) is a recently formed and registered charity which provides financial grants to support research and projects in the field of Amphibian Conservation. The Trust is funded by individual and corporate donations. The ACRT is purely a grant making Trust and does not carry out any research or conservation work itself.

Anyone may apply for support from the Trust - it will however be a requirement that the research/projects the Trust supports must have an outcome that is useful to applied amphibian conservation in the UK. The subject matter could therefore range quite widely, for example habitat level research, surveying, macro-environmental focussed projects etc.

It is expected that the recipients will often be postgraduate students undertaking supervised university courses (e.g.: PhD, MSc projects etc.), but could also include other research and projects carried out separately by individuals or groups.

Grants made by the Trust are intended to supplement other sources of funding and will not normally be sufficient to fully fund tuition/living fees etc.

A small group of leading academics, and individuals from conservation organisations and English Nature will decide which projects will receive ACRT support.

For further information please contact: *info@acrt.org.uk* or The ACRT, 5 Thornton Road East, London, SW19 4NF.

Job Announcement

Executive Officer, Amphibian Specialist Group (ASG)

The Amphibian Specialist Group (ASG) is seeking a conservation leader who can take on the global amphibian decline within the broader context of the biodiversity crisis. The ASG, a unit of the IUCN Species Survival Commission, strives to conserve biological diversity by stimulating, developing, and executing practical programs to study, save, restore, and manage amphibians and their habitats around the world. The ASG is taking IUCN's Specialist Group model to the next level of effectiveness through the establishment of a Secretariat that will serve as a dynamic hub to coordinate a global web of stakeholders and to leverage the intellectual, institutional, and financial capacity towards shared, strategic amphibian conservation goals. The Executive Officer will be responsible for coordinating the activities of the ASG to ensure a unified, strategic and sustainable approach to global amphibian conservation, effecting policy change and communicating the work of the ASG to raise the profile of amphibian issues in the public arena. Please see the full job announcement at *http://www.parcplace.org/2006-03-24CI.htm* for details.

WCNCB Long-term Frog Monitoring Annual Report, South Africa

This is the third annual report of the Cape Nature (Western Cape Nature Conservation Board) long-term monitoring project. CapeNature started a long-term frog monitoring project in the winter of 2002 with funding from the DAPTF. This report summarises the data collected from that time up to early 2006. In particular, this report covers both the 2004 and 2005 monitoring seasons.

Please contact: Andrew Turner - *aaturner@cncjnk.wcape.gov.za*

Tim Halliday

Instructions for Authors

FROGLOG publishes a range of articles on any research, discoveries or conservation news relating to the amphibian decline phenomenon. We encourage authors describing original research to first make submissions to a refereed journal and then, if appropriate, to publish a synopsis in *Froglog.* Submissions should be in English, less than 1,000 words and follow the style of past FROGLOG issues (as should references). Due to space and formatting restrictions, please do not submit images, maps, figures or tables. Short news items and press releases are also acceptable. Please submit potential contributions to Jeanne McKay at: *asg@ci.conservation.org* Accepted submissions will be printed in order of receipt.

FROGLOG **is the bi-monthly newsletter of the IUCN / SSC Amphibian Specialist Group.**