FROGLOG

IUCN/SSC Declining Amphibian Populations Task Force

December 1995 No 15

Update on the NAAMP

The North American Amphibian Monitoring Program is being created to: 'provide a statistically defensible program to monitor the distributions and relative abundance of amphibians in North America, with applicability at the state, provincial, ecoregional and continental scales.'

To that end, meetings were held in Indiana Dunes National Seashore in September 1994 where these goals were developed and determined to be feasible. A collaborative research program was initiated for the following summer. The results of these investigations were presented in September 1995 at The Canada Centre for Inland Waters in Burlington, Ontario. These meetings, research and email discussions have spawned the working drafts on *Calling Surveys*, *Larval Surveys*, *Terrestrial Salamanders*, *Herp Atlases* and *Western North America*. Associated with these sections are two appendices. Appendix 1 is a treatise on statistical sampling and sampling frames. This topic is given a thorough treatment, to strengthen current and future efforts. Appendix 2 will be a list of North America amphibians and some indication of the applicability of proposed monitoring techniques to tracking trends in their populations.

These documents present the statistical and scientific evaluations of monitoring protocols. The next objective is the implementation of these recommendations. Of the four monitoring areas, calling amphibian surveys is probably the closest to implementation. The other areas need additional research and pilot work before effective implementation can begin.

The final comment period was extended to December 8th 1995. After comments are incorporated, these documents will be distributed and will be considered to embody the collective thoughts of North American amphibian biologists.

Copies of the NAAMP will be available after January 1st, 1996, and can be obtained by contacting Sam Droege (NBS, 12100 Beech Forest Dr., Laurel, MD 20708, phone: 301-497-5840, fax: 301-497-5784, email: frog@nbs.gov), or Web site:

http://www.im.nbs.gov/amphib/naampintro.html

Christine Bishop (Canadian Wildlife Service) & Mike Lannoo (U.S. Chair DAPTF).

Abiotic Disturbances in the Lesser Antilles

The recent passing of Hurricanes Iris, Luis, and Marylin across the northern Lesser Antilles (hardest hit were Anguilla, Antigua & Barbuda, Dominica, and St. Martin) has received considerable attention in the popular media because of the potential economic impact on these small, tourism-dependent islands. These fierce storms sprang from an unusual abundance of climatic disturbances in the Atlantic. The threat of further storms continues. As members of a scientific team studying herpetological diversity on the island of Montserrat, with the assistance of the government, we observed alteration of the habitat caused by these hurricanes. However, the storms only supplemented the effects of recent volcanic activity.

The clearest result of storm activity is the transfer of dense vegetation and debris from the canopy to the forest floor. At our site on Mango Hill in northern Montserrat, the habitat initially allowed relatively easy access to streams and calling sites of both *Eleutherodactylus johnstonei* and *Leptodactylus fallax*. After Hurricane Luis, much of the protective foliage had either been removed entirely or had fallen to the ground. It is as yet unknown whether *L. fallax*, a large (SVL up to 200 mm) and economically important species, requires open ground to optimize foraging or behavioral interactions, but most wide openings have now received debris. Nevertheless, due to the heavy rainfall in conjunction with the hurricane, calling activity of both frog species was much increased during the immediate aftermath.

Volcanic activity seems to have had a more obvious negative impact on *L. fallax*. Several large emissions of ash from Soufriere volcano in southeastern Montserrat have occurred, and much of the foliage in the vicinity of the volcano, primarily to the northwest of Chances Peak, was covered with an ash layer. The heavy rains during hurricane activity washed this ash onto the ground and into the ravines and waterways. A site supporting a high density of *L. fallax* juveniles prior to some major ash falls appears to have been inundated subsequently with ash-laden runoff, and we observed dead and dying juveniles in the shallow rock pools. Emissions of Soufriere volcano are high in sulfur, and a change in water pH is a possible reason for the unhealthy young frogs. A later visit to the same site revealed that many of the pools had become filled with a grey mud and neither juveniles nor adults were seen.

It is unlikely that either volcanic or hurricane activity will lead to the extirpation of populations of frogs on Montserrat. However, a careful

monitoring program will be initiated with government help. The economic importance of *L. fallax*, locally known as 'mountain chicken', lies with its reputation as a local delicacy. Hotels serve the frogs' legs to tourists. The governments of Dominica and Montserrat, where the remaining populations of *L. fallax* occur, have initiated hunting seasons to protect the breeding stock from depletion, and based on the recent surveys, in conjunction with the Montserrat Biodiversity Project, the government of Montserrat intends to ban hunting above 1000 feet altitude.

Eleutherodactylus johnstonei is presumed to overcome any disturbances very easily because of its excellent colonizing abilities.

Hinrich Kaiser (Institut für Humangenetik, Universität Würzburg, 97074 Würzburg, Germany) & Mark L. Day (Fauna and Flora International, Great Eastern House, Tension Road, Cambridge CB1 2DT, UK).

Donations to the Task Force

The DAPTF is very grateful to the following, for financial contributions during 1995, to maintain the Task Force and support its initiatives:
The British Herpetological Society, Deutsche Gesellschaft für Herpetologie und Terrarienkunde, The Herpetologists' League, Osterreichische Gessellschaft für Herpetologie, The Phoenix Zoo, the Society for Research on Amphibians and Reptiles in New Zealand, the Society for the Study of Amphibians & Reptiles, the State of Montana Department of Fish, Wildlife and Parks, the Toledo Zoological Gardens, the Zoological Society of San Diego.

Biological Control of the Cane Toad *Bufo marinus* in Australia

The CSIRO Australian Animal Health Laboratory (AAHL) at Geelong is a high security microbiological facility, purpose designed and operated to undertake research into viruses, bacteria, fungi and parasites which are exotic and do not occur in Australian domestic or wild animals. It is the only laboratory of its kind in Australia where studies on these exotic micro-organisms can be undertaken or are permitted by the Australian Government.

Recently, the laboratory has been commissioned and funded to undertake research into the feasibility of biological control of the cane toad, *Bufo marinus*, using viruses or other microbial agents found overseas.

Bufo marinus, the cane toad, was intentionally introduced into coastal Queensland in 1935 in an attempt to control cane beetles. Since that time, the toad has spread in a westerly and southerly direction. It is now found throughout Queensland and has made significant incursions into the Northern Territory and New South Wales. The major concerns about the toad involve its prodigious appetite, and the toxicity of all of its life stages to endemic fauna. There are firmly held beliefs that these characteristics of the cane toad are responsible for the deaths of Australian wildlife including herpetofauna, mammals and fish. The toad will now almost certainly establish itself throughout the environmentally sensitive and biologically and commercially important rivers and wetlands of northern Australia. The Australian Government has provided significant funds to gather data to determine whether the toad has an impact on the Australian environment and thus whether a biological control agent is required. The funding also encompasses the search for and assessment of possible control agents.

Funding of the present project is distributed through the CSIRO Division of Wildlife Ecology, Canberra, upon the advice of the Cane Toad Research Advisory Committee. Current work to investigate the control of the cane toad by biological means has evolved from extensive studies over the past decade which have gathered basic ecological and disease data for the species. Such studies have been conducted in Australia, Venezuela and Brazil. A search for microbial agents with potential for control of toads has recently been concluded in Venezuela, with the isolation of a number of viral and bacterial agents for investigation at AAHL.

At AAHL, a specialised and unique group has been formed bringing together expertise in virology, aquatic animal pathology, electron microscopy and molecular biology. The group consists of Alex Hyatt, John Humphrey and Jacques Zupanovic, with technical support. Expertise in the group has resulted in the isolation and/or characterisation of previously unknown disease causing agents including Bohle-virus (BIV) from the ornate burrowing frog *Limnodynastes ornatus* from Queensland.

The objective of the current project is to find exotic, infectious microbial agents which may spread throughout cane toad populations in Australia and which may compromise the host by causing disease and deaths, or by more subtle effects, for example by reducing immune function and the capability to resist other infections, or by reducing reproductive capacity. The project is assessing effects of exotic agents on adult, metamorph and juvenile life stages of the toad, as it is likely that different life stages have differing susceptibilities.

Potential for biological control of the toad is considered to be good, as the toad is the only representative of the bufonid family in Australia and is thus taxonomically distinct from Australian amphibian species. In addition, many species of the genus *Bufo* exist overseas, offering exciting prospects that an infectious and/or parasitic agent from these may cause disease in Australian *Bufo marinus*, without affecting native species.

Challenge experiments have commenced to evaluate the effects of viruses on toads. These experiments are conducted under maximum microbiological security to ensure that escape of the viruses cannot occur. Toads are maintained in laminar flow cabinets, within hermetically sealed rooms. The air pressure of the rooms is lower than atmospheric pressure, thus ensuring that all air movement is into the room. Air leaving the room is double filtered to exclude the smallest viral particle from escaping. Water from the room is heated for a prolonged time to inactivate infectious agents. Entrance to the rooms is through an air-lock and exit of personnel from the room requires a full three minute shower.

In association with the challenge experiments is a spectrum of microbiological, serological and molecular studies to characterise and compare the agents under investigation, to establish information on the host response and resistance to infection, and to gather epidemiological information related to the occurrence of the agents in toads and other amphibian populations.

Should an agent be found which offers the potential for control of the toad, an extensive series of subsequent studies is planned which will involve challenge of indigenous

amphibia and fish species to ensure that the agent does not harm indigenous aquatic animals.

To achieve the objectives of the project, amphibian populations from around the world are being studied for possible infectious agents. An international network of scientists, scientific institutions, interest groups and interested individuals is being developed for information exchange relating to diseases and population declines of amphibians.

In addition to the search for potential microbial pathogens for the biological control of cane toads, AAHL is collaborating with James Cook University of North Queensland (under separate funding) to investigate causes of declining rainforest frog populations in tropical Australia. Preliminary evidence strongly suggests that a virus plays a role in such declines, hence an MSc student has recently been appointed to undertake investigations into the significance of viruses in frog populations. This project, jointly undertaken at AAHL and James Cook University, complements and enhances the biological control project. AAHL is also about to commence collaborative studies with British scientists to characterise virus isolates from British frogs which are believed to be responsible for alarming deaths in frogs in recent years. It is intended to compare these viruses with viruses from elsewhere, including Australia, and to establish whether or not they cause disease in cane toads.

It is hoped that these studies will provide valuable information on the causes of, and initiating factors behind, the recent declines in frog populations in Australia, Britain and elsewhere and will contribute to the possibility that an infectious agent might be found that will control cane toads in Australia. We are on the continual look-out for possible pathogens for consideration for the biological control of cane toads. If anyone has observed dead and/or dying toads or other amphibian species then they can contact us on the numbers listed below.

Alex Hyatt and John Humphrey, CSIRO Australian Animal Health Laboratory, Private Bag 24, Geelong, Victoria, 3222.
Tel: 052 275 000, Fax: 052 275 555
Email: alex@aahl.dah.csiro.au or johnh@aahl.dah.csiro.au

Observations From Long-term Population Studies in Switzerland

The following remarks are not the result of a major scientific research project, but are based on some long-term studies of amphibian populations which I have conducted over several years. The longest of these studies has involved counting egg clumps of *Rana temporaria* near the river Aare in the vicinity of Berne for 26 years. The mean total number of egg clumps per year is 625, but there is very high annual variation (370-1180). A decrease in the number of spawn clumps was observed between 1983 and 1987 and again between 1988 and 1992. If I had started my studies in the years 1983 or 1988, I would have been convinced after 5 years that the population was near extinction; in reality, it is stable.

Similar observations have been made over a 20 year period in two fens of about 250m^2 with much larger populations of *Rana temporaria.* In both fens, vegetational succession was offset by creating a new pond of half a hectare surface area. At one site, 'Bermoos', we observed very large fluctuations (between 1100 and 9200 egg clumps) with a decrease between 1980 and 1986 and again between 1988 and 1993. At 'Widi', annual variation has been smaller (550-2500 clumps), with a slight tendency of long-term decrease. At 'Widi' there seems to have been a real decrease over the last 6 years. Since 1982, *Phragmites,* which was not previously present, is spreading, mainly in the former best breeding sites. Both fens suffer from excessive inflow of nutrients; both are bordered on three sides by intensive agricultural land, with no buffer zone. *Rana temporaria* has not benefited from the creation of the new ponds, but the populations of both *Bufo bufo* and green frogs have increased.

Useful data have come from groups who, for more than 20 years, have collected amphibians migrating to ponds in spring to prevent them being killed by traffic. At 'Bleienbach' numbers of migrating adult *Bufo bufo* seem to show a 10-12 year fluctuation (range 740 to 4450 animals), but no long-term decline, although between 1978 and 1982 a clear decrease was observed. Numbers of *Rana temporaria* were much lower, with a slight tendency to increase. All these changes are more likely to be due to the recruitment of juveniles in the pond rather than to the protection measures taken along the road.

At a site called 'Enggistein' a very different picture has emerged. The population of *Bufo bufo* collapsed 13 years ago; in 1977 polecats (*Putorius putorius*) killed about 120 toads and it seems that the population has never recovered from this event. *Rana temporaria* and *Triturus alpestris* have shown large variations but with a clear tendency to increase. *Rana temporaria* increased until 1991, *T. alpestris* until 1994, followed by catastrophic declines to near-total extinction for both species. The causes of decline are unclear, but worsening of water quality is possibly responsible.

Monitoring of adult *Salamandra salamandra* in an overwintering cave near Berne revealed numbers of up to 20 between 1973 and 1978; then followed a sharp decrease until 1982 when no adult fire salamanders were observed. At this site we have additional information because all animals are individually known by their skin pattern. No adult animal survived the decline of 1981. It seems that an unknown catastrophe happened at this time. Over the last 12 years a new, smaller, population has slowly built up.

A population of *Triturus cristatus* in a pond in a riverine forest was stable between 1981 and 1986 with a maximum of 77 adults. However this population rapidly declined to extinction by 1991. A suspected causal factor is the lowering of the water level.

A population of *Bufo bufo* in the Swiss Alps near Grindelwald at 1850m altitude has been monitored since 1982 (in the first 3 years by A. Hemelaar's group). The numbers of toads per year arriving to reproduce for the first time showed a decrease until 1985, followed by a steady increase until 1993 and a stable situation over the last two years (150-200 adults at the breeding pond per year). Currently a sudden renewal of the population is taking place, suggesting that population structure can change quickly in the medium term. In this example the population can be based for many years on only a few age classes.

The development of populations of *Rana dalmatina* and *Rana latastei* in Southern Ticino is a good example of effective amphibian protection. The original breeding sites were destroyed between 1986 and 1988. In the winter of 1988/89 a chain of 4 new ponds was created, connected by a slowly

running brook. Within only 7 years the populations exploded from 40 to 500 egg clumps for each of the two species. This initial success may not be sustained in future, because population turnover in these two species is very rapid.

In summary, our studies have revealed several cases where clear trends over five years have subsequently been reversed, resulting in marked population fluctuations. Even for a species such as *Bufo bufo,* which is considered to be conservative and slow to react, population size and structure can vary remarkably between years. In the last few years, we have often been asked for precise or numerical evidence for the decline of amphibian species. Such evidence is not easily provided. In many cases there is a clear risk of drawing the wrong conclusions from initial observations.

The decline of many amphibian populations in Switzerland is real, but in most cases we have only very imprecise information. For example, it is hard to prove that a species is no longer present at a certain place. In most cases the reasons for a decline or an extinction are unknown or can only be assumed from inadequate evidence. Such information is insufficient for a long-term strategy to stabilise the situation of amphibians in our country. We need basic data about the development of our amphibian populations for later comparisons; data about changes in populations which can be used as bioindicators of environmental change. Long-term observations, as presented here, using very simple methods are urgently needed. In principle they should never stop, because it is impossible to predict when changes will begin. Workers who can no longer follow specific populations, should pass on the material and the responsibility to younger colleagues. All possible tendencies (increase, stability, decline) can be found and conclusions must be drawn very carefully.

Kurt Grossenbacher, Museum of Natural History, Bern, Switzerland.

US Regional Group Meetings

Southwestern Working Group

This Second Annual Meeting, co-sponsored by Arizona Game and Fish Department, will take place on 4-5th January, 1996 at the Arizona-Sonora Desert Museum, Tucson, AZ.

For copies of meeting abstracts, contact: Michael J. Sredl, Arizona Game & Fish Dept., 2221 W. Greenway Road, Phoenix, AZ 85023-4312, USA.
Email: msredl@gf.state.az.us

Great Lakes Declining Amphibians Conference: Announcement And Call For Papers

The first meeting of the Great Lakes (Minnesota, Wisconsin and Michigan) Working Group of the DAPTF is to be held on March 30th, 1996, at Milwaukee Public Museum, Milwaukee, Wisconsin.

It is planned to host paper sessions on amphibian decline, monitoring , research and education in the region. A discussion session is planned to address the NAAMP white paper, 'Protocols and Strategies for Monitoring North American Amphibians', and to apply it to the Great Lakes region. A goal is to reach a consensus and distribute a white paper on standard survey methods for amphibians in the Great Lakes region.

Abstracts with a title, presenter name, address, and phone/fax/email numbers should be sent to the conference coordinator below. Abstracts sent by email are greatly preferred.

A pre-registration fee of $5.00 payable to the Milwaukee Public Museum, Inc., should be sent to the conference coordinator, Gary S. Casper, Milwaukee Public Museum, 800 W Wells St, Milwaukee, WI 53233. voice: (414)278-2766. fax: (414)278-6100, email: gsc@csd.uwm.edu

Publications of Interest

Bury, R.B., Corn, P.S., Dodd, C.K.J., McDiarmid, R.W. and Scott, N.J.J. (1995) Amphibians. In: Our living resources: A report to the nation on the distribution, abundance, and health of US plants, animals, and ecosystems, ed., E.T. LaRoe, G.S. Farris, C.E. Puckett, P.D. Doran and M.J. Mac. US Department of the Interior - National Biological Service, Washington, DC.

Dodd, C.K.J. and LaClaire, L.V. (1995) Biogeography and status of the striped newt (*Notophthalmus perstriatus*) in Georgia, USA. Herpetological Natural History 3, (1) 37-46.

Fellers, G.M. and Freel, K.L. (1995) A standardized protocol for surveying aquatic amphibians. United States Department of the Interior, National Park Service. Technical Report, NPS/WRUC/NRTR-95-01. Can be ordered from NBS Cooperative Park Studies Unit, University of California, Division of Environmental Studies, Davis, CA 95616

Long, L.E., Saylor, L.S. and Soulé, M.E. (1995) A pH/UV-B synergism in amphibians. Conservation Biology 9, (5) 1301-1303.

Reed, J.M. and Blaustein, A.R. (1995) Assessment of 'nondeclining' amphibian populations using power analysis. Conservation Biology 9, (5) 1299-1300.

Stewart, M.M. (1995) Climate driven population fluctuations in rain forest frogs. Journal of Herpetology 29, (3) 437-446.

Tarkhnishvili, D.N. (1995) Status of amphibian species in Georgia. Report submitted to the DAPTF.

New Working Group Chairs

Slovenia

Nusa Vogrin, Vransko 121, 63305 Vransko, Slovenia

Turkey

Kurtulus Olgun, Adnan Menderes Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, Aydin, Turkey

Monitoring Protocols

The Task Force gratefully acknowledges the work of the retiring Chair, Roy McDiarmid. New chair:
Stephen Corn, Midcontinent Ecological Science Center, 4512 McMurry Avenue, Fort Collins, Colorado 80525-3400, USA
Phone: (970) 226-9464; Fax: (970) 226-9230
Email: Steve_Corn@nbs.gov or: scorn@lamar.colostate.edu

There have been changes of address for the following regional and sub-regional groups of the CIS:

Regional Chair

Sergius L. Kuzmin, Institute of Ecology and Evolution, Russian Academy of Sciences, Leninsky Prospekt, 33, Moscow 117071, Russia, Phone: 7-095-954-1036, Fax: 7-095-954-5534

Caucasus Region

David N. Tarkhnishvili, Moskovsky prospect, 40b, kv.89, Tbilisi 380037, Georgia.
email: HUgo@iberiapac.ge

Ukraine

Andrew N. Misyura, Ul. Narymskaya, 32, kv.1, Dnepropetrovsk 320008, Ukraine. Phone: 7-562-76-83-81
Fax: 7-562-465523

West Siberia

Valentina N. Kuranova, Institute of Biology and Biophysics, Tomsk State University, Prospect Lenina, 36, Tomsk-10, 634010, Russia.
Phone: 23-42-90

FROGLOG is the Newsletter of the World Conservation Union (IUCN), Species Survival Commission (SSC) Declining Amphibian Populations Task Force (DAPTF).

Partial funding for FROGLOG is provided by donation from:

Frog's Leap Winery, P.O. Box 189, Rutherford, CA 94573, USA.

John Baker, Editor
Department of Biology, The Open University, Walton Hall, Milton Keynes, MK7 6AA, United Kingdom.
Phone: 01908 (44 1908 if ex-UK) 652274.
Fax: 01908 (44 1908 if ex-UK) 654167
E-mail: j.m.r.baker@open.ac.uk

New Web Address

Please note that the World Wide Web URL for FROGLOG has been changed to:

http://acs-info.open.ac.uk/info/newsletters/FROGLOG.html

Anyone who prefers to receive FROGLOG via WWW and wishes to cancel hard copy mailing should inform this office.