FROGLOG

IUCN/SSC Declining Amphibian Populations Task Force

June 1995 Number 13

Ron Heyer, Chair

More Seed Grants Available

I am very pleased to announce the revival of the DAPTF seed grant program. At this point, we have identified a total of US$21,500 for the program. Of this, $14,500 must go to projects falling within the area of climatic and atmospheric change. The Board continues its efforts to raise further funds for the seed grant program. Seed grants are intended as one-time awards to further DAPTF goals according to the priorities established by the Board. Generally, proposal requests should fall within the range of $500 - $2,000.

Our intention is to provide a streamlined but responsible system for evaluating and deciding upon proposals. All proposals should be sent to Tim Halliday, by September 1st, 1995. There is no specific format. The proposals should be succinct and not exceed 4 pages. They should include details of the proposed project, a statement as to how the project meets DAPTF objectives (see Task Force Priorities, FROGLOG 11, or contact the DAPTF office), and an outline budget.

Tim Halliday will form ad-hoc committees as needed to review the proposals. Criteria for awarding grants will be based on scientific rigor, responding to DAPTF priorities as identified by the Board, and availability of funds. All decisions reached by the above process will be forwarded to me for final approval. It is planned to allocate grants by the end of September.

Invasive Species Specialist Group and Bullfrogs

The Species Survival Commission of the World Conservation Union (IUCN) has formed a new group, the Invasive Species Specialist Group (ISSG), which is chaired by Mick Clout (Centre for Conservation Biology, School of Biological Sciences, University of Auckland, Tamaki Campus, Private Bag 92019, Auckland, New Zealand. Email: m.clout@auckland.ac.nz). The group aims to reduce the threats posed by invasive species to natural ecosystems and their native species through increasing awareness of invasive species and the means of controlling or eradicating them. The ISSG publishes a newsletter *Aliens*.

Some amphibian declines have been attributed to introduced species. Also, many amphibian workers are concerned that bullfrog (*Rana catesbeiana*) introductions are responsible for severe damage to native faunas.

Mike Lannoo, the DAPTF Co-ordinator for the US, has been invited to join the ISSG, as an advisor on amphibian matters. The DAPTF has alerted this Group to the problems posed by bullfrogs becoming established outside of the natural range, with the result that the ISSG has proposed aiming recommendations at governmental level. In order to provide a sound basis for these recommendations Mike Lannoo is collating information on bullfrog introductions to establish the magnitude of the problem. We are grateful to everyone who has aided us so far: we now have information on introductions in Brasil, Canada (British Columbia), Colombia, Indonesia, Israel, Italy, Malaysia, Peru, Singapore, Spain, Tadjikistan, Taiwan, and the US (Arizona, California, Iowa, Minnesota, Puerto Rico). We welcome further contributions.

We would like to know:

1) Sites/countries of bullfrog introductions (if possible distinguishing between direct introductions, escapes from farms/ranches and incidental introductions via fish stocking).
2) Information on the impacts on native fauna.
3) Information on known eradication measures - successes or failures.
4) Whether or not any known bullfrog farms/ranches have been economically viable.
5) Any other comments that may be of importance.

In order to draw up firm conclusions, we would be grateful if literature could be cited in your response. Alternatively, if you can pass on personal observations, then a note of your professional status (e.g. wildlife manager/professional ecologist) would add weight to any conclusions drawn. In addition, please supply your address and phone number to allow Mike Lannoo to make any necessary follow-up enquiries.

Please send information to:
Michael Lannoo, Muncie Center for Medical Education, Rm. 209 Maria Bingham, Ball State University, Muncie, IN 47306-0230, USA.
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Amphibian Conservation in Denmark

Amphibian workers in Denmark have been comprehensively documenting and tackling the problem of declining amphibians for some years. Species perceived to be declining the most rapidly are *Bombina bombina*, *Hyla*

arborea, *Pelobates fuscus*, *Bufo viridis*, and, except in some areas, *Bufo calamita*. *Bufo bufo*, five *Rana* species and three *Triturus* species are declining less rapidly. The general trend is that species that are already rare are also declining the most rapidly.

An estimate of the magnitude of declines has been made possible due to historical records gathered by Per Holm Andersen who collected a vast amount of data on amphibian populations in Denmark in the 1940s, and later around 1960.

From 1977-1986, a team of amateur and professional biologists re-surveyed 1300 localities described by Holm Andersen. This survey revealed a relatively low rate of pond loss; 19% of the breeding ponds had disappeared, but a further 40% had been altered to some extent. However, amphibians disappeared to a much greater extent than did the ponds; about 50% of populations disappeared from c.1945 to c.1980. Where amphibians remained, population size was often drastically reduced. The rate of decline for common species is as follows: 1945-60: 15%, 1960-80: 25%, 1980-90: 35-70%, and for rare species: 1945-60: 25-35%, 1960-80: 45%, 1980-90: 50-99%. From 1980-1990 net declines (allowing for colonization of new ponds) for common species are 20-50% and for rare species 45-85%.

Data from the 1980s are based on annual surveys of known localities in selected regions. Net decline rates during 1980-90 were c.50% for *Bombina bombina*, c.65% for *Bufo viridis*.

The causes of decline are known in many cases, based on the state of the locality at the time of re-survey. In the NE Seeland region (307 localities) total disappearance of ponds accounted for c.33% of the cases of extinction, eutrophication of pond water accounted for 30-40%, predation (fish, ducks) for at least 10%, and unknown causes from 5% (common species) to 10% (rare species). Unknown causes may embrace effects such as chemical pollution or undetected fish introductions.

In south Seeland and Falster (50 localities) total pond disappearance, partial filling-in, or draining, contributed in total to c. 80% of the extinctions. Eutrophication contributed to c.20%. Unknown causes contributed only 2% (1 case).

The fate of *Hyla arborea* on the island of Bornholm was studied closely by Kåre Fog, using historical records made by Arne Larsen. Extinction rates have tended to increase with time: 1950-1960: 36%, 1960-1970: 45%, 1970-1980: 43%, 1980-1990: c.60%. The cause of extinction was investigated in 80 cases, by inspection and by interviews with landowners. The most important causal factor was eutrophication (primary cause in 42% of cases), and fish introductions (primary cause in 21%). Disappearance of ponds accounted for only 11%. Unknown causes accounted for 15%. The relative importance of fish increased during the period 1950-1990 from c.9% to c.36% of the cases, whilst unknown causes increased from c.9% to c.32%. The 'unknown cause' could in many cases be due to random fluctuations leading to extinction of isolated populations.

The extensive documentation of severe declines, and of their causes, has made it possible to convince public authorities that an effort to save the remaining populations is necessary. This has been attained partly by changes in legislation. Every pond in Denmark of the size 100 m^2 or more is now protected by law. In addition, during the 1990s, the government has awarded grants for habitat restoration. A considerable part of these grants has been used for pond restorations, and the creation of new ponds. The main effort has been to dredge eutrophic ponds where amphibians still occur, but have limited breeding success.

Pond restoration programs for rare amphibians started in the mid 1980s, and are now going on in many parts of the country. Most projects are under close inspection by herpetologists - such inspection is important for successful results.

The main impression up to now is that declining populations usually have little ability to colonize new ponds; creation of new ponds close to existing ones often gives disappointing results. On the other hand, measures to improve old breeding ponds are usually successful, leading to good breeding success, which in turn increases the likelihood that neighbouring ponds will be colonized.

These conservation efforts have been concentrated on the rarest species. *Triturus alpestris* has been very closely monitored. The total number of breeding ponds in Denmark has been: 1978: 46, 1988: 32, 1994: 156, i.e. a five-fold increase during the last six years. *Bombina bombina* has also been very closely monitored. It decreased from 22 populations in 1970 to only 7 populations in 1987. However, since then 100 ponds have been restored, and the number of ponds with successfully breeding populations has increased from only 10 in 1988 to 17 in 1994.

For *Hyla arborea*, all populations have been surveyed at least once, and taken care of. A total of c.900 ponds have been created or restored. Monitoring indicates that the total Danish population is increasing. Attempts to save very small (1-5 males), isolated populations have in most cases been successful, although inbreeding poses a problem. *Hyla arborea* has been reintroduced to a region near its former northern limit in Jutland. In nine years, the introduced population has grown to c.250 males, in 27 ponds.

After these initiatives to save the above three rarest species, efforts are now also being focused on *Pelobates fuscus*, *Bufo calamita*, and *Bufo viridis*.

Conclusions drawn from work in Denmark are that (1) precise documentation of declines and their causes is important in securing grants from authorities (2) where the ponds are improved, it is possible to reverse the downward trend, even in an intensively farmed country. Where nothing is done, declines continue and accelerate.

Literature:

Memoranda Societas pro Fauna et Flora Fennica (1988). 64 (3): Special issue on Scandinavian herpetology.

Fog, K. (1993). Oplæg til forvaltningsplan for Danmarks padder og krybdyr (management plan for Danish amphibians and reptiles). 170 pp. Available from: Skov-og Naturstyrelsen, Haraldsgade 53, 2100 Copenhagen Ø. In Danish, with 8 pp. English abstract.

Kåre Fog, Lojesovej 15, DK-3670 Vekso, Denmark.

US SW Working Group Meeting

On the 5-6th of January, the Southwestern United States Working Group met at the Phoenix Zoo, Phoenix, Arizona. This meeting was attended by Ron Heyer, Mike Lannoo, and more than 50 persons representing academic institutions, state and federal agencies, as well as interested individuals throughout

southwestern US. The conference was organized by Mike Sredl (Arizona Game and Fish Department) and was co-sponsored by the Department and the Zoo.

Dr. Martha Crump delivered the keynote address, recounting the biology and decline of *Bufo periglenes*. The meeting was divided into three sessions and three round table discussions. The first two sessions evaluated the status and trends of Arizona and New Mexico's amphibians.

Participants presented data from studies on most of the known special status or declining amphibian species in the southwestern US. Talks focused on the recent, severe declines of leopard frogs (especially *Rana chiricahuensis*) and the status of several species of toads and the Huachuca tiger salamander. Presenters identified many factors believed to have had prominent roles in declines of amphibian populations in southwestern US including: introduced species (bullfrogs, crayfish, and sport fish), habitat fragmentation and degradation, and water manipulation. While most declines of ranid frog populations seem to be attributable to the previously identified, or natural, causes the recency and severity of many declines remain perplexing to some working group members.

The third session, Conservation, Management, and Research, consisted of talks which reviewed population dynamics, ecology, conservation, and management of southwestern amphibians. The working group discussed various issues related to the study and conservation of southwestern US amphibian populations through a series of round table discussions. Specific discussion items ranged from the proposed North American Amphibian Monitoring Program to identifying causes of population declines to fruitful lines of future research in the Southwest. The working group agreed to meet in early January 1996 in Tucson, Arizona.

Listed below are the titles and authors of the talks. To receive a copy of the complete program and abstracts, contact working group coordinator Mike Sredl, Nongame Branch, Arizona Game and Fish Department, 2221 West Greenway Road, Phoenix, AZ, 85023, USA, (602) 789-3515,
email: msredl@gf.state.az.us.

Presentations: *Rana* revisited: Some *R. chiricahuensis* sites in the Chiricahua Mountains then and now, R.G. Zweifel. Status of (most of the) leopard frogs in Arizona, M.J. Sredl & D.L. Waters. Distribution, status, and suggested conservation strategies for the Chiricahua leopard frog, J.C. Rorabaugh, M.J. Sredl, R.D. Jennings, & N.J. Scott. Status of the plains leopard frog in Arizona, D.A. Parizek, Jr., P.C. Rosen, & C.R. Schwalbe. Current distributions of the Sonoran green toad and Southwestern toad in Arizona, B.K. Sullivan. Recent changes in leopard frog distribution in the White Mountains of east central Arizona, P.F. Fernandez & J.T. Bagnara. Conservation and management of the Madrean populations of the Chiricahua leopard frog, M.J. Sredl & J.M. Howland. *Rana onca* in southern Nevada: Population trends and phylogenetic relationships, R.D. Jennings, D.F. Bradford & B.R. Riddle. The effect of habitat alteration on mountain tree frogs: a model of how permanent ponds can provide a refuge for predators, T.J. Maret, J.P. Collins, P.E. Brunkow, & R.E. Ziemba. Hybridization and amphibian conservation: the distinctive biology and current status of an isolated subspecies of salamander, *Ambystoma tigrinum stebbinsi*, along the borderlands of Arizona and Sonora, J.P. Collins, P.E. Brunkow, T.J. Maret, & R.E. Ziemba.

Round table: Evaluating status and trends in the Southwest, and Conservation, Management, and Research: Big Spring: Insight into desert ranid population declines, S.G. Seim. & M.J. Sredl. Microhabitat use and small-scale movements in lowland leopard frogs, J.G. Hill, S.G. Seim, & M.J. Sredl. Correlative evidence for biological and chemical impacts on the Chiricahua leopard frog in southeast Arizona, P.C. Rosen. Preliminary evaluation of visual encounter surveys for southwestern leopard frogs, J.E. Wallace, & M.J. Sredl. Return of the Chiricahua leopard frog to San Bernardino National Wildlife Refuge, K.S. Cobble, M.O. Magoffin, P.C. Rosen, & C.R. Schwalbe. Bullfrog-removal experiments in a southwestern wetland complex, C.R. Schwalbe & P.C. Rosen.

Round table: Causes of declines in the Southwest.

Round table: Future of DAPTF SWWG and amphibian conservation in the Southwest.

Southeast Asia Working Group

The SE Asian Working Group held a workshop on monitoring amphibian populations, January 16-21, at Poring Station, Kinabalu Park, Sabah, Malaysia. The goals of the workshop were: (1) to stimulate and encourage work on populations of amphibians in Southeast Asia by resident biologists; (2) to discuss with those potential workers a set of standard procedures in order to facilitate comparison across future studies; (3) to encourage communication among those workers; (4) to find a resident biologist to assume the chairmanship of the Southeast Asia Working Group.

Participants in the workshop were: Djoko T. Iskandar, Daru Juli Setyanto, Mumpuni Sancoyo, Agustinus Winantotaufik (Indonesia); H. S. Yong, B. H. Kiew (Peninsular Malaysia); Alim Biun, Maklarin Lakim, Anna Wong, Abd. Hamid Ahmad (Sabah); Ramlah Zainudin, Isa Said (Sarawak); S. Chan, K. Lim (Singapore); Tanya Chan-ard, Jarujin Nabhitabhata (Thailand); Ho Thu Cuc, Nguyen Van Sang (Vietnam); C. Custodio (Philippines); S. Dutta, N. Singh (India); J. Birkett (Australia); S. B. Emerson, L. Carroll, R. F. Inger, R. B. Stuebing, F. L. Tan (United States). The latter three were responsible for general direction and logistics. Prior to the workshop, organization was handled by R. F. Inger and H. K. Voris (Field Museum).

The program included: region-by-region reports on status of amphibians; review of current work; review of inventory and monitoring procedures; demonstration of field procedures; preparation of proposals for research; discussion of means of continuing communication and future activities of the Working Group; election of a new chair. Seven research proposals were produced and the search for funding is now underway. Discussion of procedures relied heavily on the book *Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians* copies of which were distributed to participants.

The new chair of the Working Group is Dr. Hoi Sen Yong (Department of Biology, University of Malaya, 59100 Kuala Lumpur, Malaysia).

Sabah Parks provided the meeting place. Travel and subsistence costs were supported by a grant from the National Science Foundation (USA) to R. F. Inger and H. K. Voris.

Is a Pathogen Decimating Australia's Rain Forest Frogs?

For the past two years Keith MacDonald, Rick Speare and I have been studying the dramatic decline of some frog populations in Australian rain forests. Since the late 1970s at least 14 species of endemic, stream-dwelling frogs have declined precipitously, mainly in eastern Queensland and in adjoining areas of New South Wales. Seven of these species, including the unique southern and northern gastric-brooding frogs (*Rheobatrachus silus* and *R. vitellinus*) may now be extinct.

Our analysis has convinced us that a highly virulent pathogen is the most likely responsible agent. In a recent manuscript (Laurance et al. in press) we review information on these declines and then present eight lines of evidence that support our interpretation. I will mention three of these here.

First, the declines have followed a distinctive geographic pattern. Populations in southeastern

Queensland apparently declined first, in the late 1970s, then the declines appeared to sweep progressively northward during the next 15 years, eventually spanning an area of 1500 km.

Second, monitored populations in central and northeastern Queensland declined with remarkable rapidity. In most cases adult and juvenile frogs disappeared first, followed later by larvae.

Finally, pathological evidence from animals collected in declining populations clearly suggests viral infection. Some evidence suggests that the pathogen could a be a type of iridovirus, a family of viruses that affects ectothermic vertebrates and some insects.

We would welcome correspondence with other workers who suspect that a pathogen could be linked to declines of their study populations. Our general impression is that the role of disease in amphibian populations is underestimated. In particular, we suspect that exotic pathogens could pose a dramatic threat to non-immune host populations.

Reference:

Laurance, W.F., McDonald, K.R. and Speare, R. (in press) Epidemic disease and the catastrophic decline of Australian rain forest frogs. Conservation Biology.

William Laurance, CSIRO Tropical Forest Research Centre, PO Box 780, Atherton, Queensland 4883, Australia.
Email: bill.laurance@tfrc.csiro.au

Frog-logger: an Automated Recording System

Previously unknown populations of anurans in the US are being detected with the help of a portable automated recording system. This uses a timer to automatically activate a tape recorder to log animal vocalizations in the field. The system, dubbed a 'frog-logger', also uses a voice clock to audibly time stamp the beginning of each sampling interval. It is self-contained, portable and weather resistant.

Michael Dorcas, a postdoctoral fellow at Savannah River Ecology Laboratory, designed the 'frog-logger' with help from his father, Eugene Dorcas, an electrical engineer, and Charles Peterson, his doctoral degree advisor at Idaho State University. Drs. Dorcas and Peterson have used the system to monitor populations of western chorus frogs, southwestern toads and Pacific chorus frogs in Utah and Idaho. They have also been monitoring frogs and toads, including the potentially threatened gopher frog, at the US Department of Energy's Savannah River Site in collaboration with Whit Gibbons, Justin Congdon, Tracey Tuberville and other colleagues at the Ecology Laboratory.

At least nine other scientists from across the country are also using automated recording systems, with permission and instructions from Dr. Dorcas, to monitor populations of frogs and birds. In a number of cases, these systems have detected species otherwise thought to have been absent.

In one of the most dramatic cases, Dr. Richard Seigel of Southeastern Louisiana University detected a breeding population of barking tree frogs at the Merritt Island National Wildlife Refuge at Kennedy Space Center, Florida, where the species was previously represented by only a single road-killed specimen, in spite of 19 years of field work.

In Ohio, researchers Michael Walton and Ralph Gibson of Cleveland State University detected a population of leopard frogs at a site where they were thought to have become extinct. In other cases, state and federal wildlife officials are using 'frog-loggers' to monitor sensitive species and to gather information for federally mandated environmental impact statements.

Dr. Dorcas is now collaborating with Ontario Hydro Technologies in Toronto to develop computer software that can identify animal vocalizations, to make it easier and faster to analyze the tapes.

For further information contact: Michael Dorcas, at Savannah River Ecology Laboratory, Fax: 803-725-3309. Email: dorcas@srel.edu

Publications of Interest

Arano, B., Llorente, G., Garcia-Paris, M. & Herrero, P. (1995) Species translocation menaces Iberian waterfrogs. Conservation Biology 9, (1) 196-198.

Arntzen, J.W., Oldham, R.S. and Latham, D.M. (1995) Cost effective drift fences for toads and newts. Amphibia-Reptilia 16, (2) 137-145.

Blaustein, A.R. & Wake, D.B. (1995) The puzzle of declining amphibian populations. Scientific American (April 1995) 56-61.

Castellano, S. & Giacoma, C. (1993) A comparison of individual marking techniques applied to the study of wild populations of *Bufo bufo*. Suppl. Ric. Biol. Selvaggina XXI, 685-692.

Doody, J.S. (1995) A photographic mark-recapture method for patterned amphibians. Herpetological Review 26, (1) 19-21.

Kuzmin, S.L. (1994) Commercial collecting as a threat for amphibian and reptile species of the former Soviet Union. Species 23, 47-48.

Rooy, P.V. & Stumpel, A. (1995) Ecological impact of economic development on Sardinian herpetofauna. Conservation Biology 9, (2) 263-269.

Sparks, T.H. & Carey, P.D. (1995) The responses of species to climate over two centuries: an analysis of the Marsham phenological record, 1736-1947. Journal of Ecology 83, 321-329. Contains data on 'frogs & toads'.

Speare R. (February 1995) Preliminary Study on Diseases in Australian Wet Tropics Amphibians: Deaths of Rainforest frogs at O'Keefe Creek, Big Tableland.

This work, first reported at the Second World Congress of Herpetology, Adelaide, January, 1994, has now been presented as a report to the Australian Department of Environment and Heritage.

Sick or dead frogs (*Litoria nannotis*, *L. rheocola* and *L. serrata*) were collected from Big Tableland, Queensland, at a site where diseased frogs were previously unknown (O'Keefe Creek). Captive (for use in a captive breeding programme) *Litoria nannotis* and *Taudactylus acutirostris* also developed pathologies. The identity of the causal agent is unknown. However, deaths in wild frogs and most frogs that developed symptoms after being brought into captivity did not seem to be due to bacterial septicaemia. Death was probably due to hepatic failure, renal failure, severe anaemia or encephalopy or to a combination of these processes, with different pathologies predominant in different frogs. Pathology was consistent with some viral infections, particularly with that caused by Bohle virus. No virus was cultured in fish cell lines, nor detected on limited examinations with transmission electron microscope.

An appendix 'What to do with dead or ill frogs' is included as a practical guide for biologists working in the field.

Rick Speare (Department of Public Health and Tropical Medicine, James Cook University, Townsville 4811, Queensland, Australia) is currently preparing a manuscript based on the work in this report.

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