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FROGLOG

Newsletter of the Declining Amphibian Populations Task Force

August 1998, Number 28.

The Effects of Habitat Modification on Spotted Frogs in Yellowstone National Park

By Debra A. Patla

A report on work carried out under the DAPTF Seed Grant Programme.

This DAPTF grant supported a study replicating and comparing Frederick B. Turner's investigation (1953-1955) of a spotted frog population (formerly *Rana pretiosa*, now *Rana luteiventris*) in Yellowstone National Park, Wyoming, U.S.A. Turner's study documented population size and thoroughly described seasonal activity patterns and spatial relationships in the 1950s. Our reinvestigation was stimulated by Fred Turner's visit to the study area in 1991, during which he observed that spotted frogs appeared to be greatly reduced in numbers and that development had caused obvious changes in portions of the study area. In using historical information as a research tool, we followed one of the main recommendations of the National Research Council's Board on Biology workshop on declining amphibians (February 1990 in Irvine, CA).

Our objectives were to verify and document the suspected decline of the population inhabiting the study area; to determine how ecological characteristics, particularly spatial relationships, have changed; and to determine the causes of the decline. Our approach was to replicate Turner's study and to compare the historical and current information and data sets. We hypothesized that adverse weather patterns or local habitat changes were the most likely causes of a decline.

Employing methods similar to Turner's, we conducted intensive mark-recapture work through three consecutive summers (1993-1995) in the 28-hectare main study area. We mapped all capture-recapture locations and used small radio transmitters to track the movements of several adult frogs. We compared demographic characteristics, spatial relationships, weather patterns and environmental conditions during the 1950s and the 1990s. Comparisons were feasible because most of the important habitat features identified by Turner (e.g., streams and pools) are still obvious in the 1990s. However, two major development projects have occurred since the 1950s. The Park highway was rerouted in the 1970s, with its new path cutting through the middle of the study area and in the 1980s, an underground water pumping system was installed at the headwaters of the main drainage in the study area.

We found that the spotted frog population occupying the main study area has declined substantially, dropping from about 1200-1900 frogs in the 1950s to about 200-400 frogs in the 1990s. Comparing spatial characteristics of the frog populations in the 1950s and the 1990s, we found changes that appear to be independent of the reduction in population size. The relative distribution of frogs in the study area has changed, with the frog population clumped in some areas and absent from others, in comparison to the 1950s. The patterns of frog movements among upland areas, breeding sites, and permanent water that Turner discerned in the 1950s are restricted to fewer areas in the 1990s; only 29% of the former movement patterns remain. Three main activity ranges of the 1950s, consisting of breeding, foraging, and overwintering areas, have been reduced to one main pattern in the 1990s. The 1990s study was not preceded by abnormal or adverse weather patterns that might explain these changes in the frog population. Habitat conditions have deteriorated since the 1950s; former overwintering, foraging, and breeding areas have been reduced in number and size, and a major frog migration route between summer and winter habitat was bisected by the new highway. While most of the habitat degradation appears to be the result of human activities, potentially natural shrinkage of ephemeral pools used by frogs for breeding has also occurred.

Although the precise cause of the population decline cannot be inferred from the then-and-now data sets available to us, habitat degradation appears to provide the mostly likely explanation. The reconfiguration of frog distribution and activity patterns relative to the 1950s indicates changes in the quality, relative importance, and connectivity of habitat features. Habitat fragmentation caused by the new highway, downstream effects of water pumping at the headwater springs, and the recent cessation of breeding at one of the remaining former breeding sites appear to be the major factors that limit habitat and minimize the potential for an eventual population recovery.

The following generalizations based on our case study may be useful to the study of amphibian population declines:

1) Former herpetological studies can provide valuable information that may be used to decipher factors contributing to the persistence and decline of populations.

2) Studies that are limited to amphibian breeding sites may miss important relationships that also affect population size and persistence e.g., seasonal movements to foraging areas and wintering sites.

3) Raw data from current studies, including daily field notes, should be safely archived where other researchers can access them. Future researchers may rely on these data for comparative studies; published summaries of results may not be sufficient to answer the questions of future researchers or to perform statistical tests.

The World Conservation Union (IUCN)/Species Survival Commission (SSC)
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4) Location in protected zones, such as National Parks, does not guarantee that amphibian populations are safe from human-caused habitat loss. Researchers should try to ensure that their studies are available to land managers and should encourage environmental studies that consider potential impacts to amphibian populations prior to development projects.

We are preparing a publication based on this research. Monitoring of this population continues as part of our Greater Yellowstone Ecosystem amphibian monitoring program.

Completed:

Patla, D.A. & Peterson, C.R. (1994) The effects of habitat modification on a spotted frog population in Yellowstone National Park. In: Harlow, H.J. & Harlow, M. (eds.) *University of Wyoming, National Park Service Research Center, 18th annual report.* University of Wyoming, Laramie. pp 135-144.

Patla, D.A. (1997) *Changes in a population of spotted frogs in Yellowstone National Park between 1953 and 1995: the effects of habitat modification.* M.S. thesis, Idaho State University, Pocatello, ID.

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Midwest Declining Amphibians Conference a Hopping Success

From Gary Casper, DAPTF USA-Great Lakes

About 300 people attended the two-day Midwest Declining Amphibians Conference in Milwaukee, Wisconsin, USA, hosted by the Milwaukee Public Museum on March 20-21, 1998. This was a joint meeting of the Central and Great Lakes Division Working Groups of the DAPTF. The conference was organized by Gary Casper, chair of the Great Lakes Working Group, with assistance from Christopher Phillips (chair of the Central Division Working Group), and Michael Lannoo (US DAPTF Coordinator). There were 42 papers presented, and a panel discussion on amphibian malformities. Topics included survey and monitoring reports, population biology and ecology, and malformity causes and statistics. Abstracts are available through the Great Lakes Declining Amphibians web site at:

http://www.mpm.edu/collect/vertzo/herp/Daptf/daptf.html

Publication of the proceedings is being investigated.

The new research presented by scientists investigating potential causes of frog deformities attracted national attention, including network television. There is increasing evidence implicating pesticides as causal agents, with retinoids or retinoid-like compounds suspected. The evidence now suggests that, of the three leading hypotheses, chemical contaminants should now be considered the most likely (more so than either parasites or UV light). Reporters and camera crews from NBC Nightly News (Chicago), ABC (New York), National Public Radio (WUWM), Outdoor Wisconsin, the Green Bay Press-Gazette, the Minneapolis Star Tribune, the Milwaukee Journal Sentinal and the Washington Post attended. The conference was also covered by CNN.

The mix of scientists, natural resource managers and students attending came from as far away as Maryland, California and Guatemala. Participating agencies included seven state DNRs, the US Environmental Protection Agency, the Minnesota Pollution Control Agency, the Illinois Natural History Survey, the US Geological Survey, the Salk Institute, many universities and colleges, the Nature Conservancy, the National Wildlife Health Center, the US Fish and Wildlife Service, the Pacific Northwest National Laboratory, the Patuxtent Wildlife Research Center, the National Institute of Environmental Health Sciences and the Northern Prairie Wildlife Research Center.

The Wisconsin Herpetology Homepage is at:

http://www.mpm.edu/collect/vertzo/herp/atlas/welcome.html

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Amphibians in Arunachal Pradesh, India

By Sabitry Choudhury Bordoloi

Arunachal Pradesh is the largest state in North-East India (83,740 km^2) and is one of the world's 16 most important biodiversity hotspots. It has diverse climatic conditions; over 62% of its area is under various types of forest cover including tropical wet evergreen, subtropical pine, montane wet temperate, sub-alpine and moist alpine scrub. The terrain is hilly and altitude ranges from 100 to about 7000m. Summer temperatures range between 9 - 38^{0}C and the winter temperature varies from below freezing point to 25^{0}C. The numerous rivers and rivulets originating in the hills, along with other temporary and permanent water bodies, provide a diverse range of habitat conditions for amphibians.

Work has been started under a project founded by the G.P. Pant Institute of Himalayan Environment and Development, India. All accessible areas wil be surveyed in order to investigate the amphibian fauna of the region. The Zoological Survey of India has previously conducted surveys, and Chanda (1994) summarized earlier publications. Twenty-three species of amphibian were reported from this region. Our collections are currently being identified and a survey of accessible areas during the last breeding season revealed an altitudinal variation in amphibian species diversity.

Various workers have reported that the amphibian breeding season here is normally between May and August, i.e. during the monsoon season. We surveyed drying amphibian habitats during December 1997 and January 1998 and found that *Bufo melanostictus* was actively breeding during these coldest months of the year. Freshly laid egg-strings and tadpoles in various stages of development were recorded from most of the temporary, drying pools in the west Kameng district of Arunachal Pradesh. These areas areas are now being monitored in order to record other species which may be breeding during the dry winter season. Our study team comprizes S.C. Bordoloi, Shri M.M. Borah and Shri S.N. Kalita.

Reference: Chanda, S.K. (1994) Anuran (Amphibia) fauna of North-East India. Mem. of Zool. Surv. of India.

Contact: S.C. Bordoloi, E/5 Professors' QTR, Dighali Pukhuri East, Ambari, Guwahati- 781 001, Assam, INDIA.

Declining Amphibian Populations: Looking for Large Scale Patterns

By Jeff Houlahan

The causes and magnitude of amphibian declines are questions that have bedevilled conservation ecologists for better than a decade. A team of researchers from Switzerland, Canada, Russia, Hong Kong (tentative) and China (tentative) are attempting to address these questions using a macroecological approach. We are amassing a large data set of amphibian population time series from the literature, as well as from the unpublished work of herpetologists and conservationists around the world. Using general patterns that emerge from this set of data we hope to be able to answer questions such as: are there hotspots of amphibian decline?; are specific species or functional groups declining more than others? are amphibians declining more in recent years than historically? are species in high acidic deposition areas declining more than species in low acidic deposition areas?

To date we have acquired 400-500 amphibian population time series from over 100 different studies on more than 60 different species. Each population time series contains at least the following information: 1. primary researcher, 2. site location, 3. species name, 4. population/relative abundance estimates and years they were estimated, 5. censusing technique. Some of the time series also have data on size of site, altitude, human impacts and annual precipitation. The criteria for inclusion are: (1) that the time series be three years or longer (not necessarily consecutively) and (2) that the method of censusing not be biased (e.g. different effort among years with no method of controlling for effort). The time series range from 3-25 years in length and include many different types of censusing techniques including mark/recapture population estimates, egg mass counts, calling male counts, drift fences etc. The majority of the work was done in the 1970's, 80's and 90's but there are studies from as early as the 1930's. Most of the data are from North America and Europe, although we also have populations from Asia, South America, Africa and Australia.

One particularly gratifying part of the project has been our ongoing correspondence with dedicated and concerned herpetologists from around the globe. They have been generous with both their data and advice and we thank those researchers who have been kind enough to let us use their data before they have had the opportunity to publish them themselves. Amphibian population time series are relatively rare (although not as rare as we might previously have suspected), so many of the researchers we have contacted have had no hard data to provide but the words of support and encouragement have been near unanimous.

We are still in the process of acquiring data and will be until September 1998. If there is anyone who has or knows of data that sounds appropriate, we would love to hear from you.

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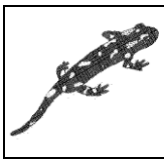
GRANT OPPORTUNITIES

The DAPTF Office has received notification of several funding opportunities suitable for DAPTF members, brief details of which are given below. The deadlines for most applications are not too far away, so if anyone is interested in further details, please contact John Wilkinson by fax or e-mail (as below) as soon as possible.

The Bay Foundation (awards with emphasis on education and research in areas such as biodiversity and wildlife preservation, $3,000-$25,000); **Chicago Zoological Society** (conservation projects on captive and wild animal populations of up to $5,000); **Leverhulme Trust** (original research, especially research without traditional funding sources, various levels of award); **Harvard Museum of Comparative Zoology** (systematics research, eg. museum-based taxonomic studies, ca. $1,000).



DAPTF-Netherlands Report

From Gerard Smit, DAPTF-Netherlands

In 1997 41 sites were surveyed. After just one season of monitoring only a little can be said about amphibian numbers. We present therefore a brief summary of this first year's results. In almost all provinces (except Groningen and Utrecht) the monitoring network is active. The 41 sites represent a total of 232 different water bodies. This gives an average of almost six water bodies per site. All native species are included in the network. An average of 4 to 5 species were observed per site with a maximum of 9 species at one site. For individual water bodies the average is less, 2 to 3 species per water body with a maximum of 7 species.

The average survey frequency was 3.3 visits in 1997. A visit took about 2.5 hours. This means that in 1997 a total of 360 hours of field-work was invested in the monitoring network, most of it by volunteers. Table 1 gives for each species the number of sites and total number of water bodies in which it was observed. For average presence, 1 = rare; 2 = common; 3 = very common.

Table 1. Amphibians in the Netherlands in 1997

SPECIES	SITES/ SPECIE	WATER BODIES/ SPECIE	AVERAGE PRESENCE
Salamandra salamandra	1	-	-
Triturus alpestris	14	34	1.5
Triturus cristatus	7	19	1.3
Triturus helveticus	2	8	1.9
Triturus vulgaris	30	94	1.7
Alytes obstetricans	2	8	1.8
Bombina variegata	1	8	1.0
Pelobates fuscus	1	1	1.0
Bufo bufo	25	115	1.9
Bufo calamita	12	31	2.1
Hyla arborea	3	14	1.0
Rana arvalis	10	25	2.4
Rana temporaria	33	100	1.6
Rana esculenta	30	79	1.9
Rana ridibunda	4	5	1.8
Rana kl. esculenta	5	13	1.6
Rana lessonae	2	3	2.3

As could be expected, the common species occurred at most sites. The average presence of the moor frog (*Rana arvalis*) in the surveyed water bodies is high. In the 25 water bodies where this species was observed it was common. Observations were made of hundreds of egg clutches in water of the heath areas of Drenthe. Due to the activities of the fieldwork group of Eindhoven, ponds with the alpine newt (*Triturus alpestris*) are well represented in comparison with its limited distribution in the Netherlands. Monitoring is carried out in 4 areas where the spadefoot toad (*Pelobates fuscus*) may (still) be present. In 1997 it was observed in only 1 water body in the province of Overijssel. This could be due to the unfavourable weather conditions that spring for observing this species. The fire salamander is counted on land. No data for water bodies for this species are available.

In 1998 we expect the number of sites monitored will increase to about 60 distributed around the country. Also the results of the monitoring project of Drenthe, with surveys of ponds and

fen systems, will be included in Meetnet Amfibien.

Contact the new DAPTF-Netherlands Working Group by writing to:

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NSF Workshop on Declining Amphibian Populations

The US National Science Foundation (NSF) organised a workshop on amphibian declines in Washington DC, 28th & 29th May, 1998. This came 8 years after the U.S. National Academy of Sciences sponsored workshop that led to the formation of the DAPTF.

Several speakers reviewed the latest information on the geography of amphibian declines: South America (Ron Heyer), Central America (Karen Lips), Australia (Ross Alford), western USA (Gary Fellers), eastern USA (Henry Wilbur), Europe (Tim Halliday), Canada (David Green). It is clear from these reports that amphibians are continuing to decline worldwide, for a variety of reasons. Other speakers discussed potential causes of declines and some specific issues: UV-B radiation (Andy Blaustein), deformities (Jo Tietge), toxins and deformities (Don Sparling), viruses (Alex Hyatt), disease in salamanders (Betty Davidson), climate change (Kriistina Ovaska), disease, climate change and immunology (Cindy Carey). These talks showed that a lot of basic research is now being done on all these issues and that a considerable number of herpetologists are now engaged in this work.

The workshop ended with discussion of some possible new initiatives to maintain the momentum of research into declining amphibian populations. These included setting up an informatics system (David Wake), devising simple standard protocols for monitoring populations (Ross Alford), an intensive study of amphibians along the entire length of the American Cordillera (David Wake) and a forthcoming workshop on disease and immunology (Cindy Carey).

Froglog Shorts

DONATIONS British Airways, through a Smithsonian donation program, has generously provided space-available airline tickets to allow certain Board Members to attend the Board Meetings in Prague last summer and the Board Meeting in Guelph, just concluded. In addition to this critical in-kind contribution, we gratefully acknowledge receipt of the following donations from 1 May through 30 June 1998. **Organizations:** Argofilms Ltd.; Association of Reptilian & Amphibian Veterinarians; Earth Images (Nancy Cannon); Sedgwick County Zoo. **Individuals:** Sandra Cobb; Ernie Karlstrom; Kati Loeffler; Noel O'Flanagan; Charles V. Quinn.

The 3rd Annual Meeting of the Canadian Amphibian and Reptile Conservation Network / Réseau Canadien de Conservation des Amphibiens et des Reptiles, and the 8th Annual Meeting of the IUCN/SSC Task Force on Declining Amphibian Populations in Canada (DAPCAN), is to be held at the University of Saskatchewan, Saskatoon, Sask. October 1-5, 1998. The principal feature of this year's conference will be a symposium on the Conservation Biology and Monitoring of Reptile Populations in Canada, plus our regular program of featured speakers, research papers, posters, workshops, field trips, discussions and a general meeting on all aspects of the conservation biology of amphibians and reptiles in Canada. Overnight field trips are planned to Grassland National Park and the South Saskatchewan River Escarpments. Topics that are being considered for symposia or round-table discussion are: Herpetological Education, Ethics, and Highway Mortality. *Please forward your ideas, comments, suggestions or proposals for this meeting to:* Andrew Didiuk (local organizer and reptile symposium)
Tel: 306-975-4087
Fax: 306-975-4089
Andrew.Didiuk@ec.gc.ca
or: Stan Orchard (programming)
Tel/Fax: 250-595-7556
sorchard@islandnet.com

The Canadian Amphibian and Reptile Conservation Network / Réseau Canadien de Conservation des Amphibiens et des Reptiles announces the launch of their new website. The website is hosted by Environment Canada's Ecological Monitoring and Assessment Network at: **http://www.cciw.ca/eco watch/dapcan**

The highlight of the site is a tour of the amphibians of Canada including provincial species lists, national distribution maps, photos, calls where applicable, and natural history and conservation information. Also included in the site is a key to the 45 species of amphibians found in Canada which is designed for use by non-specialists, as well as some basic amphibian biology and information on CARCN/RCCAR and DAPCAN. The site is intended to provide educational materials for students and the general public as well as training support for volunteer monitors. Coming soon there will be a set of quizzes so users can test their identification skills (calls or photos).

Publications of Interest

Anzalone, C.R., Kats, L.B. & Gordon, M.S. (1998) Effects of solar UV-B radiation on embryonic development in *Hyla cadaverina, Hyla regilla* and *Taricha torosa. Conservation Biol.* **12:** 646-653.

Borkin, L.J. & Pikulik, M.M. (1986) The occurrence of polymely and polydactyly in natural populations of anurans of the USSR. *Amphibia-Reptilia* **7:** 205-216.

Demaynadier, P.G. & Hunter, M.L. (1998) Effects of silvicultural edges on the distribution and abundance of amphibians in Maine. *Conservation Biol*. **12:** 340-352.

Denton, S.J., Hitchings, S.P., Beebee, T.J.C. & Gent, A. (1997) A recovery plan for the natterjack toad (*Bufo calamita*) in Britain. *Conservation Biol.* **11:** 1329-1338.

Dodd, C.K. Jr. (1997) Imperilled amphibians: a historical perspective. In: *Aquatic Fauna in Peril*: *The Southeastern Perspective,* G.W. Benz and D.E. Collins (eds.), Southeast Aquatic Research Institute Special Publication 1.

Dodd, C.K. Jr. (1998) *Desmognathus auriculatus* at Devil's Millhopper State Geological Site, Alachua County, Florida. *Florida Scient.* **61(1):** 38-45.

Fog, K. (1997) A survey of the results of pond projects for rare amphibians in Denmark. *Memoranda Soc. Fauna Flora Fennica* **73:** 91-100.

Lips, K.R. (1998) Decline of a tropical montane amphibian fauna. *Conservation Biology* **12(1):** 106-117.

Lizana, M. & Pedraza, E.M. (1998) The effects of UV-B radiation on toad mortality in mountainius areas of central Spain. *Conservation Biol.* **12:** 703-707.

Marsh, D.M. & Pearman, P.B. (1997) Effects of habitat fragmentation on the abundance of two species of leptodactylid frogs in an Andean montane forest. *Conservation Biol.* **11:** 1323-1328.

Measey, G.J. & Tinsley, R.C. (1998) Feral *Xenopus laevis* in South Wales. *Herpetological Journal* **8(1):** 23-27.

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