

FROGLOG

IUCN/SSC Declining Amphibian Populations Task Force

December, 1993, No. 8



A Letter from the Coordinator

This month the DAPTF enters its fourth year since being formally established during the triennial meetings of the IUCN/SSC at Perth, Australia, in December, 1990. Beginning with the organizational meeting of the Costa Rica-Panama Working Group in February of 1991, during which 12 persons formulated a model action plan, the Task Force approaches 1994 as a global operation with over 1,200 collaborators organized as Working Groups in 91 countries or regions, and more than 600 additional persons or agencies who assist us in communicating the activities of the Task Force through the medium of *FROGLOG*.

Also of significance this month is the concurrent release by the Smithsonian Institution of the publication, *Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians*, and issuance of the DAPTF Working Document No. 1, *Report on the Status of Amphibian Populations*, in which we collated and analyzed the contributions of nearly 100 collaborators in more than 40 regions throughout much of the world. We are optimistic that this report will serve as a benchmark by which to reference our knowledge and understanding of amphibian declines. After distribution to all Working Group Chairs, a limited supply will remain, available free to interested parties.

It has been my privilege to have served as Coordinator for the DAPTF since its inception. The opportunity to develop a working association with nearly 2,000 persons does not come often in any professional career, and I wish to express my gratitude to all who have contributed toward the achievement of our goals and in spreading word of our mission.

The organizational phase of the Task Force is well advanced and our operational procedures need but fine-tuning. Now that my major objectives have been accomplished, I feel it is time for some-

one with new ideas and initiatives to take on the leadership role. As of December 31, I shall be departing as Coordinator of the Task Force.

It is appropriate at this time for me to acknowledge the special contributions and support of several persons and organizations that have been most closely engaged with the DAPTF.

The Center for Analysis of Environmental Change (CAEC), initially through the efforts of Acting Director William Winner, followed by current Director, Michael Unsworth, along with its Directorate, not only initiated actions which enabled the DAPTF to locate in Corvallis, but has continued to provide financial and other material support.

Thomas Murphy (Director), Robert Lackey (Deputy Director) and Anne Fairbrother (Branch Chief) of the EPA Environmental Research Lab - Corvallis, invited us to share their facilities and integrated the Task Force as a cooperative unit with their programs. Office space and equipment represent the most obvious, but by no means all, of their generous contributions.

Richard Tubb, as Head, and other members of the Department of Fisheries and Wildlife, Oregon State University, graciously offered me a professorship on their faculty, and provided both equipment and services to the Task Force.

From our earliest days, John and Julie Williams, proprietors of Frog's Leap Winery, in St. Helena, California, have been among the most ardent of our sponsors. Their active interest in the project and sustained contributions for the production of *FROGLOG* have been resolute. (If you haven't tried Frog Leap's princely Sauvignon Blanc, you should do so!)

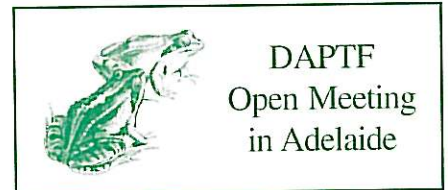
As of press time the position of Coordinator remains open to a qualified candidate. Interested persons should contact Bob Johnson, Chair DAPTF, Metro Toronto Zoo, P.O. Box 280, West Hill, Ontario, M1E 4R5 Canada (Phone: 416/392-5968; Fax: 416/392-4979).

Any DAPTF correspondence likely to arrive after December 31, 1993, should be addressed to the nominal "Coordinator."

Beginning January 1, 1994, I shall be otherwise engaged in ecological research and consulting in southern Arizona, where my new mailing address will be:

P.O. Box 35
Copper Queen Station
Bisbee, AZ 85603, USA
(Phone: 602/432-1495)

Sincerely,
James L. Vial



DAPTF Open Meeting in Adelaide

Bob Johnson, Chair of the DAPTF, extends an open invitation to participants in the Second World Congress of Herpetology (SWCH) in Adelaide, Australia, to attend a meeting of the DAPTF Directors. The meeting is tentatively scheduled for January 7, 1994, immediately following the Congress.

Among items included on the proposed agenda are:

- * Increasing the representation of Working Groups from centers of high amphibian diversity.
- * Achieving greater support for regional Working Groups, and research in biodiversity "hot spots."
- * Enlarging the "seed grant" program for support of short-term pilot projects.
- * Expanding utility of the DAPTF databank.
- * Enlarging the role of the international herpetological community in determining the Task Force mission and goals (see *FROGLOG* No. 2).

Other items may be brought forth during the meeting.

The World Conservation Union (IUCN), Species Survival Commission (SSC), has provided an umbrella agency under which the DAPTF was organized. However, the essential operation and sponsorship by which the objectives were to be achieved remained as initiatives of the herpetological community.

There is definite and urgent need for a collective endeavor by which a global unified action plan can be formulated, activated and sponsored.

The DAPTF was established in response to the expressed concerns of many participants attending the First World Congress of Herpetology in 1989-1990. It is not only desirable, but appropriate, that future Task Force operations and priorities be determined by participants in the SWCH. Advance notice as to time and place of the meeting will be announced and posted during the Congress.



Report from Romania

Dr. Dan Cogălniceanu, Chair of the DAPTF Working Group for Romania, recently submitted this report for FROGLOG.

The global decrease of amphibian populations is caused directly or indirectly by human activities. These animals are confronted with multiple threats, the more important in Romania being habitat destruction, increased pollution of water and soil (mainly increased use of pesticides), introduction of foreign species (fish, trees, etc.) and direct collecting and/or killing by humans. The ecological significance of most amphibian species was and still is little understood. Destruction of natural habitats affects amphibians in many ways. The damming and draining of tributaries and wetlands destroyed 80% of the Danube River flood plain and 17% of the Danube Delta, the main habitats of *Triturus dobrogicus* and *Pelobates syriacus balcanicus*. Damming of the Erului Valley in the 1960s has eliminated many populations of *Rana arvalis*. Deforestation during the last hundred years has reduced by half (from 50% to 25% of the total area of Romania) the area covered by forests. The reforestation with other tree species, like pine, spruce, or locust trees, instead of native beech or oak, has altered many natural habitats through changes in soil structure, fauna and flora. Transformation of steppe and forest steppe areas into agriculture land, mainly in Dobrogea and Bărăgan has destroyed hundreds of thousands of hectares of natural habitat. The introduction of foreign salmonid fish in many alpine lakes has eliminated a large number of amphibian populations. Although frog legs are not a popular food in Romania, large quantities of Green Frogs (*Rana ridibunda* and *R. esculenta*) are exported every year to Western Europe, and an unknown number is used for research and education.

Romania is in a particularly interesting geographic position, since many species inhabiting it are at the limits of their distribution and therefore might experience large fluctuations in number and area; however, the data available at this time are quite limited.

Of the 20 species and subspecies of amphibians inhabiting Romania, ten are Vulnerable (*Bombina bombina*, *Bufo bufo*, *Hyla arborea*, *Pelobates f. fuscus*, *Rana dalmatina*, *R. temporaria*, *Salamandra salamandra*, *Triturus alpestris*, *T. cristatus*, *T. vulgaris ampelensis*); three are Endangered (*Pelobates syriacus balcanicus*, *Rana arvalis*, *Triturus dobrogicus*); one species (*Triturus montandoni*) is Rare; and one is undetermined (*Rana lessonae*). Only five species are not considered Threatened; however, locally all species are declining.

For the efficient conservation and protection of these species a different approach is needed. Long-term studies

on the life histories would enable the recognition of areas with the highest biodiversity that need protection. Any legal measures proposed for the protection of amphibians must be supported by national programs of environmental education at all levels in order to succeed.

In Romania, the Bucharest Public Environmental Information and Documentation Center has been recently established. This Center will include an environmental library, computer database and information bulletin located at the University of Bucharest.

Dr. Cogălniceanu, one of the directors, is seeking contributions of literature from members of the herpetological community in order to build the Center's resources in this area of study.

These literature donations can be sent to: Dr. Dan Cogălniceanu, Faculty of Biology, Bucharest University, Spl. Independentei 91-95, 76201 Bucharest, Romania.



Hormones and Hazards

Diane L. Larson, of the USA Fish and Wildlife Service at the Northern Prairie Wildlife Research Center in Jamestown, North Dakota, offers the following report of her studies on the use of amphibian stress hormones as physiological indicators of environmental degradation.

Measures of habitat suitability for a species have traditionally relied on relative population abundance across the species' range. Recent work has shown, however, that local populations in some habitat patches are maintained primarily through immigration. Although individuals may survive in these "sink" habitats, the chronic stress of inhabiting sub-optimal habitat precludes sufficient reproduction. Thus, it is the physiological health of a population, rather than simply its presence, that is indicative of suitable habitat. New techniques are necessary to incorporate physiological well-being into measurements of habitat quality.

Stress hormones (e.g., cortisol and corticosterone) are important mediators of physiological and behavioral response to stress in vertebrates. Although many studies have demonstrated short-term increases of these hormones in response to acute stress, responses to the chronic stress of occupying a sub-optimal habitat have received less attention. One potential method of habitat evaluation may be a measurement of response to acute stress: animals occupying good habitat should respond to acute stress with elevated corticosteroids, while those occupying sub-optimal habitat should show little or no response.

One of the difficulties encountered in using stress hormones as indicators of environmental quality under field conditions is distinguishing between environmental stress and the stress of capture. As part of a larger study on hormonal response to environmental stress (part of USA EPA's Environmental Monitoring

and Assessment Program), the Northern Prairie Wildlife Research Center addressed this problem with larval Tiger Salamanders (*Ambystoma tigrinum*) in the prairie pothole region of North Dakota and South Dakota.

Larvae were trapped in four semipermanently flooded wetlands during July 1992. None of the sites was disturbed by agriculture or grazing. Traps were left overnight and pulled after sunrise when captured larvae were bled. Each larva was then subjected to one of three acute stress levels and bled again. Blood was put into microcentrifuge tubes and placed in an ice-filled cooler for transport to the laboratory.

As expected, plasma corticosterone increased with higher levels of acute stress. Thus, the capture technique itself (i.e., trapping salamander larvae in the unbaited traps described above) did not cause corticosterone levels to rise to their maxima before experimental stress was applied. Corticosterone measurements for *Ambystoma* were comparable to those published for other amphibians.

During the 1993 field season sampling was expanded to include 25 wetland sites known to have salamander populations. In addition, laboratory studies begun this year in collaboration with USA EPA's Environmental Research Lab in Corvallis, Oregon, are designed to determine the relationship between acute and chronic stress responses under controlled conditions. Radioimmunoassays have yet to be completed on the 1993 samples. If hormonal response to acute stress is indicative of environmental quality, corticosterone measurements could be incorporated into long-term monitoring strategies, providing an early warning of populations in jeopardy, even before causes of chronic stress can be identified.



A Boost for *Bufo boreas*

On September 27, 1993, the Biodiversity Legal Foundation (BLF), a Boulder, Colorado, non-profit environmental organization dedicated to the preservation of all native wild plants and animals, biological communities and naturally functioning ecosystems, petitioned the USA Department of the Interior (DOI), to protect under the Endangered Species Act what was once one of the most abundant toads in the American west. Like amphibians worldwide, the Boreal Toad (*Bufo boreas boreas*) is disappearing from historical habitats at an alarming rate and for largely unknown reasons.

By petitioning the DOI to list the southern Rocky Mountains population of the Boreal Toad as an Endangered species, the BLF hopes the government will be more willing to examine reasons for the toad's disappearance and take immediate action to help combat its precarious situation. It is also hoped this action will focus greater public attention

on the plight of amphibians and the need for a greater commitment of resources dedicated to their study and protection.

The USA Fish and Wildlife Service has 90 days after filing of the petition in which to determine whether listing of the Boreal Toad is warranted.



Litoria in Victoria

Extensive surveys in recent years in the highlands of Victoria, Australia, have demonstrated that the Spotted Tree Frog (*Litoria spenceri*) was absent or in very low numbers at former collection localities, which still exist as potential breeding sites.

Recently a substantial population was discovered in the Bogong Creek, New South Wales. In late 1992 and early 1993 a population study at Bogong Creek by Harald Ehmann and others involved in the Herpetological Techniques Course (Sydney Institute of Technology) found >90 frogs and >800 tadpoles: numbers that greatly exceed those found at any sites in Victoria. The tadpoles of *L. spenceri* are not well-adapted to fast waters and prefer quiet backwaters or slow flowing streams. In later stages of development the tadpoles move into still, edge shallows that are significantly warmer than the mainstream, thus optimizing development/metamorphosis rates.

It seems that *L. spenceri* breeds best in drought or near-drought conditions. The southeastern Australian highlands have received higher than average rainfall in 1992 and also in at least three previous years. In 1993 (to September), the southeastern highlands have received lower than average or near average rainfall and the 1993-94 survey season may provide data to further test a "drought" breeding hypothesis. If this hypothesis is further supported then the proposed "Snowy Precipitation Enhancement Project," involving cloud seeding to increase snowfall, may adversely affect Spotted Tree Frog populations that can be expected in the Snowy Mountains. At present, the Bogong Creek below the Burkes Gorge Intake (Snowy Mountains Hydroelectricity Scheme) is in a permanent drought-like condition because of up to 96% upstream water diversion.



What is KARCH?

The "Coordination Center for the Protection of Amphibians and Reptiles in Switzerland" (KARCH), founded in 1979, is situated at the Museum of Natural History in Berne. Its aim is the improvement of the life conditions of

indigenous amphibian and reptile populations. KARCH is supported by the Federal Government, the majority of the Swiss cantonal administrations and three conservation organizations.

Although all amphibian and reptile species have been protected by law for the past 23 years, their habitats continue to disappear. Conditions for survival are no longer present in some localities and some species are near extinction.

KARCH supports and coordinates all activities protecting amphibians and reptiles. The Center publishes annual reports, information bulletins on special problems, and organizes workshops for specialists in herpetology and nature protection. Another aim is to carry out public relations for these groups of vertebrates. Interested persons (professionals, officials, amateurs, organizations for nature protection) may use the documentation and information material produced by KARCH.

One of the main tasks is to inventory all habitats of amphibians and reptiles within the national boundaries. A project of recording breeding sites for amphibians is well advanced; thus far, 7800 breeding sites have been registered. A distributional Atlas of Amphibians in Switzerland was published in 1988.

A synthesis of reptile habitats on a national level is scheduled for completion within the next three to four years.

For further information contact: Dr. Kurt Grossebacher, Silvia Zumbach, or Ueli Hofer at KARCH, c/o Museum of Natural History, Bernastrasse 15, CH-3005, Berne, Switzerland.



Abstracts from the SSAR

The following abstracts have been selected from the Program and Abstracts for the 1993 meetings of the Society for the Study of Amphibians and Reptiles (SSAR), held at Indiana University, Bloomington, Indiana, USA, August 7-12, 1993.

PHYSIOLOGICAL ADAPTATIONS PROMOTING ANURAN FREEZE TOLERANCE

Natural freeze tolerance, the survival of freezing under ecologically relevant conditions, is known in five species of terrestrially hibernating frogs: *Rana sylvatica*, *Hyla versicolor*, *H. chrysoscelis*, *Pseudacris triseriata*, and *P. crucifer*. From studies of the Wood Frog, *Rana sylvatica*, several physiological responses have been identified that function to promote freezing survival. The onset of freezing is marked by the release of latent heat of crystallization that moderates the rate of ice accumulation for more than 24 hours; this is critical because rapid freezing is injurious. Concomitant with internal freezing,

the cryoprotectant glucose is rapidly mobilized from hepatic glycogen reserves. The distribution of cryoprotectant to tissues is facilitated by the cardiovascular system, which continues to function for many hours after freezing begins. Glucose protects cells and tissues from freezing injury by colligatively reducing the equilibrium freezing point of tissues and increasing the fraction of bound (unfreezable) water. The progressive dehydration of organs and the sequestration of water in extra-organ compartments reduces mechanical injury and concentrates cryoprotectant in the remaining unfrozen fluid fraction.

SSAR abstract by J.P. Costanzo and R.E. Lee, Jr.; Dept. of Zoology, Miami Univ., Oxford, OH 45056, USA.

RECENT TRENDS IN THE POPULATION OF WYOMING TOADS (*Bufo hemiophrys baxteri*)

Bufo hemiophrys baxteri, an Endangered species, has been reduced to a single population. Since 1990, the size of the population has been estimated from mark-and-recapture data obtained by photographing the dorsal patterns of individual toads. Numbers of subadult and adult toads were estimated to be 120 in 1990, 394 in 1991, and 155 in 1992. For the past several years, beginning about 1 September, adult toads with bacterial and fungal infections have been found moribund or dead. Mortality of toads > 1 year old was estimated to be > 80% each year between 1990-1991 and 1991-1992. Mortality of young-of-the-year toads may have been less than mortality of adults. Growth of yearling toads is rapid; males acquire secondary sexual characters in their second summer. Females, however, probably require an additional year to reproduce, and the high rate of mortality make survival to breeding questionable for most females.

SSAR abstract by P. Stephen Corn; US Fish and Wildlife Service, National Ecology Research Center, Ft. Collins, CO 80525, USA.

EGG MORTALITY IN POND BREEDING SALAMANDERS

Breeding and egg mortality of *Ambystoma jeffersonianum* and *A. maculatum* were monitored at a semipermanent woodland breeding pond (pH=6) in north-eastern Ohio for four years (1990-1993). The range of egg mortality for a population of 300-550 female *A. jeffersonianum* was 13-16% over these four breeding seasons. The percentage of eggs that hatched was significantly correlated with the size of the egg mass ($r=0.51$). Egg mortality for a population of 1600-4500 female *A. maculatum* ranged from 28-40%. Hatching success was highest in egg masses nearest the surface, in egg masses with symbiotic algae, and in clusters with other egg masses.

SSAR abstract by R. Brodman, St. Joseph's College, Rensselaer, IN, USA.



DAPCAN III Convened

On October 15-17, over 70 Canadian herpetologists as well as representatives from Germany and the United States, met to examine changes in amphibian populations. This third conference on Declining Amphibian Populations, Canada, was organized by Stan Orchard of the Royal British Columbia Museum and co-sponsored by the Pacific and Yukon Regions of the Canadian Wildlife Service, Environment Canada. Discussions were chaired by David Green (Redpath Museum, McGill University), National Coordinator of the Canadian Working Group, and Bob Johnson (Metropolitan Toronto Zoo), Chair of the Board of Directors, DAPTF. Among the highlights:

* Don McAlpine (New Brunswick Museum) provided evidence that amphibians have not declined in New Brunswick and the Gray Treefrog may actually be expanding its range.

* Using a computerized database and mapping software, Michael Oldham and Wayne Weller (Ontario Ministry of Natural Resources) discovered a widespread region in northern Ontario where Leopard Frogs appear to have declined.

* Linda Dupuis (University of British Columbia) found terrestrial salamanders on Vancouver Island more diverse and abundant in old growth than in managed forests. This was attributed to the lack of decomposing logs and reduced soil moisture in the clear-cut areas.

* Lisa MacGillivray (Trent University) argued that the decline of Bullfrog populations in eastern Ontario could be due to commercial harvesting, pesticide use and loss of habitat. Ronald Brooks (University of Guelph) demonstrated that breeding adults are the most important element for sustainable Bullfrog populations and that overharvest will considerably decrease population viability.

* Megan Harris (University of Guelph) reported on the effects of agricultural chemicals upon amphibians. Spraying with fungicides and insecticides resulted in lowered survival rates, and increased numbers of deformities in frogs.

* Canadian Wildlife Service toxicologist, Bruce Pauli, showed that some pesticides had lethal effects on tadpoles at "environmentally realistic" concentrations.

Participants recognized that permanent declines and losses are largely due to human population growth. Fragmentation of habitats, by road-building for instance, disrupts migration routes and the dispersal of individuals, and can lead to extinction of a population even if no changes are made to the local habitat.

Meeting participants called for more scientific studies of amphibian populations, which are prime indicators of general environmental health, and for government aid to study amphibians in proportion to the profound importance of these animals in Canadian ecosystems.



Report from the USA Central Region

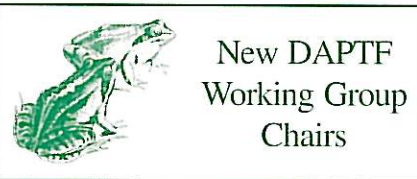
On October 1-3, 1993, 23 participants in the DAPTF USA Central Region Working Group (Iowa, Illinois, Indiana, Ohio and Missouri) were convened by Michael Lannoo for an inaugural meeting at the Reis Biological Station near Steelville, Missouri. State coordinators, Lisa Hemesath (IA); S. Ballard, R. Brandon and K. Mierzwa (IL); D. Karns and S. Minton (IN); S. Moody (OH) and T. Johnson (MO) gave reports on the status of amphibian populations.

The following species were listed as: Endangered; *Ambystoma laterale* (IA, OH), *Necturus maculosus* (IA), *Notophthalmus viridescens* (IA), *Rana areolata* (IA), *Ambystoma platineum* (IL), *Desmognathus fuscus conanti* (IL), *Cryptobranchus alleganiensis* (IL, IN, OH), *Pseudotriton ruber* (IN), *Aneides aeneus* (OH), *Eurycea lucifuga* (OH), *Scaphiopus holbrookii* (OH). Threatened; *Pseudacris streckeri* (IL), *Hemidactylium scutatum* (IL, IN), *Rana areolata* (IN), *Aneides aeneus* (IN). Special Concern; *Scaphiopus holbrookii* (IN), *Rana blairi* (IN), *Rana pipiens* (IN), *Necturus maculosus* (IN), *Ambystoma laterale* (IN), *Hemidactylium scutatum* (OH).

Committee coordinators also reported. Alan Resetar described how to use museums and search for historical data. Tony Krzysik detailed the use of Geographic Information Systems (GIS) and statistics to assess the status of amphibian populations. A clinician's perspective on evaluating amphibian exposure to toxins was presented by Val Beasley. Ray Pawley described his survey of 24 zoos, nature centers and museums; 23 of which were aware of the problem of amphibian declines; 11 of which currently have exhibits on the subject.

Immediate concerns involved the standardizing of criteria for listing the risk of species, protection of rare subspecies and phenotypes, evaluating the accuracy of data, and reintroductions. Also on the agenda are plans for publishing a book on the status of midwestern amphibian species.

For further information contact: Dr. Michael J. Lannoo, Ball State University, Muncie, IN 47306, USA.



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* Acceptance pending

FROGLOG

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