

FROGLOG

IUCN/SSC Declining Amphibian Populations Task Force

September, 1992, No. 3



USA National Science Foundation Grant Opportunities

The USA NSF DIVISION OF ENVIRONMENTAL BIOLOGY (DEB) has established a BIOTIC SURVEY AND INVENTORY (BSI) Program to enhance the understanding of biological diversity, an essential for research in ecology, conservation and resource management. The BSI Program will support a wide range of research activities, including: sampling of populations and species; surveys of regional taxa; inventories of existing collections; producing species lists, catalogs, identification manuals and/or keys; and developing databases for use in later studies. Surveys conducted in developing countries should involve personnel of the host country and contribute to regional biodiversity infrastructure.

Particulars relevant to the merit review are:

1. *Taxonomic breadth* - surveys should sample a diversity of taxa. Broad based studies will be more competitive.
2. *Scale* - justification for need of designated collecting or inventorying effort on geographic or logistical scale proposed, as well as a statement of inadequacies of existing collections or inventories.
3. *Urgency* - proposals should indicate reasons for urgency, e.g. habitat loss, rare cataclysmic or other environmental events, etc. Statements should make reference to specific collection sites and sampling strategies.
4. *Project Management Plan* - include arrangements for collection, documentation, curating, distributing and studying materials, assessing completeness of survey and producing a database, including an estimated timetable.
5. *Conceptual Issues* - provide scientific justification for the research, especially

as it relates to resolution of broader pattern or other fields of study.

The Division also sponsors LONG-TERM RESEARCH IN ENVIRONMENTAL BIOLOGY (LTREB) with a focus on evolutionary or ecological phenomena that require long-term investigation, observation, experimentation or data gathering. Most LTREB projects derive from research begun with support from other sources. Included within this DEB cluster are Biological Surveys and Inventories, designed to collect, sample, census and inventory biota, for subsequent research in biodiversity, ecology and conservation biology.

The National Science Foundation also invites proposals for SMALL GRANTS FOR EXPLORATORY RESEARCH (SGER) in all areas normally supported by NSF. Such research is characterized as:

- Preliminary work on untested and novel ideas.
- Ventures into emerging research areas.
- Application of new expertise.
- Multi-disciplinary work.
- Research having a severe urgency with regard to availability of or access to data.
- Efforts of similar character likely to catalyze rapid and innovative advances.

Only one copy of the proposal is required. The project description should be brief (two to five pages) and include clear statements as to why an SGER grant would be a suitable means of supporting the work.

Award amounts will vary by program; in any event, no award will exceed \$50,000. Awards are non-renewable and are normally made for one year but in no case to exceed two years. Continued support may be requested only through submittal of a complete non-SGER proposal that will be fully reviewed. More than one investigator may be supported on one SGER award. Investigators without prior NSF support are encouraged to apply.

NSF program officers are not required to seek advice from external reviewers before recommending that an SGER proposal be awarded or declined. Therefore proposers are strongly encouraged to contact the cognizant program officer before submitting an SGER proposal, to determine whether the project meets the guidelines and SGER funding is likely to be available, or whether the idea should be considered for initial

submission as a fully-reviewed proposal. Information about specific NSF programs and contacts is generally available from institutional sponsored-research offices, or may be found the following publications: NSF 83-57, Revised, Grants for Research and Education in Science and Engineering; the NSF Guide to Programs; and the monthly NSF Bulletin.

Pertinent documents and further details as to the relevancy of these programs to DAPTF activities are available from the Task Force Coordinator.



Canada Convenes Workshop II

The Canadian Working Group will convene its national Workshop II on October 17 and 18, 1992, at the Redpath Museum, Montreal, Quebec. Reports on amphibian research and monitoring in Canada, as well as formulation of a detailed action plan for studying declines in amphibian populations are included in the agenda. Information regarding the workshop can be obtained from Christine Bishop, Canadian Wildlife Service, P.O. Box 5050, Burlington, Ontario L7R4AC, Canada (phone: 416/336-4968 or 336-4843, fax 416/336-6434).



Australia Assists Conservation

Melbourne Zoo, Australia, is assisting Hong Kong University in a conservation project for Romer's Tree Frog (*Philautus romeri*). This tiny rhacophorid reaches only 2 cm in length and is restricted to three Hong Kong Islands. One of the islands, Chek Lap Kok, is being leveled to make way for Hong Kong's new international airport, and one of the frog's breeding sites on the adjacent island will also be lost. It is thought that no more than 1,500 frogs remain on the islands.

*Edited from a report
submitted by Chris Banks*



Reports from U.S. Regions

CAL/NEVA

There are six native anuran species which occur in the central portion of the Sierra Nevada Mountains of California. These include the California toad (*Bufo boreas halophilus*), California red-legged frog (*Rana aurora draytonii*), foothill yellow-legged frog (*Rana boylei*), mountain yellow-legged frog (*Rana muscosa*), Yosemite toad (*Bufo canorus*) and Pacific tree frog (*Hyla regilla*). Population declines have been documented for *R. aurora*, *R. boylei*, *R. muscosa* and *B. canorus*. *B. boreas* and *H. regilla* appear to be declining in the higher elevations as well as many lowland areas of the Sierra Nevada. The non-native bullfrog, *Rana catesbeiana*, occurs in certain low elevation areas and has been implicated in the decline of some native species.

*Edited from a report
submitted by David Lamar Martin*

PACIFIC NORTHWEST

The Pacific Northwest (PNW) Working Group held an organizational meeting on April 7, 1992, at the USDA Forest Service-PNW Research Station in Portland, Oregon. Open discussion of the structure and concerns of the Working Group led to the identification of several working group objectives: 1) to compile a comprehensive mailing list for regional communication among researchers, state and federal agencies, and conservation groups; 2) to provide a briefing package to notify of the existence of the PNW Working Group; 3) to recommend a greater degree of incorporation of non-game species into surveys and regional study agendas; 4) to compile a comprehensive and consistent regional amphibian locality database; 5) to create standardized survey data forms designed for amphibians in pond, stream, and terrestrial habitats, and standardized "siting cards"; 6) to promote the value of photographs in place of voucher specimens because of the number of PNW amphibians on sensitive species lists; 7) to create a data management facility for the storage and handling of a regional amphibian database, and identify and characterize a list of data users; 8) to coordinate and enhance species identification tools; 9) derive a set of management guidelines for amphibian monitoring and assessment.

Other issues of particular concern included the importance of cooperation, collaboration, and communication among agencies and groups monitoring amphibians, and the education of the different tiers of management/research hierarchies with regard to amphibian monitoring and assessment. Attendees of the April 7th meeting included representatives of the USDA Forest Service, U.S. Fish and Wildlife Service, Bureau of Land Man-

agement, Oregon Department of Fisheries and Wildlife, Washington Department of Wildlife, Nature Conservancy, Northwest Ecological Research Institute, Portland State University and Oregon State University.

*Edited from a report submitted by
D. Olson, R. Kiester and A. Blaustein*

APPALACHIA

Organizational meetings of the US Appalachian Working Group (chaired by Richard Bruce) were convened at the Highlands Biological Station in Highlands, North Carolina, on 28 March. The morning session was devoted to reports of ongoing projects which included assessing the status of amphibian populations, long-term studies, conservation and management of the regional species.

Subcommittees were appointed to formulate documentation methods, identify major habitats in the region (with a list of indicator species) and develop applicable protocols for population studies and long-term monitoring. A preliminary state-by-state list of more than 40 possible research sites was assembled, and will be circulated to all Working Group members for review prior to final compilation. Wayne Van Devender is compiling a list of threatened and endangered taxa for each of the five states in the region. Information for sites at which long-term sampling has been carried out, such as those studied by Richard Highton, will be analyzed for evidence of change in population densities.

*Edited from a report
submitted by Richard Bruce*

MISSISSIPPI DELTA

Stan Trauth of Arkansas, has submitted reports on the status of the following species to the Arkansas Nongame Preservation Committee:

Hyla avivoca - is known from 14 sites in 10 counties in Arkansas. Populations are distributed discontinuously along four major river basins. Populations status are not known in Arkansas, but habitat destruction of the specific demands of this species is obvious.

Cryptobranchus bishopi - Spring River only. Populations in upper reaches (Fulton County) are perilously low compared to numbers estimated a decade ago. Collection of specimens for scientific and other purposes, habitat destruction associated with heavy recreational use and situations caused by clearing of riparian habitats are mentioned as causes. Trauth proposed this population be listed (federal) immediately or it will not survive.

Scaphiopus bombifrons - located in the Arkansas River Valley of Central Arkansas only. Three specimens collected from a small chorus (the only one found) of about 12 males (total in two years, 1988 and 1989) near Morrilton. There was not enough information on these small populations at the eastern

margins of the range to make any evaluation at present.

*Edited from a report
submitted by Ronn Altig*

NORTHEAST

Rick Wyman, Chair of the US Northeastern Working Group reports that over 400 survey forms were mailed to herpetologists to determine the extent and type of amphibian research activity in the region. He and Bill Dunson are editing the symposium papers on "Amphibian Declines and Habitat Acidification" presented during the SSAR/HL meetings at Penn State University in 1992. These will appear collectively in the *Journal of Herpetology*. Wini Eisen is conducting a literature search for long-term studies that will identify potential resampling opportunities in the region. Wyman is also developing techniques for rapid, accurate sampling of terrestrial amphibian populations.

*Edited from a report
submitted by Richard Wyman*

SOUTHWEST

Except where it flows over a rocky sill in Leslie Canyon, Leslie Creek is a very temporary stream in Cochise County in southeastern Arizona. Here, in a northern outlier of the San Bernardino National Wildlife Refuge, the stream flow is permanent for about 500 m. Grazing has been excluded and the riparian vegetation forms a dense canopy over a live stream filled with native fishes.

Large, highly aquatic leopard frogs also occur there. They are currently assigned the name *Rana chiricahuensis*, but they differ from true *R. chiricahuensis* in several ways. They may be related to *R. tarahumarae* or other similar large aquatic frogs that were once widespread in southwestern New Mexico (and presumably southeastern Arizona), but most of these relict populations have gone extinct in the last 40 years. Extant relatives may still exist in northern Mexico, but we do not know of any. Randy Jennings of the Barrick Museum, University of Nevada, Las Vegas is studying the biochemical systematics of this and other enigmatic, isolated populations of southwestern leopard frogs.

The future of the Leslie Canyon leopard frog seems to be precarious, given the highly restricted habitat and the propensity for disappearance shown by leopard frog populations throughout the area. Two or three dead adults were observed by Kevin Cobble, the refuge manager, in the spring of 1991; these sorts of observations have been made in other leopard frog populations during the period in which they went extinct. Only six adults were seen in an intensive nighttime survey in September 1991, and five were seen in November 1991.

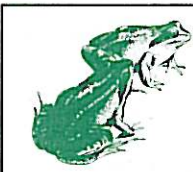
However, recent events have given cause for optimism. A daytime search in

March 1992 yielded only one adult and egg mass. Also, no dead frogs were seen.

In addition, Howard Lawler, curator of the Arizona-Sonora Desert Museum in Tucson, and Dale Belcher, curator of the Rio Grande Zoo in Albuquerque, have agreed to establish small colonies of the Leslie Canyon frog as a buffer against extinction in the wild and to provide material for genetic analyses.

The causes of leopard frog extinctions in the southwest, especially in the mountains, remain unknown. Invasion by bullfrogs (*R. catesbeiana*) is implicated in some cases, but the ubiquitous, regional nature of the phenomenon suggests an atmosphere-mediated effect; however, nothing has been identified. Perhaps increased levels of ultra-violet radiation suppress the frogs' immune systems and set them up for environmental toxins or infections. The destruction of riparian vegetation by livestock would also increase frogs' exposure to ultraviolet rays. Cecil Schwalbe of the U.S. Fish and Wildlife Cooperative Research Unit at the University of Arizona is pursuing this line of inquiry in the lab.

*Edited from a report
submitted by Norman J. Scott, Jr.*



A Case of the Missing *marinus*

David Whistler, Curator of Vertebrate Paleontology, at the Los Angeles County Museum of Natural History recently returned from Kauai, Hawaii where he was struck by the almost total absence of *Bufo marinus*. Whistler was on the island from 20 March through 28 March, 1992, during which time he observed but a single toad. In previous years (1988-91), they were ubiquitous throughout the island, and particularly common on highways at night and on irrigated lawns and gardens around resorts. The "natives" commented that the "toads were gone" in most areas where they used to be common.

The island experienced a particularly severe storm in mid-January, with considerable flooding of lowlands and stream drainages, but otherwise there is no other natural event of particular significance in the past year. This storm was *not* accompanied by high wind or surf, thus the flooding was fresh water.

Whistler did note aerial spraying of some of the sugarcane fields on the island, something he had not seen previously. Temperatures were about 5° C below normal for this time of year for most of his visit (18-25° C), but clearly in the range of activity for toads.

The other common herps (geckos and *Anolis*) were doing fine.

*Edited from a report
submitted by John W. Wright*



Abstracts from ASIH/HL/AES Meetings

The following abstracts have been selected from the programs for the 1992 annual meetings of the American Society of Ichthyologists and Herpetologists (ASIH), Herpetologist's League (HL) and the American Elasmobranch Society (AES) in June at Urbana/Champaign, Illinois, USA.

PREDATOR AVOIDANCE BY THE SALAMANDER *Desmognathus ochrophaeus*: EFFECTS OF SEASON, PREY SIZE, AND SPECIES OF PREDATOR

A trade-off between selection on predator avoidance and antipredator mechanism has been proposed. Selection on each is the inverse of the efficacy of the other. We predict that predator avoidance should increase with lower antipredator mechanism efficacy and with higher predator density. The purpose of this study was to examine these relationships between the predatory salamanders *Gyrinophilus porphyriticus* and *Desmognathus quadramaculatus* and their prey *D. ochrophaeus*. *Desmognathus quadramaculatus* occupy seep areas during the winter with the two predatory species. During the summer most *D. ochrophaeus* leave the seep for a terrestrial woodland habitat, but the two predators remain primarily in the aquatic seep habitat. The antipredator mechanisms of *D. ochrophaeus* are less effective against *G. porphyriticus* than against *D. quadramaculatus*. Results of experiments demonstrate higher rates of avoidance by *D. ochrophaeus*: 1) of *G. porphyriticus* as compared to *D. quadramaculatus*, 2) collected in the spring as compared to those collected in the summer, and 3) by smaller individuals with lower antipredator mechanism efficacy.

ASIH/HL/AES abstract by Kendra S. Hileman and Edmund D. Brodie, Jr.; Department of Biology, University of Texas, Arlington, TX 76019

FACTORS AFFECTING THE POPULATION DYNAMICS OF *Ambystoma opacum*

Since 1985 we have examined factors that influence the population dynamics of larval marbled salamanders, *Ambystoma opacum*, in temporary ponds in South Carolina (USA). Data include: drift-fence censuses of breeding population size and juvenile recruitment, estimates of the energetic costs of reproduction and embryonic development, determinants of nest success, field and

artificial-pond manipulations of larval densities and predator densities, and the relationships between adult traits and larval conditions. Relatively high embryonic lipid stores allow postponement of egg-hatching in *A. opacum* of 60 days or more. However, late pond-filling lowers nest success and is one determinant of initial hatchling density. Pond hydroperiod influences the timing and abundance of invertebrate predators, which exert strong effects on larval density and survival. Larval density affects food resource availability as well as larval growth rates, survival, and body size at metamorphosis. Pond hydroperiod interacts with larval density to affect survival and body size. Body-size variation generated in the larval stage persists in adults, and is related to adult survival, age at first reproduction, and clutch size. In general, variation in pond hydroperiod influences the interplay of biological mechanisms that regulate *A. opacum*.

ASIH/HL/AES abstract by David E. Scott; Savannah River Ecology Lab, Drawer E, Aiken, SC 29801

MONITORING AMPHIBIAN POPULATIONS IN YELLOWSTONE AND GRAND TETON NATIONAL PARKS

To determine the status of amphibian populations in Yellowstone and Grand Teton National Parks, we sampled eight sites several times during the spring and summer of 1991. Our principal sampling technique consisted of timed searches in which we counted or estimated the number of egg masses, larvae, juveniles, and adults seen or heard. Four species of amphibians were found. Western toads (*Bufo boreas*) were located at only three of the eight sites and at only one of five sites from where they were previously recorded. This species appears to be less widespread and less abundant than in the past, especially in the Jackson Hole region. Spotted frogs (*Rana pretiosa*) were present, abundant, and reproducing at all eight sites. The widespread distribution (seven of eight sites) of western chorus frogs (*Pseudacris triseriata*) was easy to determine because of their spring calling behavior. However, relatively few adults, eggs, or tadpoles were observed. Tiger salamanders (*Ambystoma tigrinum*) were harder to sample and were found at only half of the sites. Attempts to compare our results with previous studies from the 1950's by Frederick Turner and Charles Carpenter were confounded by developments at their sites (i.e., roads and a water well system).

ASIH/HL/AES abstract by Charles R. Peterson¹, Edward D. Koch² and Paul Stephen Corn³; ¹Department of Biological Sciences, Idaho State University, Pocatello, ID 83209, ²U.S. Fish and Wildlife Service, Boise, ID 83705; ³U.S. Fish and Wildlife Service, Fort Collins, CO 80525

ROLE OF LARVAL TIGER SALAMANDERS ON THE COMMUNITY DYNAMICS OF FISHLESS PONDS

We conducted an in situ enclosure experiment and surveyed 15 ponds to assess the impact of larval tiger salamanders (*Ambystoma tigrinum nebulosum*) on lower trophic levels in fishless lentic systems in montane areas of Arizona. We also examined whether the presence of two predators on larvae, predaceous diving beetles (*Dytiscus*) and the cannibalistic morph of *A. t. nebulosum*, could mediate "top-down" trophic effects by typical (non-cannibalistic) salamander larvae in these communities. Predator treatments in enclosures were: 1) typical larvae only, 2) typical larvae with *Dytiscus*, 3) typical larvae with a cannibalistic morph, and 4) no salamanders or other predators. Typical larvae significantly reduced zooplankton densities but this reduction was greatest in enclosures without beetles or cannibals. The copepod *Diaptomus nudus* was the predominant zooplankton in treatments with larvae, whereas *Daphnia pulex* and the large cladoceran *Simocephalus vetulus* were abundant in treatments without larvae. These alterations in zooplankton density and composition, in turn, affected phytoplankton abundance. Chlorophyll *a* levels were significantly higher in treatments with salamanders than in those without salamanders. Despite this difference, nutrient (N-NO₃ and P-PO₄) levels were uniform among treatments. These trends were generally observable in the survey ponds. These systems are highly productive and support high densities of salamanders which exert a "top-down" pattern of trophic control.

ASIH/HL/AES abstract by Joseph R. Holomuzki and James P. Collins²; ¹Division of Natural Sciences, Transylvania University, Lexington, KY 40508; ²Department of Zoology, Arizona State University, Tempe, AZ 85287

A MONITORING PROGRAM OF AMPHIBIAN POPULATIONS IN CENTRAL PANAMA

Reports of worldwide amphibian populations declines motivated the initiation of a monitoring program at the Lutz watershed in Barro Colorado Island, a site previously censused by Toft et al. (1982). The objectives were; (1) to determine whether any of the two species previously censused show a decline, (2) to obtain information on the fluctuations of tropical amphibian populations, and (3) to relate the dynamics of amphibian populations to environmental variables. One of us censused two routes, i.e., one on the slopes and the other in the stream bottom, every two weeks. The population of the frog *Colostethus flotator* does not show a declining trend, whereas the population of the toad *Bufo typhonius* has decreased. There is a strong seasonal effect on the

populations of both species, mainly due to the concentration of frogs on moist areas during the dry season. This amphibian monitoring program has been expanded to a transect across the isthmus, in Central Panama. Such transect was selected because of a steep rainfall gradient without altitudinal differences. Four sites are being monitored along this lowland Atlantic-Pacific transect. An altitudinal dimension to this transect is given by two mid-elevation sites located nearby.

ASIH/HL/AES abstract by Roberto D. Ibáñez,^{1,2} A. Stanley Rand¹ and César A. Jaramillo¹; ¹Smithsonian Tropical Research Institute, Unit 0948, APO AA 34002-0948; ²Asociación Nacional para la Conservación de Naturaleza (ANCON), Apartado 1387, Panamá 1, Rep. de Panamá

SALINITY TOLERANCE OF DEVELOPING EMBRYONIC STAGES OF THE CALIFORNIA RED-LEGGED FROG (*Rana aurora draytonii*)

Naturally fertilized and deposited eggs of the California red-legged frog (*Rana aurora draytonii*) were placed in saline serial solutions of 1.0 [control], 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, and 7.0‰ in the laboratory to determine salinity levels tolerated by developing embryos. Results showed that embryos in salinities of 4.5-6.0‰ either died before hatching or had gross deformities; embryos in salinities >6.0‰ all died in early cleavage stages. Comparisons of laboratory results with observations in the field at Pescadero Marsh Natural Preserve, San Mateo County, California, during the spring of 1989 indicated that red-legged frogs deposited egg masses in coastal salt marsh habitats with salinities between 4.5-6.2‰ and that mass reproductive failure occurred because of abnormally high salinities due to extended drought conditions and water diversions upstream from the marsh. These observations are important because they indicate the reproductive vulnerability of *R. a. draytonii* in central California coastal lagoons, the last region where this frog exists in any numbers.

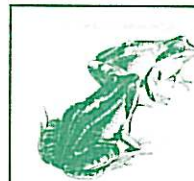
ASIH/HL/AES abstract by Mark R. Jennings; Department of Herpetology, California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118

EXPERIMENTAL STUDIES OF GEOGRAPHIC VARIATION IN THE IMPACT OF A KEYSTONE PREDATOR, *Notophthalmus viridescens*

Two subspecies of the keystone predator *Notophthalmus*, *N. v. viridescens* and *N. v. dorsalis*, differ in adult body size and geographic distribution. We tested whether experimental populations of the two subspecies differed in their effects on community

organization, and whether observed differences in body size are genetic and/or environmentally induced. We compared the effects of predation by both *Notophthalmus* subspecies on larval *Bufo americanus* by experimentally manipulating *Notophthalmus* densities (0.2, or 4 newts/1000 liters) and subspecies (*N. v. viridescens* or *N. v. dorsalis*) in artificial ponds. Four replicates of each of the six combinations of newt density and subspecies were randomized over an array of 24 artificial ponds. Both *Notophthalmus* subspecies reduced *Bufo* survival, but the different subspecies did not differ in their effects on *B. americanus*, despite their initial two-fold differences in body mass. Male *N. v. viridescens* grew significantly more than male *N. v. dorsalis* under common environmental conditions, suggesting that differences in predator size were not entirely environmentally induced. However, growth of female newts did not vary significantly among subspecies.

ASIH/HL/AES abstract by Lynn M. Kurzava and Peter J. Morin; Department of Biological Sciences, Rutgers University, Piscataway, NJ



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* Acceptance pending.

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Newsletter of the IUCN/SSC Task Force on Declining Amphibians

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