

# FROGLOG

Newsletter of the Declining Amphibian  
Populations Task Force

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**Decline of the endemic frog  
*Atelognathus patagonicus* from  
Laguna Blanca, Neuquén,  
Argentina: assessment of the  
effect of fish introduction.**

**By: María Elena Cuello and María  
Gabriela Perotti**

*Atelognathus patagonicus* occurs in the Laguna Blanca wetland system, in the province of Neuquén, northwestern Patagonia, Argentina (Ceï, 1980). This Patagonian frog has shown a significant contraction of its original range, with a complete decline of the main population in Laguna Blanca lake. The decline of this formerly endemic species is one of the most dramatic examples of amphibian decline in the Patagonian fauna and it has been listed as threatened by the IUCN (2004). The introduction of perch is suspected to have contributed to the decline of *Atelognathus patagonicus*. Historically, *A. patagonicus* bred throughout the steppe lagoon system in eastern Neuquén province, Argentina, but is now largely restricted to small lagoons belonging to the Laguna Blanca wetland system. The dramatic early decline began in 1986 and was associated with human introduction of perch and salmonids. Possible mechanisms of the complete loss from Laguna Blanca, the main lake associated to the wetland system, include habitat loss and degradation, competition with and predation by introduced perch (*Percichthys colhuapiensis*) (Fox *et al.* in press; Ortubay *et al.* in press).

Two morphotypes have been described for the species: an aquatic form, with baggy skin and extensive webbing between the toes of the hind feet and a littoral form with less development of these features (Ceï & Roig 1966, 1968).

Breeding habitats of this species vary from small, temporal ponds ("mallines") to permanent large lakes. In this wetland system *A. patagonicus* breed from November to January. Overwintering tadpoles can survive extreme winter with snow and temperatures as low as  $-23^{\circ}\text{C}$ , reaching metamorphosis in the next summer. After breeding in temporary ponds, adult *A. patagonicus* are highly terrestrial and are found around water bodies, hiding under stones (Cuello & Perotti, 2004).

Competition or predation are frequently proposed to explain population declines or habitat shifts of native species after exotic introduction, but such mechanisms are rarely isolated and tested in an experimental setting. Following the hypothesis that predation and competition has been operating after the introduction of fishes, we designed a project that focused on two levels of study: (1) Field surveys and distributional records and, (2) Outdoor experiments to test the direct predatory effect of fish and the role of habitat complexity. We conducted field surveys in lagoons inside and near the national park to date the current extant populations of *A. patagonicus*. A strong negative correlation was observed between introduced fish and amphibians at the landscape scale. A total of 23 wetlands were surveyed from January 2001 through April 2004, detecting the presence of amphibians in 21 unfished lagoons while amphibians were absent in two remaining lagoons containing fish. Our records of microhabitat distribution of larvae indicate a preference for complex habitats characterized by gravel, boulder or bedrock in the littoral zone and aquatic vegetation (macrophytes) in

deeper zones of the lagoons (Cuello & Perotti, 2004). These microhabitats, in which the Patagonian frog larvae were most abundant, are now occupied by predatory perch in fished lagoons (Cuello, 2002; Ortubay *et al.* in press).

We also have experimental evidence about the direct predatory effect of the introduced perch on *A. patagonicus* tadpoles. A factorial design combining predator and refuge (macrophytes) showed that the survival proportion of tadpoles was high (100%) in treatments without predator compared with the null survivorship (0%) in predator treatments. Ortubay *et al.* (in press) reported a high abundance of adult perch in the littoral zone and the presence of macrophytes in the gut contents, constituting an important consumer of these resources. They hypothesized that predation/competition interactions affect the complex trophic cascade affecting frog populations.

Here we report that fish introduction has a negative impact on the Patagonian frog (*Atelognathus patagonicus*) by direct predation. However the reduction of frog populations can be attributed to a combination of effects due in part to the similar habitat requirements of these two taxa. Life history of this endemic amphibian is characterized by larvae living in both shallow and deep zones of the lagoons (Cuello & Perotti, 2004), overwintering larvae (requiring more than a year to complete metamorphosis), and a diet rich in benthic invertebrates (Cuello, *et al.* 2003). Frog biology reveals overlapping habitat use and diet with fish, indicating competition between these species. Thus, we hypothesize that, during periods when both species share the same habitats, strong competition and direct

predation could have been a decisive factor in the decline of frog populations.

#### Acknowledgements

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Fox, S.F., Yoshioka, J.H., Cuello, M.E. & Ubeda, C. (In Press) Status, distribution, and ecology of endangered semiaquatic frog (*Atelognathus patagonicus*) of northwestern Patagonia, Argentina (COPEIA)

Ortubay, S.V., Cussac, V., Battini, M., Barriga, J., Aigo, J., Alonso, M., Macchi, P., Reissig, M., Yoshika, J. & Fox, S. (In Press) Is the decline of birds and amphibians in a steppe lake of northern Patagonia a consequence of limnological changes following fish introduction? (*Aquatic Conservation*)

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#### DAPTF GRANTS 2006

##### SEED GRANTS

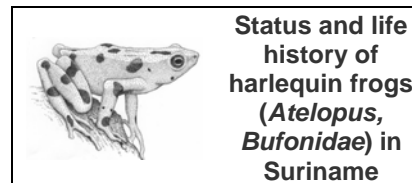
We have received 32 applications this year, from 23 countries. Seven applications are for Chester Zoo grants, 7 for ARMI grants and 17 for Unrestricted grants. For the first time, we have received proposals from Albania, Bolivia, Indonesia and Tobago. Successful applicants will be notified in February.

##### DAPTF/CEPF GRANTS

A reminder that the closing date for applications for these grants, announced in FROGLOG 71, is **1st March, 2006**. We would like to take this opportunity to emphasise that we welcome applications for projects that will lead to the development of integrated conservation programs for red-listed taxa, for example:

- getting key participants, especially from developing countries with rich but critically threatened amphibian faunas, to international meetings to coordinate appropriate responses to the amphibian extinction crisis,
- bringing amphibian biologists from developing countries to experienced institutions for training in husbandry, field methods, and other needed technical skills,
- bringing the expertise to the amphibian biologists in developing countries to support capacity building including development of research, monitoring, habitat protection, and captive-breeding programs,
- supporting Rapid Response teams deployed around the world to rescue amphibian species in immediate danger of extinction.

Contact: Tim Halliday ([t.r.halliday@open.ac.uk](mailto:t.r.halliday@open.ac.uk)) and /or Robin Moore ([rdmoore@ci.conservation.org](mailto:rdmoore@ci.conservation.org))



#### By Martina Luger

It is well known that Neotropical harlequin frogs, genus *Atelopus* (Bufonidae), have suffered from dramatic population declines or even extinctions since the 1980's (La Marca *et al.* 2005). These trends also affect populations in protected areas (e.g. Pounds & Crump 1994, Lips 1998, 1999). According to the IUCN Global Amphibian Assessment, all Andean and trans-Andean *Atelopus* are considered "Critically Endangered" or even "Extinct" (<http://www.globalamphibians.org>).

Possible reasons include increased mortality due to infections with the epizootic fungus *Batrachochytrium dendrobatidis* (Bd) (La Marca *et al.* 2005) in combination with climatic change (e.g. Pounds & Puschendorf 2004), as well as direct human impact like habitat destruction.

But what about *Atelopus* populations from the lowlands east of the Andes, i.e. the Amazon Basin and the Guiana Shield? There are indications that species of *Atelopus* occurring in these regions probably exhibit stable populations (Lötters *et al.* 2004). However, data are limited regarding this species' taxonomy and distributions.

The aim of this study was to assess the population status and to study spatial distribution, site fidelity, home range aspects as well as confirm the presence/absence of Bd in a population of *Atelopus spumarius* sensu lato, at Brownsberg Nature Park (BNP), Suriname. This study was conducted between April and September 2004 at Brownsberg Nature Park (BNP), Suriname, ca. 500 m.a.s.l.

The study area is located along a small stream, 1-4 m in width, and bordered by riparian forest. The stream gradient is steep, resulting in many small waterfalls and splash zones. I investigated a 1000 m<sup>2</sup> area which covered both stream banks and the forested hill north of the stream. Each individual encountered was measured and digitally photographed for individual recognition. To estimate the home range areas, the exact location of each individual was marked; substrate, height as well as the activity of each individual were also recorded. To test the population for the presence of Bd, tissue samples

(preserved in 95% ethanol) were taken here and from other areas of the BNP.

The population appears to be in relatively good condition, with 0.065 individuals/m<sup>2</sup>. Only one female was found in the vicinity of the stream; others were encountered in the forest, some distance from the creek. Males and females seem to occupy different habitats when they are not ready to mate. Only males remained near creeks. Most of the adult males preferred to stay, call and feed at elevated locations up to 1.70 m height in low vegetation (48% of all encounters), on rocks (17%) and tree logs (15%). Only 14% of the observations were made in leaf litter. In a minimum-number-alive-plot only a small fluctuation in population dynamics was notable from the 13th day of observation. The rate of residence was relatively high (0.988), i.e. most of the individuals encountered on one day stayed in the investigation area until the next observation. In addition, some of the individuals were consistently found at identical locations. This indicates strong site fidelity among male individuals, which is the assumption for calculating home range areas.

Home range areas were calculated for eight male individuals with the Animal Movement extension for Arc View based on the Kernel method. The mean size of the 95% probability of residence area was 38 m<sup>2</sup>. These areas overlapped, whereas the activity centres (mean size 5.4 m<sup>2</sup>) hardly overlapped. The home ranges as well as the locations of encounter seemed to be clustered. According to multiple linear and logistic regression models only one factor which included the habitat parameters distance to the creek, slope and density of the under story vegetation determines clustering of the locations of encounter as well as the establishment of home ranges.

The collected tissue samples were analysed for chytridiomycosis according to Boyle *et al.* (2004) by Trent Garner (Zoological Society of London). Fortunately the tests proved negative.

Male *A. spumarius* *sensu lato* seem to prefer areas near the creek with dense understory vegetation. Almost 50% of the encounters were made in low vegetation which provides elevated calling sites as well as microarthropods, the main known source of food in *Atelopus* species. The establishment of a home range can reveal some positive effects. It is apparently an advantage to know the environment well as feeding gets more efficient and escape routes and

hideouts are easier to find. Additionally, for a male harlequin frog it is probably reasonable to establish a home range in the vicinity of a creek providing an egg-depositing site for arriving females.

Short-term studies can only give a brief insight. Until now, only a few long-term studies on species of the genus *Atelopus* have been performed, although results of such studies would be necessary to implement appropriate conservation measures in the future.

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### Amphibian Biodiversity Conservation (ABC) training course

(19<sup>th</sup>-30<sup>th</sup> June, provisional)

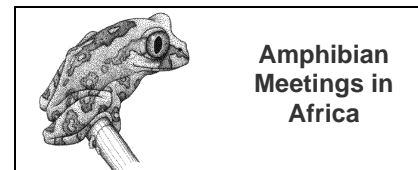
The International Training Centre of the Durrell Wildlife Conservation Trust,

Jersey, British Channel Islands is planning to launch its first short course dedicated to understanding amphibian conservation problems and solutions. Designed in response to the global threat facing amphibians and the need for more qualified amphibian conservationists to turn the situation around, the ABC course is an introductory level course to bring conservationists up to speed with new thinking in amphibian conservation work in the field and captivity. It will be a rare opportunity to bring together field and captive-based staff to focus on the same issues and to cross-pollinate ideas.

The course will run for 12 days, in order to cover the main subjects of relevance to amphibian species managers working in captivity and in the field. Topics covered include: threat diagnosis; species & area prioritisation; writing species action plans; techniques for studying amphibian ecology; meta-population management; and breeding facility design and bio-security. Course format will be a balance of lectures from world experts on amphibian conservation, small group activities and whole group discussions. The middle weekend will be used to develop particular practical fieldwork and husbandry skills, using both amphibian conservation projects in the field (on Jersey) and the captive animal collection of Jersey Zoo as teaching grounds.

The course is designed for senior keepers and curators of zoos intending to play an active role in amphibian species conservation and field conservationists (senior forestry officer, field biologists etc.) working with the species in the wild.

ABC is being run in collaboration with the Declining Amphibian Population Task Force (DAPTF) and the Durrell Institute of Conservation and Ecology (DICE) at the University of Kent. Please note the course will be run subject to level of interest. Further details, an application form and deadlines can be downloaded by visiting the Durrell Wildlife Conservation Trust website, at [www.durrellwildlife.org](http://www.durrellwildlife.org)



Two meetings will be taking place in Africa this year, and the DAPTF is supporting both, with a view to developing the Amphibian Conservation Action Plan (ACAP). In

particular, we are seeking specific proposals for priority survey activities, and for priority *in situ* conservation efforts.

In late August, there will be a meeting of the African Amphibian Working Group (AAWG) in Benin, organised by Mark-Oliver Rödel ([roedel@biozentrum.uni-wuerzburg.de](mailto:roedel@biozentrum.uni-wuerzburg.de)), including a post-meeting method workshop (please see [http://www.biozentrum.uni-wuerzburg.de/amphibien\\_workshop.html](http://www.biozentrum.uni-wuerzburg.de/amphibien_workshop.html) for details).

This year's meeting of the Herpetological Association of Africa (HAA), to be held in Potchefstroom, South Africa, in late November, will include a one-day workshop on amphibian declines. The organiser is Louis du Preez ([drklhdp@puknet.puk.ac.za](mailto:drklhdp@puknet.puk.ac.za)).

Anyone interested in attending either or both of these meetings should contact the relevant organiser. We can provide a letter of support to anyone seeking funding.

**Tim Halliday**

#### Books received

Gunther Köhler, Milan Vesely & Eli Greenbaum. (2006) *The Amphibians and Reptiles of El Salvador*. Krieger Publishing Company, Malabar, Florida. (238 pp.)

This beautifully-produced book provides a very detailed account of the 130 species that comprise the herpetofauna of El Salvador. Fully illustrated in colour, it contains detailed distribution maps, identification keys and is fully referenced. This is a handsome and authoritative book which makes a very important contribution to our knowledge of the herpetofauna of Central America.



#### World Amphibian Day

New Zealand National Frog Week was held during the last week of October 2005 and again attracted a huge amount of attention from the general public. Despite New Zealand only having four indigenous species of amphibians (and three introduced ones), people seemed to be fascinated by frogs and genuinely concerned about their future. The event was organised by myself (Phil Bishop, University of Otago, Dunedin, New Zealand) and consisted of frog displays at over 25 regional centres throughout the country. The displays were locally organised, although I

produced supplementary material in the form of posters, pamphlets and flyers centrally at the University of Otago. Most displays featured an exhibit of live introduced frogs, talks on New Zealand frogs and lots of fun frog-related activities for children. Frog week was centred at the Otago Museum and during the week there were talks on declining amphibian populations, New Zealand frogs and current frog research in New Zealand by various frog experts. These talks were followed by guided field trips where people had a chance to see frogs calling, fighting and mating in the wild.

Walter Hödl (Universität Wien) has organised similar events in celebrating amphibians during the Austrian Science week with similar degrees of success. Many other amphibian researchers also conduct 'Frog Events' in their own parts of the world (e.g. Graham Pyke at the Australian Museum, Sydney). These national incentives have the dual potential for increasing public awareness on the plight of amphibians in the world as well as providing a platform for local messages regarding the local amphibian fauna. For example, during frog week in New Zealand we were able to put across four important points concerning the conservation of our native *Leiopelma* as well as informing the public of the global decline of amphibians and its significance. The event in New Zealand would not have been possible without generous sponsorship from Grove Mill Winery and Cadburys chocolate.

I first suggested that this should become a global event after the interest that was generated during the first NZ Frog Week (FROGLOG 54, December 2002) and, after discussions with Walter Hödl, we have decided to coordinate a World Amphibian Week to coincide with the 6th World Congress of Herpetology in 2008. It is envisaged that this will be similar to the local events that Walter and I have organised in the past but with a truly global theme. We will form a small organising committee (that will hold virtual meetings) and will seek advice from the herpetological community of the main messages that need to be conveyed during a World Amphibian Week. We hope that all working group chairs of DAPTF will act as regional coordinators and if anyone else is willing to help coordinate or organise the display materials and attract sponsorship please contact either Walter or myself ([phil.bishop@stonebow.otago.ac.nz](mailto:phil.bishop@stonebow.otago.ac.nz) or [Walter.Hoedl@univie.ac.at](mailto:Walter.Hoedl@univie.ac.at)).



#### Froglog Shorts

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