

Anuran breeding programs at the Vancouver Aquarium

By Dennis A. Thoney, Ph.D.

Thirty percent of the 6,285 species of amphibians are threatened with extinction according to the International Union for Conservation of Nature (IUCN). Over 126 species are thought to have gone extinct in our lifetime and an additional 39 species only survive in assurance populations. Habitat changes resulting from human development and climate change are the main contributing causes, but pollution and invasive species such as the bull frog and diseases such as chytrid fungus or Bd (*Batrachochytrium dendrobatidis*) also take their toll. This is largest extinct event since the dinosaurs. Because of this grave concern, the IUCN and WAZA formed the Amphibian ARK (<http://www.amphibianark.org/>).

“The IUCN is calling on zoos and aquariums to participate in the global response to this conservation crisis. Recognizing that the rate of decline far outpaces the ability to respond to environmental problems *in situ*, *captive assurance populations have been recognized as the only hope for survival for many amphibian species and will buy time to respond to threats in the wild.* The WAZA (World Association of Zoos & Aquariums), IUCN/CBSG (Conservation Breeding Specialist Group), the IUCN/ASG (Amphibian Specialist Group), and regional zoological associations have hosted a series of workshops and developed a number of resources to support the zoological community’s *ex situ* response to this crisis.”

Analysis by herpetologists and ecologists have estimated that 500 species have threats, which currently cannot be mitigated quickly enough to prevent extinction. They have requested help from zoos and aquariums that have the expertise to maintain amphibian populations. If each of the 500 largest institutions took on one species then some of these species might be preserved until they can be released back into their natural habitat. Unfortunately zoos and aquariums have not met this goal. The Association for Zoos and Aquariums (AZA) for instance only intensively manages 10 species. If this number of managed species is extrapolated globally only 50 species are represented or 10% of those requiring help.

Fortunately, these numbers do not account for many species that may be in assurance populations, but are not part of regional association breeding programs. The International Species Information System (ISIS) data base has 800 zoological institutional members in 80 countries. As of February 2012, ISIS lists 661 species and subspecies and 105,016 individuals as being maintained. Of course, most of these species are likely display animals and in breeding programs. Zoos and aquariums need to do more.

The ten species managed intensively by AZA include the following:

- *Atelopus varius* Harlequin golden frog

- *Atelopus zeteki* Panamanian golden frog
- *Anaxyrus (Bufo) houstonensis* Houston toad
- *Peltophryne lemur* Puerto Rican crested toad
- *Anaxyrus (Bufo) baxteri* Wyoming toad
- *Dendrobates azureus* Blue poison dart frog
- *Lithobates sevosa* Dusky gopher frog
- *Mantella aurantiaca* Golden mantella
- *Tylototriton shanjing* Emperor (Mandarin) newt
- *Eurycea rathbuni* Texas blind cave salamander

2008 was named year of the frog. Zoos and aquariums around the world were encouraged to develop exhibits and education programs presenting the Amphibian problem. The Vancouver Aquarium recognized the importance of amphibians through the display of 30 amphibian species in “Frogs Forever” and other exhibits. Visitors were introduced to general amphibian biology and the major issues facing amphibians. Topics covered in the exhibit include:

- Ordinal taxonomy
- Habitat diversity
- Reproduction
- Prey/predator significance
- Chytrid fungus
- Invasive Species
- Amphibians as food
- Extinction
- VA recovery programs

To increase the Vancouver Aquarium’s expertise in amphibian husbandry and to reduce the reliance on the pet trade and collection from the wild for specimens, over 20 species are part of its breeding program including the following:

• <i>Rana pretiosa</i>	Oregon spotted frog
• <i>Rana pipiens</i>	BC Northern leopard frog
• <i>Agalychnis callidryas</i>	Red-eyed tree frog
• <i>Hyperolius</i> sp.	Reed frog
• <i>Dendrobates auratus</i>	Green & black poison frog
• <i>Dendrobates tinctorius</i>	Dyeing/blue poison frog
• <i>Ranitomeya imitator</i>	Imitating dart frog
• <i>Epipedobates tricolor</i>	Phantasmal poison frog
• <i>Ameerega trivittatus</i>	Three-striped dart frog
• <i>Phyllobates terribilis</i>	Golden dart frog
• <i>Pipa pipa</i>	Suriname toad
• <i>Atelopus zeteki</i>	Panamanian golden frog
• <i>Bombina orientalis</i>	Fire bellied toad
• <i>Paramesotriton hongkongensis</i>	Hong Kong warty newt
• <i>Typhlonectes natans</i>	Rio Cauca caecilian
• <i>Taricha granulosa</i>	Rough skin newts

The Aquarium also is involved in direct conservation by maintaining assurance populations of the two most endangered amphibians in Canada and a Neotropical frog that is extinct in the wild. The Oregon Spotted Frog (OSF), *Rana pretiosa*, is the most endangered amphibian in Canada with only three breeding populations and less than 300 breeding females in total. The Vancouver Aquarium assists the OSF Recovery Team by maintaining a captive assurance population. In 2010, the Aquarium was the first institution to breed the OSF in captivity. Of the approximately 3,000 tadpoles hatched in 2011, three hundred were used for field enclosure survival studies, three hundred were retained for radio tagging studies, fifty were retained by the Aquarium to produce F2 generation, and over 2,000 tadpoles were released into a new adjacent wild site. In 2012, approximately 3,000 tadpoles were released to two wild sites. The Northern leopard frog, *Rana pipiens*, is also endangered in British Columbia, with frogs only occurring in one natural and one introduced site in southeastern BC. The Aquarium assists the British Columbia Northern Leopard Frog Recovery Team by maintaining captive assurance population. Although

breeding was expected in 2012, frogs were in ovigerous and will bred in spring 2013. The Panamanian golden frog, *Atelopus zeteki*, was just acquired as part of the AZA breeding program and we hope to breed them this year.



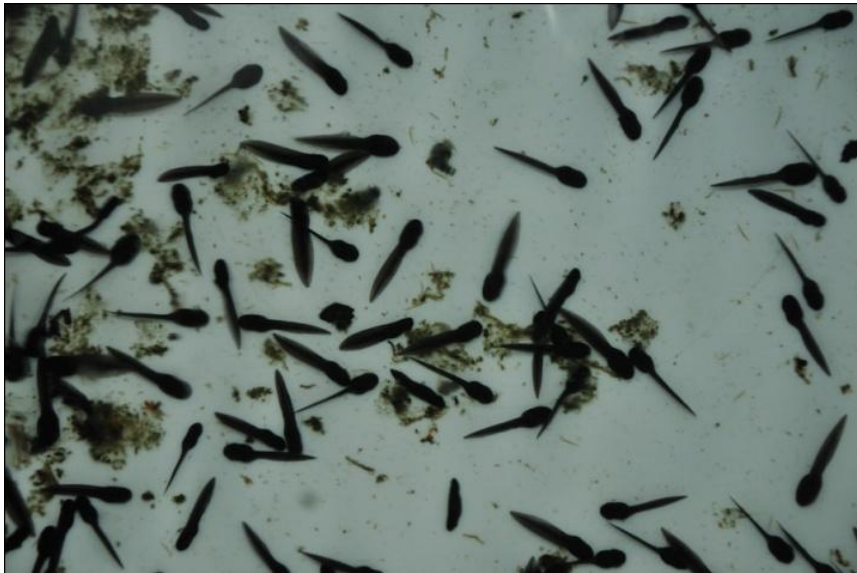
Greenhouses used to hold and breed Oregon spotted frog.



Aquarium systems used to hold and breed Oregon spotted frog.



Oregon spotted frogs in amplexus. Photo by Darren Smy.



Tadpoles of Oregon spotted frog.