

The Hurricane Toad - Puerto Rican Crested Toads

The Story of Puerto Rico's Only Native Toad

Becoming a Toad

Follow the amazing development of a toad egg and if you want to be a wildlife detective, compare these pictures with Gosner Staging and identify the toadlet's development stages!



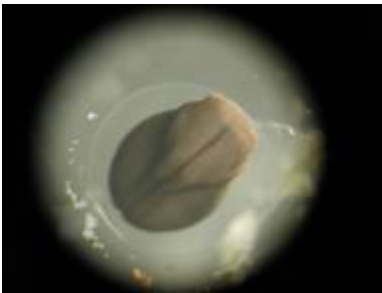
Male and female toads mate. The female is larger than the male because she is carrying the eggs.



Toads breed in temporary ponds created by seasonal rains. Eggs laid at Toronto Zoo.



Eggs are laid in parallel strings.



Larval development inside the egg. Neural tube, running in the center, will close to form the spinal cord. Gosner Stage (a)____



The embryo feeds on yolk as it develops quickly. Gosner Stage (b)____



The embryo hatches within 24 hours. Gosner Stage (c)____



When the embryo hatches, it is a larvae and also called a tadpole. Gosner Stage (d)____



The tadpole's external gills are lost within 24 hours after hatching... Gosner Stage (e)____



...and internal gills are developed behind the mouth. Gosner Stage (f)____



This is followed by development of the hind legs and shaping of the head... Gosner Stage (g)____



...accompanied by the development of lungs instead of the internal gills. Gosner Stage (h)____



Emergence of the front limbs. Gosner Stage (i)____



Finally, the tail is lost.

Gosner Stage (j)_____



Larval development, from egg laying to toadlet, is only 18 days on average
Gosner Stage (k)_____



Toadlet!

Find out if you matched the pictures with Gosner Staging successfully by clicking [here](#).
(Answers are on the last page to be the link)



As adults, every toad has a unique pattern on their underbellies, which is used for their individual identification

To learn more about amphibian development, visit:
<http://fwie.fw.vt.edu/VHS/amphibian-development.htm>

Status



The Puerto Rican crested toad is the only native toad species of Puerto Rico. Although it used to be found on other Caribbean Islands, it is now endemic to (exclusively found in) Puerto Rico. There are two known populations of the toad, one in the north and one in the south. However, the north population has not been recorded since 1992 (although captive populations breed in zoos). There is currently only one known wild population which can be found in the Guánica National Forest. The Puerto Rican crested toad is listed as Critically Endangered by IUCN, which means that without adequate conservation action the species will become extinct. This species was the first amphibian species selected by the American Zoo Association (AZA) Species Survival Plan (SSP). This is a network of zoos, aquariums, government offices, and researchers worldwide cooperating for the survival of species at risk. Each institute provides facilities for captive breeding, expertise for habitat rehabilitation and construction, field research, leadership in public education, or funding. The Toronto Zoo works in cooperation with other zoos and authorities in Puerto Rico, North America and Europe. Since 1983, 150,000 tadpoles have been released into man-made ponds in Puerto Rico. These reintroduction efforts appear to be successful as many captive born toads are returning to their release ponds to breed.



This water trough was the last breeding site available for the northern crested toads

For more information visit:

- <http://www.torontozoo.com/Animals/details.asp?AnimalId=674>
- <http://www.amphibianark.org/>
- http://www.aza.org/Snapshots/Snapshot_PRC_Toad/
- <http://www.crestedtoadssp.org/gal/main.php>
- <http://amphibians.org/index.php>
- <http://www.waza.org/conservation/projects/projects.php?id=88>
- http://www.aza.org/Publications/2007/02/coop_amph_prgms.pdf

Habitat



pond
the south population has left.

Puerto Rican crested toads breed in ponds created by hurricanes or seasonal rains. The frequency of storms influence the toad's breeding cycle because males emerge for breeding only at times of rains heavy enough to create ponds, so there may be over two years between breeding events. Since the ponds in which the toads breed are temporary, their larvae must enter into metamorphosis and move to land before the pond dries up in 28 days.

Guánica Forest with the only



The primary threat to the toads' survival is loss of habitat due to filling or drainage of their ponds for construction, cultivation, and mosquito control. While the northern population is considered extirpated (extinct in the wild with some individuals or populations in zoos), there is only one



This constructed pond in southern Puerto Rico is used as a toadlet release site.

known breeding pond for the wild southern population. This pond is now protected in the Guanica State Forest Preserve although it is in a parking lot. A significant part of the conservation efforts for the Puerto Rican crested toads is rehabilitation and construction of suitable breeding ponds. These ponds are used as release sites for thousands of tadpoles that were captive bred at zoos, including the Toronto Zoo. The goal is to create new ponds to support six self-sustaining metapopulations (A group of populations, each distinct but that interact with each other), three in the north and three in the south.

Foreign Competition



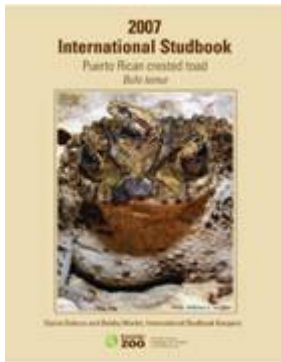
The marine toad (*Bufo marinus*) is much larger in size and much more abundant in numbers than the Puerto Rican crested toad. The marine toad (right in picture) was introduced to Puerto Rico from Jamaica to control the sugar cane beetle as a biological pest control (in which an animal is introduced to control a local pest, usually as a predator; the marine toads feed on sugar cane beetles' larvae). This is the same toad known as the cane toad, which was introduced to Australia. In Puerto Rico, it quickly became a pest itself and a threat to the native crested toads (left in picture) by competing for limited resources, such as breeding sites, shelter, and food.

Research

The first step in establishing a conservation plan is to evaluate the number of toads in the wild and identify the characteristics of habitats in which toads can thrive. The Toronto Zoo initiated studies to determine the toad's population size, range, and preferred habitats. Toads were equipped with a transmitter contained in a backpack, fitted on the toads' backs.



Scientists from the Guánica Forest and the Toronto Zoo tracked the toads by following signals sent from the transmitters and received by an antenna. A scientist holds the antenna, points it in different directions and goes in the direction from which the strongest signals come. This technology allows scientists to find the toads' exact locations. The data gathered from tracking the toads was used to protect its limestone habitat and plan ponds suitable for breeding and long term use by the toads.



It is also important to conduct studies in order to gain better understanding of Puerto Rican crested toad biology, ecology, and behaviour. Researchers at the Toronto Zoo studied male Puerto Rican crested toads' reproduction in captivity in order to determine the most suitable housing and care to encourage successful breeding. Diet composition in captivity and its effect on growth and development of tadpoles and toadlets has also been studied in order to provide the toads with the most suitable food to ensure proper growth and good health. Other factors which may be influencing toad growth and health, such as substrate temperature and water temperature have also been studied at the

Toronto Zoo. In addition, the Toronto Zoo keeps a record of all the toads in the program worldwide, including their breeding history. These records are published by the Zoo in a document called 'Studbook', which also helps with seeking potentially successful mates. Many zoos are conducting research on the diet and nutritional requirements of toads and tadpoles.

In Puerto Rico, the Toronto Zoo works with partners in 22 AZA accredited zoos and aquariums, the Juan A. Rivero Zoo, United States Fish and Wildlife Service, Puerto Rico Nature Resources, Citizens of the Karst and local schools in Quebradillas for the Puerto Rican crested toad conservation plans, including research, habitat rehabilitation and construction, habitat protection, monitoring of introduced toadlets, and education for conservation in Puerto Rico.



For more information visit:

- <http://www.torontozoo.com/conservation/reptiles.asp>

Education



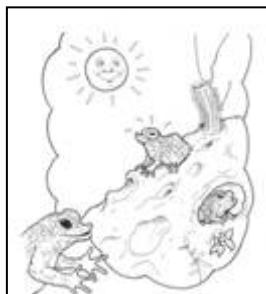
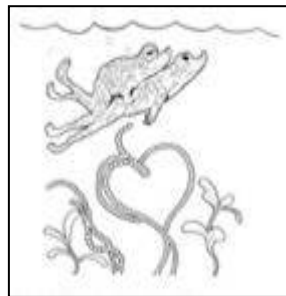
Raising awareness and bringing children and adults closer to wildlife in their community is an essential component of any successful long term conservation plan. In Puerto Rico, the Toronto Zoo assisted the AZA SSP® with developing education programs for schools with the purpose of getting the local communities involved in the crested toad's conservation efforts. Puerto Rican communities are encouraged to protect wetlands and engage in community conservation activities. One approach to make locals fond of the crested toad is making the toad part of the local culture. This was achieved by introducing the Toad Mascot, which is gaining popularity, making toads' image friendlier and more approachable. This mascot visits schools and community celebrations to increase awareness of this unique Puerto Rican amphibian.



The toads' conservation story is also introduced to children in an activity book. In the book, a toad is talking with a parrot about the species' life cycle, the threats it is facing, and how to help the toads. The Toronto Zoo also assisted with designing an exhibit for the crested toad at the Juan A. Rivero Zoo at Puerto Rico. Visitors can view the toads up close or go visit them in their natural habitat at the Guánica Forest.



Download toad drawings for coloring (*add more drawings that make sense without text when they are available on the computer*)



Gosner staging answers

- (a) 16 (b) 18 (c) 19 (d) 20

(e) 21 (f) 36 (g) 41 (h) 42

(i) 43 (j) 44 (k) 45