

## Highlights:

- Conserve grouper to fight lionfish?
- Are robotic fish finding the future of invasive species management?
- Merits of risk assessment for preventing invasions
- Lampreys? Stink 'em out!

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## Focal Species: Cane Toad

### Scientific name:

*Rhinella marina*

### Size:

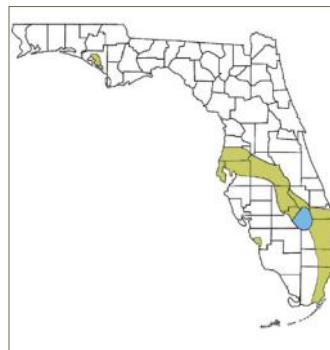
Usually 4 - 6 in.  
(max. ~9.5 in.)

### Native range:

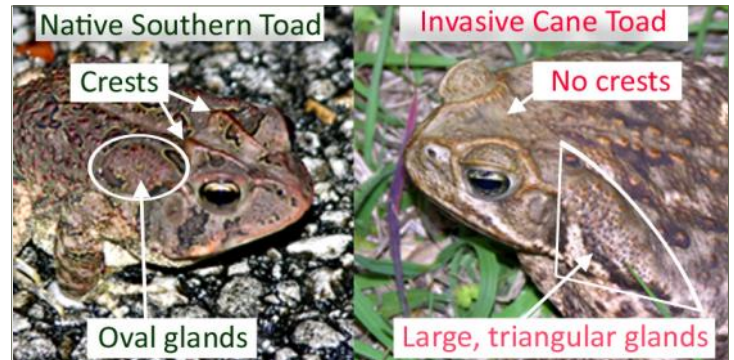
Central/South America

### Notes:

Formerly *Bufo marinus*, also commonly known as Bufo Toad, Marine Toad, or Giant Toad



Invasive [Cane Toads](#) have been featured prominently in the news this summer, and were responsible for causing the deaths of at least two dogs in Florida. The University of Florida and the sugar industry introduced these frogs into the state in the 30s and 50s for pest control; however, these introductions failed. Experts believe that



the invasive Cane Toads found in Florida today were introduced when a shipment of 100 toads from Colombia, intended for the pet trade, escaped at the Miami Airport in 1955.

These large toads prey on native wildlife and are highly toxic to pets – their presence in urban areas can significantly impact human quality of life. They are predominantly found in the areas shown in yellow on the map at left. In and near the known range of these toads, residents should vigilantly watch for and [report these toads](#). Cane Toads breed mainly from March through September; males call females with a distinctive, melodic trill and females lay long strings of eggs that are

virtually indistinguishable from those of native [Southern Toads](#). Adult Cane toads can be recognized by the large, triangular *parotoid* glands on their shoulders and the distinct lack of crests on top of their heads. Native toads rarely reach 4 inches in length, whereas invasive Cane Toads commonly grow to 6 inches or longer (nose to rump). Both the native and introduced species have somewhat dry, warty skin. However, the toxins produced by the invasive toads' glands is much more potent – be sure to wash your hands if you touch them. When you capture these toads, you should euthanize them by applying benzocaine gel to the belly and then freezing them overnight.

[Learn More...](#)



Photo by Kirk Kilfoyle  
(Nova Southeastern University)

## Science: Lionfish Management

The Lionfish invasion of the Caribbean, Eastern Seaboard of the U.S., and the Gulf Coast has been the most rapid finfish invasion in history. Recently, Lionfish were found on the coasts of Louisiana and Texas. Two recent studies offer insights on management strategies.

First the good news—a study conducted by Peter Mumby and colleagues found that high biomass of native grouper on Caribbean reefs corresponded to significant reductions in lionfish biomass. The habitat was similar between sites, but grouper

had been protected at some sites for five years and fished at others. Although this study does not truly demonstrate that grouper are suppressing Lionfish populations, large grouper are known to prey on these invasive fish. The authors suggest that grouper fishing bans or slot limits to protect the largest fish might impact Lionfish.

Now the bad news—Andrew Barbour of the University of Florida and collaborators used mathematical models to examine the projected effectiveness

of removal programs (e.g., Lionfish derbies) for managing this invasive species. They found that consistent, prolonged removal of as much as 65% of the Lionfish population each year would be needed to cause an overfishing effect, and that the species would recover rapidly even after 50 years of overfishing. Their results suggest that the value of derbies lies solely in education and the best management strategy is likely development of a sustainable commercial market.

[Learn More...](#)

## More Science: A Deathly Odor

Sea Lampreys (*Petromyzon marinus*) begin their lives as filter feeders burrowed in muck in stream beds. After about five years they transform into parasitic adults, head out to sea, and feed on fish for a year or more before returning to streams to spawn and die. Unfortunately, Sea Lampreys have invaded the Great Lakes through manmade channels and devastated the once-rich fishery they found there. Newly-transformed adult lampreys enter the lakes and feast on native fish rather

than moving out to sea. When lampreys begin their breeding migration, they follow chemical cues in the water that lead them to the filter-feeding young lampreys spawned in previous years. Arriving male lampreys follow pheromones to find females. Lampreys move only in the safety of darkness, and rely on cues called necromones (i.e., death cues) to avoid potentially dangerous areas. Previous studies of chemical management strategies have focused on pheromones. Michigan

State University's C. Michael Wagner and his colleagues took another approach, focusing on how lampreys respond to necromones. They extracted the chemical milieu produced by "putrefying carcasses" of lampreys and tested whether or not live lampreys avoided the scent. Not surprisingly, lampreys (and surely everyone else in the building) rapidly avoided the odor, suggesting that necromones have great potential for "herding" this species for management.

[Learn More...](#)



Photo courtesy of the [Great Lakes Fishery Commission](#)



# Innovations: Predicting Invasions



By: [Matthew Johnston](#)

The speed and extent of the lionfish invasion in the western Atlantic and Caribbean is unprecedented in a marine ecosystem. A new software tool has been developed at the Nova Southeastern University's National Coral Reef

Institute. The software tool, *invasionsoft*, relies on historical capture records, combined with ocean parameters (i.e., salinity, temperature, water depth, and current) at the capture locations, to predict potential areas where future invasions might occur. The model can then be applied in other locations to determine where control

measures or monitoring efforts should be focused.

The current beta version of the software is web-based and tailored to the marine environment. Future versions will allow users to upload their own data sets and configure parameters to describe both marine and terrestrial habitats and examine a variety of vertebrate—and invertebrate—invasive species. [Learn More...](#)

“This tool will help resource managers and scientists deal with invasive species such as the lionfish.”

## News Updates: Judge or Assess?

Recently, an [article in Nature](#) suggesting that introduced species are being harshly judged by their origins caused quite a stir. Mark Davis and co-authors suggested that the concept of native vs. non-native is outdated in our modern, globalized society and that costly eradication and management efforts may not be warranted. They point-

ed out that some non-native species have even proven beneficial. This caused quite an outcry in the scientific community. Give up? Never!

In a [new study to be published in Ecological Economics](#), Michael Springborn and co-authors demonstrate that focusing on risk assessment and prevention are a better, more cost-effective

strategy than simply chalking species invasions up as an unfortunate byproduct of globalization. Most species listed as injurious under the Lacey Act received that distinction *after* they became established and started costing the U.S. money. Simply put, implementing and acting on risk assessments could save money in the long run. [Learn More...](#)



## Noteworthy: Robotic Fish Fighters

Kirt Lillywhite and other scientists at Brigham Young University's [Robotic Vision Lab](#) are working to develop new technology that can recognize fish species by their shape. This machine-vision technology has many implications for studying native species, but

could be used in monitoring channels to detect the presence of invasive fish such as Asian carp. Underwater cameras snap photos of fish as they pass by, which are then analyzed by the machine-vision application and identified by human observers. Af-

ter the robotic-vision technology has gathered enough information about the shape of each species, it will be able to identify the fish on its own and could be used to corral invasive species for eradication.

[Go to Noteworthy Events...](#)

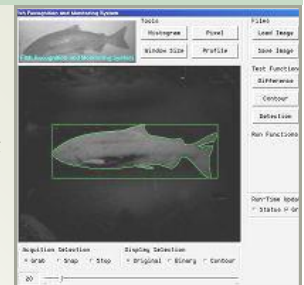


Image from the [BYU Robotics Lab website](#)





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suggestions, or an In Focus photo?  
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## In Focus...

This photo, taken in February off the coast of Naples, Florida shows the incredible density of Lionfish that has been observed in deeper waters (here, 250 ft.), particularly in the southeastern Gulf.



Photo © Michael Barnette, 2011

The Invader Updater is a quarterly newsletter focused primarily on providing information on invasive vertebrate animals in Florida and the southeastern U.S., and was first published in Fall 2009.

## Resources

- ◆ **EDDMapS mobile** – while the App is being developed, Chuck Bargerion has created a temporary solution for mobile reporting that works on both the Android and the iPhone (photo upload not supported on the iPhone web browser). Check it out by pointing your phone browser to <http://mobile.eddmaps.org/> and email feedback to [cbargerio@uga.edu](mailto:cbargerio@uga.edu)
- ◆ **iMap Invasives** – if you have stumbled across this online mapping system or [read about it in the news](#), you may be wondering how it relates to **EDDMapS** and whether or not the two systems share data. Unfortunately, the current answer to that question is no – although iMap has indicated that they will eventually share point data with EDDMapS. Under their current subscription system only paying users can see point data, and

everyone else only sees county level data. Check it out at <http://www.imapinvasives.org/> but if you use it, be sure to always report your data on EDDMapS as well!

- ◆ **InvasionSoft** – the full version of this modeling software will be available online at [www.invasionsoft.com](http://www.invasionsoft.com) in the fall (there is a beta version available now). Eventually, it will be customizable to create predictions for many invasive species.
- ◆ **Invader Updater News** – don't forget, we keep an [extensive archive of Florida, U.S., and international news stories on our website](#).
- ◆ Know of an important resource not listed here or in our archives? Let us know – email a description and URL to [monicaem@ufl.edu](mailto:monicaem@ufl.edu).