

South Florida/Caribbean Network Inventory and Monitoring Program

National Park Service
U.S. Department of the Interior



Amphibians: Monitoring Amphibians in South Florida/Caribbean Network Parks 2017

Importance: Amphibians as indicators of ecological condition

Amphibians are good biological indicators of ecosystem health because of their dependence on water for their biphasic life cycle, mid-trophic level position, and their porous skin which makes them extremely sensitive to contaminants. In Virgin Islands National Park, the native frog species are strongly affected by water availability for reproduction. The white-lipped frog (*Leptodactylus albilabris*) has a tadpole stage (dependent on water for reproduction) and the other two native species, Antillean frog (*Eleutherodactylus antillensis*) and whistling frog (*Eleutherodactylus cochranae*), utilize moist vegetation for egg laying with direct development to the froglet stage. In Everglades National Park and Big Cypress National Preserve, the pig frog (*Rana grylio*) is a dominant Anuran within the freshwater marsh lands and makes up a large amount of the vertebrate biomass. The pig frog life cycle is strongly related to marsh hydrology. Shifts in pig frog population structure have been shown to be related to water management. Amphibian research within these parks has also documented invasion by exotic species such as the Cuban treefrog (*Osteopilus septentrionalis*), and shifts in community structure of native species due to exotic species.

Objectives: Monitoring the amphibian community

The goal of the amphibian vital sign is to monitor the status and trends of amphibian community composition and distribution. The current plan is to use the proportion of area occupied technique to monitor the amphibian community. Changes in proportion of Area Occupied will help provide park management with insight about ecological consequences of changes in hydrology, restoration efforts, and exotic animal impacts. Two methods for monitoring the amphibian community will be assessed, which include the use of Automatic Recording Devices (ARD) and visual encounter surveys.

Protocol Status

The South Florida/Caribbean Network is currently performing pilot work on amphibian monitoring using Automatic Recording Devices. Griselda Landa Posas (Mosaics in Science Intern, <http://www.mosaicsinscience.org/author/glandaposas/>), during her 2017 summer internship, developed recording schedules for the Automatic Recording Devices and laid the groundwork for analyzing amphibian calls using two different sound analysis softwares, Kaleidoscope® and Raven Pro.®

Male *R. grylio*. Photo by A. Catenazzi



Pig Frog (*Rana grylio*) in Everglades National Park. Photo by A. Catenazzi.



Griselda Landa-Posas (NPS Mosaics Intern) next to an SM3 Automated Recording Device in Big Cypress National Preserve.



Green Frog (*Hyla cinerea*) in Everglades National Park. Photo by K. Whelan.



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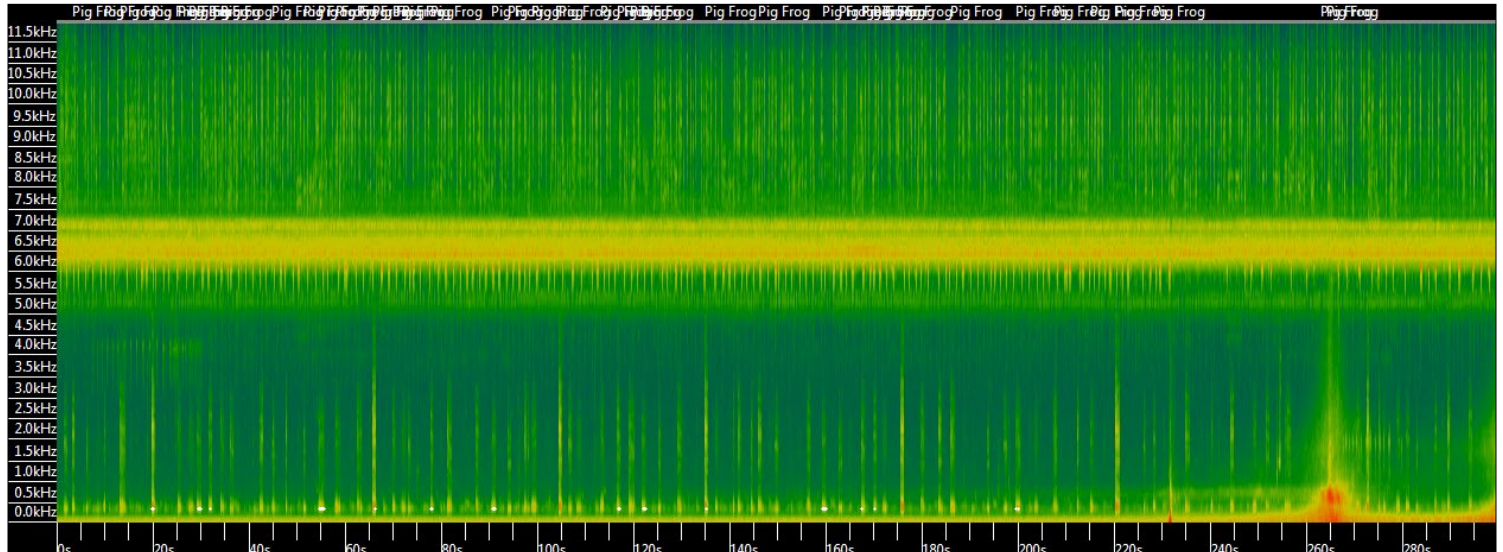
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Protocol Status (Continued)

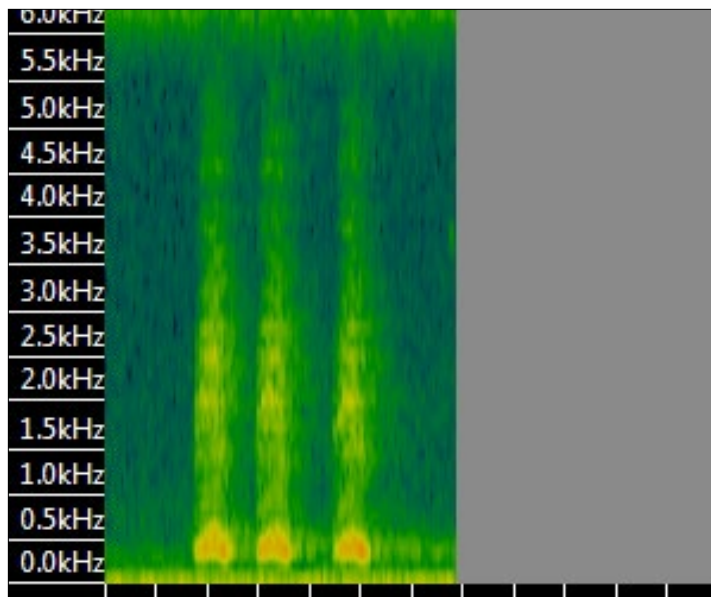
Further progress has been made by Ingrid Moncada (Florida International University Resource Monitoring Intern) in processing the Automatic Recording Devices recordings collected in Big Cypress National Preserve and developing a procedure for effectively identifying amphibian calls using Kaleidoscope and Raven Pro. Classifiers have been created in Kaleidoscope to detect five specific amphibian species' calls (Pig frogs, Leopard frogs, Green tree frogs, Green House frogs, and Cricket Frogs). A manual evaluation of the collected ARD recordings is currently underway to determine the efficiency of these classifiers to correctly identify the target species and assess false positives and false negatives. Additionally, a manual evaluation of the collected recordings has also been done to assess road noise pollution in relation to distance from the road and its effect on the sound quality of the recordings. This study was performed in Big Cypress National Preserve.



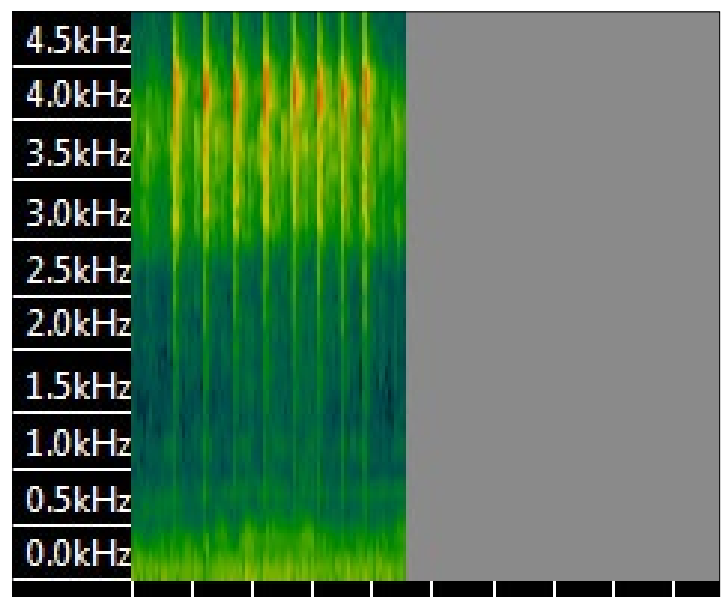
Two Automated Recording Devices deployed in Big Cypress National Preserve. SM4 model (left), and SM3 model (right).



Spectrogram of a five minute recording file, with labels (at the top of the figure) identifying Pig Frog calls in Kaleidoscope.



Spectrogram of a Pig Frog call as identified in Kaleidoscope.



Spectrogram of a Florida Cricket Frog call as identified in Kaleidoscope.



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