Two-Year Report for Amphibian Monitoring at Barataria Preserve 2018-2020

Project Background and Methods

The Gulf Coast Network tracks amphibian presence and abundance over time in three national park units, as part of their long-term vital signs monitoring program. Amphibians occur in a wide range of terrestrial habitats, but as landscapes change and hydrological processes are altered, most frogs, toads and salamanders are at particular risk because they depend on vegetated habitats for shelter and freshwater to breed. The Gulf Coast Network monitors amphibians as indicators of ecosystem health for the Barataria Preserve of Jean Lafitte National Historical Park and Preserve, so these species and their habitats can be understood and protected for the enjoyment of future generations.

The network's monitoring approach involves two types of artificial cover objects, PVC pipes in trees and coverboards on the ground. These objects provide favorable microclimates for key amphibian species, allow them to come and go unharmed, and can easily be checked by a team of two. In two sites within the Barataria Preserve, field crews record the numbers and types of amphibian species under boards or inside pipes, as well as temperature in and around them, relative humidity, barometric pressure, and water level in the nearest waterbody. Ancillary data on rainfall and temperature in the days prior to sampling are obtained from nearby weather stations. Field crews complete sampling over 1-2 mornings, once every other month.

The network's two monitoring objectives for this project are (1) determine species composition of the amphibian communities that use the monitored PVC pipes or coverboards at each site, including native and exotic species; (2) determine the frequency (yes/no detected) and relative abundance (counts per pipe or board) of the more commonly encountered amphibian species at each site, particularly in the context of trends over time, while also accounting for the effects of ancillary environmental data.

Monitoring Design and Installation

In November 2017, 64 coverboards and 128 PVC pipes were installed in the two sites in the Barataria Preserve, both adjacent to the Bayou des Familles. One site is at the Education center (ED), and the other site is in the woods near the V-Levee (LV). In each study site, boards and pipes are arranged in clusters, each separated by 20-30 meters. Eight clusters has 4 boards and 3 pairs of pipes. A final cluster per site has 8 pairs of pipes hung in trees. For more information on cover object location and materials, see the documents in the Supplementary Materials section, further below.

The first sample included in this report is January 2018, although network staff have checked similarly-placed pilot-study coverboards and PVC pipes at the ED site every month since February 2011. The monitoring season runs from May of one year to March of the next, but for this first 2-year report, an additional two events are included, January and March 2018. Fieldwork is completed by Gulf Coast Network staff, led by Field Biologist Billy Finney.

Western dwarf salamander (*Eurycea paludicola*) at the Education Center site.

Results from Amphibian Monitoring

There were 1,322 amphibian detections in the Barataria Preserve between Jan. 2018 and March 2020, belonging to 12 native and 1 exotic species (Table 1). The single exotic species, *Eleutherodactylus planirostris*, is native to the Carribean and was first seen in the unit in 2012. Because it can reproduce in high humidity without standing water, it has successfully spread into many habitats throughout the southeast. This species was recorded in both the ED and LV sites, although it was much more common at ED (433 versus 38 detections). Indeed, across all species and cover objects, there were many more amphibian detections at ED than LV (989 versus 333; Table 1). This was true for pipes (379 versus 220) and coverboards (610 versus 113).

Table 1. Number of individuals of each amphibian species recorded at the two sites at the Barataria Preserve. Sampling seasons are May 2018 - March 2019 and May 2019- March 2020 but for the first 2-year report, a pre-season of Jan. - March 2018 is included as well. * is plus 1 *Hyla* sp.

Cover type	Latin name	Common name	ED pre-season	ED 2018-2019	ED 2019-2020	LV pre-season	LV 2018-2019	LV 2019-2020
pipe	*Hyla avivoca*	Bird-voiced treefrog	4	55	75	0	41	47
pipe	*Hyla chrysoscelis*	Cope's gray treefrog	1	1	16	0	6	34
pipe	*Hyla cinerea*	Green treefrog	10	76	125	1	10	60*
pipe	*Hyla squirella*	Squirrel treefrog	1	5	10	0	10	9
pipe	*Psuedacris crucifer*	Spring peeper	0	0	0	0	0	1
	Total number of pipes sampled by season and site		**128**	**372**	**374**	**127**	**353**	**367**
board	*Acris blanchardi*	Blanchard's cricket frog	0	0	0	0	1	0
board	*Eleutherodactylus planirostris*	Greenhouse frog	9	222	202	0	17	21
board	*Eurycea paludicola*	Western dwarf salamander	1	5	0	0	3	11
board	*Gastrophryne carolinensis*	Eastern narrowmouth toad	6	39	38	2	3	19
board	*Incilius nebulifer*	Gulf Coast toad	2	45	28	0	1	3
board	*Lithobates clamitans*	Bronze frog	0	5	3	0	15	14
board	*Lithobates sphenocephalus*	Southern leopard frog	0	0	0	1	0	1
board	*Notophthalmus viridescens*	Eastern newt	0	2	3	0	0	1
	Total number of boards sampled by season and site		**64**	**192**	**192**	**64**	**185**	**188**

Results from Amphibian Monitoring, continued

At the ED site, the most common species under coverboards was *E. planirostris*, followed by *Gastrophryne carolinensis* (83), *Incilius nebulifer* (75), and a few detections of three other species. The PVC pipes at ED had 4 treefrog species, with *Hyla cinerea* most common.

Eleutherodactylus planirostris was also the most common under coverboards at the LV site, followed by a few detections of 7 other species. LV coverboards had all of the species seen at ED plus two more: *Acris blanchardi* and *Lithobates sphenocephalus*. PVC pipes at LV had the same four treefrogs as ED, plus one individual of *Pseudacris crucifer*. *Hyla avivoca* was the most common treefrog at LV.

Excluding the pre-season data, there were 174 more PVC pipe detections in the 2019-2020 relative to the 2018-2019 season, observed similarly in both sites (Figure 1A). For coverboards, the cross-year differences were less striking (+30 at LV and -44 at ED; Figure 1B), but in either case, this may or may not reflect normal variation. In pilot data, capture rates were routinely variable among years. Further interpretation may be possible with more data, by the next report.

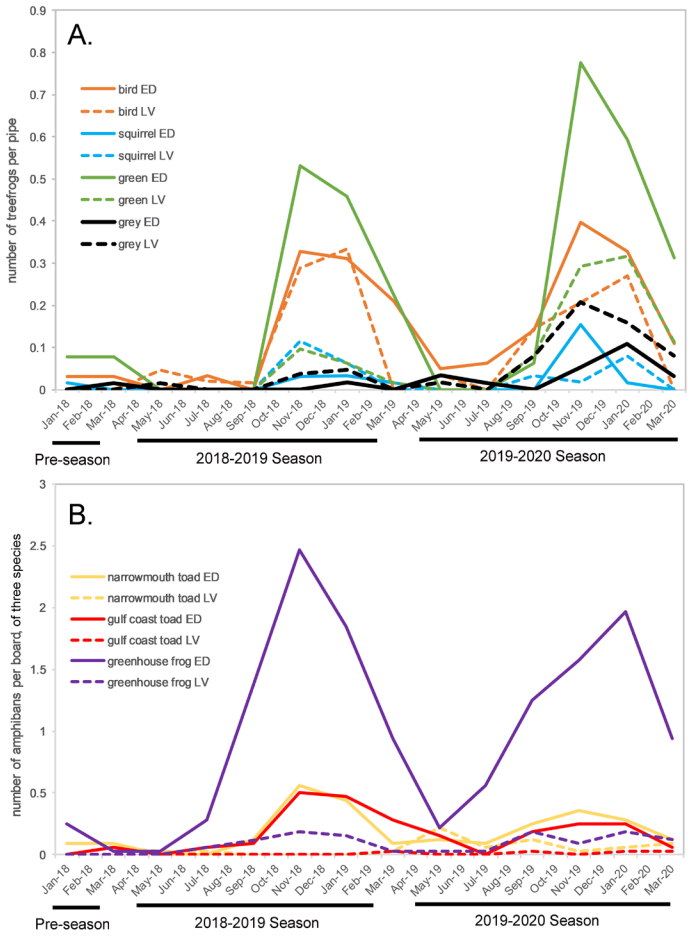

Figure 1. Capture rates for Ed center (ED) and Levee (LV) study sites (A.) in PVC pipes, for four treefrog species, and (B.) under coverboards, for three species.

Notable Events from Fieldwork through March 2020

The grey treefrog, *Hyla chrysoscelis*, was the only monitored treefrog species that was not detected during the pilot study at ED between Feb. 2011 and Nov 2017. It first appeared in PVC pipes only shortly before this reporting interval, was seen again in March 2018, and since then, detections have continued to increase at a low rate.

During the sampling period of Jan. 2018 through March 2020, cover object function was affected by two processes, and a third activity may have affected amphibian presence. First, rainfall or high water in Bayou des Familles periodically inundates or displaces coverboards. Second, the death of bottomland hardwood trees is not uncommon at the preserve, and on several occasions, PVC pipes were moved to an adjacent tree after their tree died (this occurred once for the data logger as well). Third, Bayou des Familles was cleared of aquatic vegetation in Feb. 2020, altering habitat for some amphibians.

During routine field work, field crews made several wildlife observations that are notable because they confirm species presence and document behaviors. First, pig frogs (*Lithobates grylio*) and bullfrogs (*Lithobates catesbianus*) were occasionally calling from the water at ED, although they were not seen on land. Second, crews observed 9 snake species, 4 lizard species and a box turtle (see list in Supplementary Materials). Among the lizards was the non-native brown anole, *Anolis sagrei*, seen on 3/19/2020 at Twin canals. This was the network's first brown anole detection at the park. Also of note was a milk snake (*Lampropeltis triangulum)* at LV in Sept. 2019, which is on the park's species list, but had not been seen before by the network. Third, feral hog activity is common in both sites and has been reported to park resource managers for targeted control.

List of Supplementary Materials

A supplementary materials document is prepared for each 2-year report, allowing additional space for data exports, preliminary summaries and informal exploratory analyses. The current Supplementary Materials document includes (1) maps of site locations and layouts; (2) weather and environmental summaries; (3) relevant amphibian life history; (4) list of reptiles detected; (5) useful references; and (6) select images of the field and of focal species.

For more information on this monitoring project, visit:

1. Amphibian project repository, linking all online documents and materials: https://irma.nps.gov/DataStore/Reference/Profile/2192506
2. Data repository for report: https://irma.nps.gov/DataStore/Reference/Profile/2273936
3. Protocol for amphibian monitoring: https://irma.nps.gov/DataStore/Reference/Profile/2256511
4. Gulf Coast Network webpage on the amphibian project: https://www.nps.gov/im/guln/amphibians.htm
5. Network webpage for Jean Lafitte NHP&P: https://www.nps.gov/im/guln/jela.htm
6. Park webpage: https://www.nps.gov/jela/index.htm

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