



Two-Year Report for Amphibian Monitoring at Barataria Preserve 2020-2022

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 Effort over Two Years

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 was at the Education center (ED), and the other site was near the V-Levee (LV). In each study site, boards and pipes were arranged in clusters of 4 coverboards and 3 pairs of PVC pipes, each separated by 20-30 meters. A final cluster per site had 8 pairs of pipes hung in trees over water (see the Supplementary Materials for maps). After 2 months of settling-in for cover objects, the first event was in January 2018, after which sampling occurred on 1 or 2 days, once every other month through to the present, with new monitoring years (MY) beginning in May. Fieldwork was led by network Biological technician Billy Finney, with other network staff and park interns participating as well.

The current report summarizes findings from MY2020 (May 2020 - March 2021) and MY2021 (May 2021 - March 2022). Previous findings from MY2018 and MY2019 were covered in the first 2-year



Green treefrog (*Hyla cinerea*) at the V-Levee site.

report, linked [here](#). Prior to the installation of the current design, network staff had checked similarly-placed pilot-study coverboards at ED every month since February 2011. For more information on project design and history, see the Supplementary Materials section.

Fieldwork was partially or fully completed for 10 of the 12 sampling events of MY2020 and MY2021. In MY2020, the July and September events were missed due to COVID travel restrictions. In MY2021, the September event was limited to PVC pipe sampling only, due to damage from Hurricane Ida. Within events, the average effort per site was 30 boards and 60 PVC pipes, which was less than 32 boards and 64 pipes (192 and 384 per MY) because individual cover objects were occasionally unsamplable (Table 1).

Results from Amphibian Monitoring

There were 971 amphibian captures in the Barataria Preserve between May 2020 and March 2022 (Table 1), belonging to 11 different species. This total included 610 individuals of 4 species in PVC pipes and 361

Table 1. Number of individuals per amphibian species by monitoring year (MY) at Education Center (ED) and V-Levee (LV). *does not include 1 unidentified *Hyla* sp.

Where found	Latin name	Common name	ED MY2020	ED MY2021	LV MY2020	LV MY2021
pipe	<i>Hyla avivoca</i>	Bird-voiced treefrog	22	15	39	25
pipe	<i>Hyla chrysoscelis</i>	Cope's gray treefrog	31	15	6	5
pipe	<i>Hyla cinerea</i>	Green treefrog	58	103	27	111
pipe	<i>Hyla squirella</i>	Squirrel treefrog	65	52	28	8
Treefrogs captured in PVC pipes by MY and site			176*	185	100	149
Number of pipes sampled by MY and site			245	359	242	368
board	<i>Acris blanchardi</i>	Blanchard's cricket frog	0	0	1	0
board	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	149	22	45	14
board	<i>Eurycea paludicola</i>	Dwarf salamander	0	0	0	6
board	<i>Gastrophryne carolinensis</i>	Eastern narrow-mouthed toad	21	28	9	10
board	<i>Incilius nebulifer</i>	Gulf coast toad	10	9	2	0
board	<i>Lithobates clamitans</i>	Bronze frog	3	1	11	15
board	<i>Notophthalmus viridescens</i>	Eastern newt	0	0	0	5
Amphibians captured under boards by MY and site			183	60	68	50
Number of boards sampled by MY and site			122	190	105	182

Results from Amphibian Monitoring, continued

individuals of 7 species under coverboards. The most common species in PVC pipes was the green treefrog (*Hyla cinerea*) comprising 49% of treefrog captures, fairly evenly represented between ED and LV sites. The most common species under coverboards -comprising 64% of captures- was the only non-native amphibian species from monitoring, the greenhouse frog (*Eleutherodactylus planirostris*). This Caribbean species was first seen in the unit in 2012. Because it can reproduce without standing water, it has become established in many habitats throughout the southeast. Greenhouse frogs were recorded in both the ED and LV sites, although more often at the ED site (171 versus 59 detections). In fact, across all species and cover objects, there were more detections at ED than LV for both MY2020 and MY2021 (605 versus 367; Table 1, Figure 1).

The composition of captures was fairly similar between sites, with a few notable differences (Table 1, Figure 1). In both sites, greenhouse frogs and green treefrogs were most common for boards and pipes, respectively. The second most common treefrog differed, however; with squirrel (*Hyla squirella*) second at ED and bird-voiced (*Hyla avivoca*) second at LV. The two sites also differed in that LV had three species under coverboards that were not recorded at ED: *Acris blanchardi*, *Eurycea paludicola* and *Notophthalmus viridescens*.

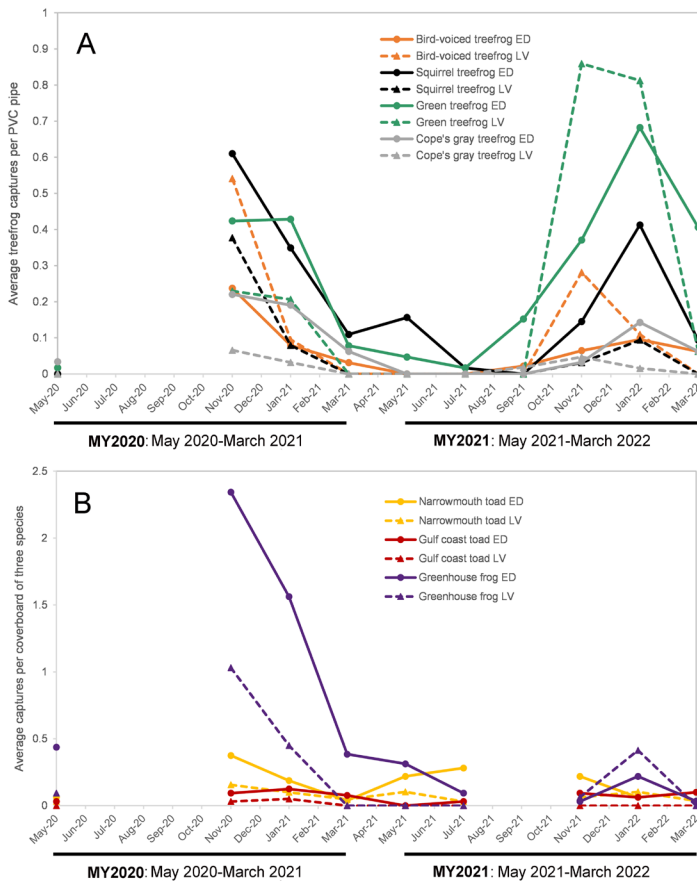


Figure 1. Capture rates for the most commonly detected species at Ed center (ED) and Levee (LV) study sites (A) in PVC pipes, and (B) under coverboards.

The composition of captures between years differed markedly for coverboards but not for PVC pipes (Table 1, Figure 1A,B). There were slightly more PVC pipe captures in MY2021 than MY2020. This weak trend was reversed, however, when captures were standardized by effort (0.6 captures per pipe in MY2020 and 0.5 in MY2021). For coverboards, in contrast, there was a strong temporal decline of 141 fewer captures in MY2021 or 0.8 fewer captures per board (1.1 in MY2020 versus 0.3 in MY2021). The decline in board captures was observed in both sites, but it was greater in ED, driven by lower greenhouse frog yields, potentially linked to inundation following Hurricane Ida in August 2021. Although these temporal differences were striking, they were also common in the pilot data. Further interpretation will be possible with the upcoming trend report in 2024.

Notable Events from Fieldwork through March 2022

As for the previous reporting interval, crews experienced minor problems with pipes and coverboards in MY2020 and MY2021. First, bottomland hardwood trees continued to die at an apparently high rate at the preserve, and on several occasions, PVC pipes had to be moved to adjacent trees as treefall events occurred. Second, high water and storms periodically inundated or displaced coverboards. There were 7 hurricanes or tropical storms in the region, and the most impactful of these was Hurricane Ida in August 2021. Most of the Barataria Preserve was inundated to depths of 0.9-1.8 m [3-6 feet]. In Sept. 2021, 19 of 128 PVC pipes were unsamplable, and all boards were excluded due to an overwash of debris and sludge.

The most notable wildlife observation during routine field work was of a Brown anole (*Anolis sagrei*) near the ED sampling site on 10/1/2021. Although previously seen in March 2020 at Twin Canals, this was the first observation of the non-native species at ED.

List of Supplementary Materials

A supplementary materials document is prepared for each 2-year report, allowing additional space for background information and ancillary data. The current Supplementary Materials document includes (1) descriptions of study layout, design and project timeline; (2) overview of weather and environmental data collected during the reporting period; (3) figures of captures over time for the current and pilot study; (4) a list of reptiles detected during monitoring; (5) useful publications and references for amphibian monitoring at the park; and (6) photos of notable amphibians or reptiles.

For more information on this monitoring project, visit:

1. Amphibian project repository, containing all online materials: <https://irma.nps.gov/DataStore/Reference/Profile/2192506>
2. Data repository for 2020-2022 reports: <https://irma.nps.gov/DataStore/Reference/Profile/2294354>
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. Webpages for Jean Lafitte NHP&P: <https://www.nps.gov/im/guln/jela.htm>; <https://www.nps.gov/jela/index.htm>

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