



Two-Year Report for Amphibian Monitoring at Gulf Islands NS 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 Gulf Islands National Seashore (NS), 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 Naval Live Oaks Area, 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 water body. Ancillary data on rainfall and temperature in the days prior to sampling are obtained from nearby weather stations. Field crews complete sampling over two mornings, one per site, 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 non-native 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 March 2018, 64 coverboards and 124 PVC pipes were installed in the two sites in the Naval Live Oaks Area. Both sites are near permanent waterbodies: one is the pond by the Maintenance facility (MT) and the other is Brown's Pond (BP). 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 6 (at MT) or 8 (at BP) pairs of pipes hung in trees or shrubs in the nearest waterbody. 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 May 2018, although network staff have checked similarly-placed pilot-study coverboards and PVC pipes at the Brown's Pond site every month since March 2011. Fieldwork is typically completed by Sarabeth Uriz and her assistants from the University of West Florida, although Gulf Coast Network staff, led by Billy Finney, participates on a regular basis.



Pinewoods treefrog at Brown's Pond site in March 2020. Photo by Sarabeth Uriz.

Results from Amphibian Monitoring

There were 204 amphibian detections in the Naval Live Oaks Area between May 2018 and March 2020, belonging to 8 native and 1 non-native species (Table 1). The single non-native, *Eleutherodactylus planirostris*, is indigenous to the Caribbean and was first seen in the unit in 1997. Because it can reproduce in high humidity without standing water, it has successfully spread into many habitats in the southeast. This species was recorded in both the BP and MT sites, although it was much more common at BP. Indeed, the majority of all species detections, or 147, were at the BP site. This site had 57 detections under coverboards, mostly consisting of *E. planirostris* (32 detections; Table 1), followed by *Eurycea quadridigitata* (17), and a

Table 1. Number of individuals of each amphibian species recorded at the two sites at the Naval Live Oaks Area. Sampling seasons are May 2018 - March 2019 and May 2019- March 2020. * indicates a coverboard detection during that sampling season; coverboard data are not included in the *Hyla* sp. counts below.

Cover type	Latin name	Common name	BP 2018-2019	BP 2019-2020	MT 2018-2019	MT 2019-2020
Pipe	<i>Hyla femoralis</i>	Pinewoods treefrog	26*	1	28	4
Pipe	<i>Hyla cinerea</i>	Green treefrog	1	0	1	0*
Pipe	<i>Hyla squirella</i>	Squirrel treefrog	36*	24	6	3
Total number of pipes sampled by season and site			370	352	336	320
Board	<i>Acris gryllus</i>	Southern cricket frog	0	5	0	5
Board	<i>Eleutherodactylus planirostris</i>	Greenhouse frog	29	3	1	1
Board	<i>Eurycea quadridigitata</i>	Dwarf salamander	11	6	0	0
Board	<i>Gastrophryne carolinensis</i>	Eastern narrowmouth toad	1	0	0	0
Board	<i>Scaphiopus holbrookii</i>	Eastern spadefoot toad	0	0	7	0
Total number of boards sampled by season and site			192	187	192	192

Results from Amphibian Monitoring, continued

few individuals of four other species, including two treefrogs. The PVC pipes at BP had 90 detections of three treefrog species: *Hyla cinerea* (1), *Hyla femoralis* (27) and *Hyla squirella* (62).

At the MT site, the total number of detections was 57 (Table 1). Under the MT coverboards, there were only two detections of *Eleutherodactylus planirostris* and 13 detections of three other species. The majority of detections were in PVC pipes (74%), nearly all of those belonging to *Hyla femoralis* (32) and *Hyla squirella* (9).

The capture rate of the 2019-2020 season was 65% lower across both sites relative to the 2018-2019 season. This change was most strongly driven by lower captures rates of *Hyla femoralis* (Figure 1A) and *Eleutherodactylus planirostris* (Figure 1B) in the 2019-2020 season. Given the limited number of events and pilot data suggesting that capture rates were routinely variable among years, the network cannot say that these declines were outside normal variation. Further interpretation may be possible by the next 2-year report for the park.

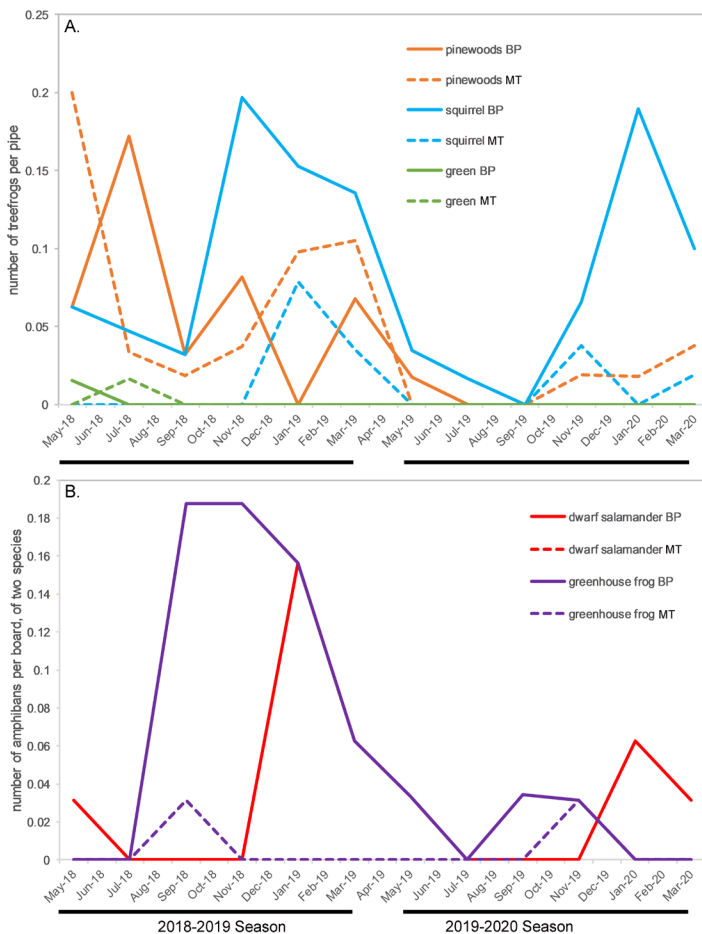


Figure 1. Capture rates at Brown's Pond (BP) and Maintenance (MT) sites (A.) in pipes, for three treefrog species, and (B.) under coverboards, for two species.

Notable Events from Fieldwork through March 2020

In addition to the species listed in Table 1, several more species or lifestages were seen as casual observation only. These include an adult oak toad (*Anaxyrus quercicus*) at BP and adult southern leopard frogs (*Lithobates sphenoccephalus*) at MT. In March 2018, an adult southern toad was seen (*Anaxyrus terrestris*) at BP. Finally, pinewoods treefrog tadpoles were seen at MT in October 2018.

The eastern spadefoot toads (*Scaphiopus holbrookii*) found in September 2018 represent the first detection of that species during monitoring. Newly-metamorphosed toadlets were under coverboards and several more were out on the ground. This species is expected for the area, but they are only aboveground for a short time after a heavy rain.

During the sampling period of May 2018 through March 2020, there were two occurrences of vandalism/site tampering which resulted in lost data. Both consisted of disturbed coverboards at BP.

While collecting amphibian data, the field crews made several wildlife observations that are notable because they confirm species presence and document behaviors. First, on 11/16/2019, one non-native brown anole (*Anolis sagrei*) was detected under a coverboard at MT, which is the first record by the network, although there are previous records from the park visitor center. Second, several other reptile species were seen during monitoring: *Anolis carolinensis*, *Aspidoscelis sexlineatus*, *Nerodia fasciata*, *Plestiodon laticeps*, *Sceloporus undulatus*, *Scincella lateralis*, *Tantilla coronata*, *Thamnophis sauritus*, *Thamnophis sirtalis* and *Eumeces laticeps*. Third, on 9/29/2019, coyote and bear tracks were seen at MT.

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 data summaries; (3) relevant amphibian life history; (4) useful references; and (5) select images of the field and species for the reporting period.

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. Webpages for Gulf Islands NS: <https://www.nps.gov/im/guln/guis.htm>; <https://www.nps.gov/guis/index.htm>

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