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A preliminary report on non-insect arthropods
(Arachnida, Diplopoda)
at Fakahatchee Strand Preserve State Park

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A preliminary report on non-insect arthropods (Arachnida, Diplopoda) at Fakahatchee Strand Preserve State Park

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Abstract. Use of a combination of a novel pitfall trap setup and Lindgren funnel traps at Fakahatchee Strand Preserve State Park resulted in the collection of few specimens due to a higher than normal ground water level. Despite this, some unusual specimens of Arachnida and Diplopoda were found, including the second known record of *Mysmena incredula* Gertsch and Davis, 1936 (Araneae: Mysmenidae) in Florida.

Key words. Millipedes, short-tailed whipscorpions, spiders.

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Introduction

Fakahatchee Strand Preserve State Park (FSPSP) is an 80,000+ acre preserve approximately 20 miles long by 5 miles wide in Collier County, Florida, receiving on average about 60 inches (1524 mm) of rain per year during May to October. It is largely a seasonally flooded depression in the underlying limestone, with elevations varying from <0.5 to 6.0 feet over short distances of 100 yards/91.44 meters or less. The strands are characterized by a canopy of bald cypress, red maple, and laurel oak trees. About 0.5% of the Preserve consists of rockland hammocks, also referred to as tropical hardwood hammocks, characterized by gumbo limbo, strangler fig, royal palm, and stopper trees (Carver 2014). Rockland hammocks can also be seasonally flooded but normally less so than strands. During some years, rockland hammocks can experience seasonal flooding sometimes ~30–60 days whereas for strands the hydroperiod is typically ~250 days per year in southwest Florida (Duever and Roberts 2013).

No list of spiders or other arthropods has previously existed for FSPSP. Due to interest by the authors in documenting the species of spiders occurring in the state, and interest by park personnel in documenting the flora and fauna in the park, a cooperative agreement was developed by which certain unique and generally non-public areas of FSPSP could be surveyed by two trapping methods - Lindgren funnel and a novel PVC pitfall trap similar to that used for mole cricket sampling.

Materials and Methods

Custom-built pitfall traps were 2' long lengths of 4" PVC pipe with end caps (28" long with end caps), one of which screwed on and off for ease of emptying the trap (Fig. 1). There was a 1" wide slit cut lengthwise in the trap that was positioned at the top when the trap was buried flush with the ground with only the slit exposed (Fig. 2–3). Each trap was covered with a wooden 'roof' to prevent direct rainfall from entering, and to prevent wild animals from disturbing the trap (Fig. 4). Four traps were used, two each at two locations situated about three miles apart. One site was in the southeast portion of Janes Scenic Drive, south of East Main/Gate 12. Data from a USGS water level recorder, located in the center of Fakahatchee approximately 20 feet from this site, provided information on above ground water level. The other site was 9.84 feet (3 m) southwest of Well 12 or 0.5 mile



Figures 1–4. Photos of traps used. 1) PVC pitfall trap structure. 2) PVC pitfall trap buried with top flush with ground surface. 3) Paired PVC pitfall traps *in situ* without roof. 4) Paired PVC pitfall traps *in situ* each with wooden roof (black arrows).

(805 m) southwest of Deep Lake located along SR 29 in Big Cypress National Preserve. These areas were located in rockland hammock habitat. The traps at each location were set at right angles to each other (Fig. 3–4). The PVC traps were partially filled with pink RV propylene glycol as a preservative.

Two Lindgren funnel traps were provided by the Cooperative Agricultural Pest Survey (CAPS). These traps (Fig. 5) were standard multi-level stacked funnel traps hung from tree branches, with 70% isopropyl alcohol as a preservative in the bottom cup. The set of central holes averaged about 0.25 inch/5.7 mm in diameter. The overall traps were approximately 44 inches/112 cm long by 7 inches/17.78 cm wide when fully extended and contained 12 funnels. One Lindgren funnel trap was placed near the pitfall traps at each site.

Traps were emptied at various intervals (usually once every two weeks, range one to four weeks) from June 2012 to September 2013 due to variable water levels. Most of the specimens came from pitfall traps. Only four Lindgren funnel samples had spiders; however, these samples added some foliage-dwelling species that otherwise would not have been caught. All specimens are deposited in the Florida State Collection of Arthropods.

Results

Based on data from a USGS water level recorder, from 1973 to 2013 the annual fluctuation in water levels above or below ground in the hardwood hammocks during the study period was relatively normal (Mike Duever, pers. comm. 2016). However, the wet season started much later in 2012 as compared to 2013 by almost 4 months. For the 2012 study year, the water level rose above ground on September 15, 2012, and fell below ground on January 29, 2013. For the second summer wet season during the study, the water level rose above ground on May 21,



Figure 5. Lindgren funnel trap in rockland habitat, Karen Relish taking notes.

2013, and remained above ground through the end of the study. An earlier start to the wet season with frequent subsequent rain would bring the soil to complete saturation earlier and keep it saturated. Once the water table reached the ground surface, the soil would be completely saturated, so a slow transition, i.e., a very gradual rise and subsequent fall of the water table during and after rainfall events, would have occurred in 2013, whereas in 2012, there was a rapid rise and fall of the water table during and after rainfall events when the soil was not completely saturated. The transition point was determined to be at 6 feet above mean sea level. This may account for why the preservative fluid became severely diluted, especially during the second summer (2013) wet season.

Because of the unusually extended above-ground water levels, significant damage was done to specimens in all trap samples, although some were worse than others. Most small, soft-bodied specimens such as spiders were in poor condition, often with abdomens cleared or completely missing. However, thanks to the presence of sclerotized genitalia, adult specimens could still be identified. All specimens were identified to species if possible, otherwise to the lowest taxonomic level that could be determined. Specimens were preserved in 70% isopropyl alcohol and deposited in the Florida State Collection of Arthropods. Due to the damage, non-target organisms were discarded.

The taxa list given here is from the results of a permit report given to the Florida Department of Environmental Protection (see Acknowledgments).

ARACHNIDA

Araneae (Spiders)

Linyphiidae

Agyneta sp.

?Genus

Mysmenidae

Mysmena incredula (Gertsch and Davis, 1936)

Oonopidae

?Genus

Pholcidae

Modisimus sp.

Phrurolithidae

Phrurotimpus cf. *alarius* (Hentz, 1847)

Theridiidae

Chrysso pulcherrima (Mello-Leitão, 1917)*Coleosoma floridanum* Banks, 1900

?Diploina sp.

Faiditus caudatus (Taczanowski, 1874)*Platnickina mneon* (Bösenberg and Strand, 1906)*Theridion* sp.

?Genus

Schizomida (Short-tailed whipscorpions)

Hubbardiidae

Stenochrus portoricensis Chamberlin, 1922**DIPLOPODA****Julida**

Parajulidae

?Genus juvenile

Polydesmida

Paradoxosomatidae

Oxidus gracilis (C.L. Koch, 1847)

Discussion. Most of the specimens consist of small to very small species. None of the spiders had a body length exceeding 3 mm, and most were much smaller. Most species were singletons, but none exceeding four specimens (*Coleosoma floridanum*). Some were interesting due to their rarity while some theridiids were of concern for possible non-native status.

Seven of the 13 species of spiders collected were only found in Lindgren funnels, including the tiny mysmenid *Mysmena incredula*, until recently placed in the synonymized genus *Calodipoena* (Lopardo and Hormiga 2015). This is only the second record of this species in Florida for this species described from Texas; the previous record also was from Collier County (Levi 1956). The other six spider species, schizomids, and millipedes were found only in the pitfall traps.

While it is well known that Florida was connected to Texas multiple times during maximum glaciation events at least as far back as the Pliocene (e.g., Rice 2013), resulting in the migration of flora and fauna from west to east, there seems to be a particular connection with southwest Florida that may be due to a singular migration event. In addition to the presence of *Mysmena incredula*, the distinctive salticid *Cheliferoides longimanus* Gertsch, 1936, described from Texas also can be found in this part of Florida.

The pholcid *Modisimus* sp. appears to be the same as an undetermined species that has been found along the southeast coast of Florida.

Surprisingly, several normally well-represented families were not found in the pitfalls (e.g., Gnaphosidae, Lycosidae, Salticidae, Thomisidae). It is not known if this lack of species diversity is due to the abnormally wet conditions, unusual trap design, or other unknown factors. Perhaps a 2" slit in the trap rather than a 1" slit would have been more productive for larger arthropods.

Of concern are the theridiid spiders *Chrysso pulcherrima*, *Coleosoma floridanum* and *Platnickina mneon*, which are cosmopolitan in distribution (World Spider Catalog 2022). Probably none of them are native (despite the specific epithet of one of them), and it is unknown what effect they might have on native species. Since usually

introduced exotic species of spiders are found in disturbed or synanthropic habitat (personal observation, GBE), this is a matter of concern. How these species might be monitored or what, if any, effect they have on native species is a subject that requires further investigation. The millipede *Oxidus gracilis* is also a cosmopolitan species, and sometimes a nuisance in the ornamental plant industry due to its large numbers.

A surprising development was the difficulty in identification of a few adult specimens. Two of the theridiids have not yet been recognized, and both linyphiids belong to an incompletely known group that will require further investigation.

Conclusion

The low numbers of species in this survey seems more due to unfortunate timing of sampling with high water conditions than it does potential lack of diversity. It is recommended that hand collecting in the same habitats with other sampling methods (e.g., beating, sweeping) be conducted to supplement the results of this survey. The total spider diversity in the park is probably several times greater than indicated by the above-mentioned trapping methods, although the traps utilized may have picked up a few species that may not have been sampled by other methods. The fact that some rare and unrecognized species turned up in this survey should provide further impetus for additional study of the FSPSP fauna.

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