

Title:

Ant community dynamics in the Big Thicket National Preserve

Introduction:

Ants are an important component of most terrestrial ecosystems, and native ants engage in numerous symbiotic relationships with other species as well as provide invaluable ecosystem services (Agosti et al. 2000). However, native ants are often displaced by the arrival of non-native species, with which they compete for resources and nesting sites. A series of invasions by non-native ants has had major impacts on the arthropod fauna of the southeastern United States (McGown et al. 2013). In particular, the red imported fire ant (*Solenopsis invicta*) is well known for its ability to dominate landscapes and displace native ants and other arthropods. In the last decade, the tawny crazy ant (*Nylanderia fulva*) has been spreading through the southeast United States and has been shown to displace *S. invicta* in some ecosystems (LeBrun et al. 2013, Horn et al., 2013). *N. fulva* is also negatively associated with arthropod richness and abundance (LeBrun et al. 2013). We aim to (1) characterize the ant communities of the various units of the Big Thicket National Preserve, (2) estimate the relative proportion of native ants in each unit, (3) document the spread of *N. fulva* as it invades the Big Thicket region, (4) determine the impact of *N. fulva* presence on the ant community and the arthropod community in general, and (5) determine whether the size and shape of the units influences the ability of *N. fulva* to invade.

Methodology:

Sampling of ants and other arthropods will be done using pitfall traps, which will consist of 50-mL plastic tubes containing water and odorless soap. Total of 180 pitfall traps will be used, distributed as described below. Pitfalls will be left in the ground for 7 days, after which they will be collected and brought to the lab for sorting and identification. All specimens will be deposited in the Sam Houston State University Natural History Collection (contact: Dr. Jerry Cook).

The sampling design will be as follows:

- Along waterways (creek, bayou, or river) within main units (Big Sandy Creek Unit, Turkey Creek Unit, Beech Creek Unit, Lance Rozier Unit, Neches Bottom Unit, Beaumont Unit). Two sets of 5 pitfall traps per site x 6 sites = 60 pitfall traps.
- Away from waterway within main units (Big Sandy Creek Unit, Turkey Creek Unit, Beech Creek Unit, Lance Rozier Unit, Neches Bottom Unit, Beaumont Unit). Two sets of 5 pitfall traps per site x 6 sites = 60 pitfall traps.

- Along waterways in Corridor Units (Menard Creek Corridor Unit, Big Sandy Creek Corridor Unit, Village Creek Corridor Unit, Upper Neches River Corridor Unit, Lower Neches River Corridor Unit, Little Pine Island Bayou Corridor Unit). Two sets of 5 pitfall traps per site x 6 sites = 60 pitfall traps.

Time-line:

In order to capture seasonal dynamics in ant populations, we plan to sample twice a year (April/May and August/September) for three years beginning in 2014 and concluding in 2016. Sampling will occur in each unit within a two-week period. Pitfall traps will be collected after one week from the day they were set. The first sampling will occur in May 2014 and the last sampling will occur in August/September 2016. Specimen processing and identification will continue for an additional year, concluding in May 2017.

Budget:

We are requesting funding to help offset the costs of purchasing collecting equipment and the cost of travel associated with field work. Field collections will be conducted as day trips from Houston, TX, estimated to be approximately 300 miles round trip per day (we estimate being able to visit 6 units in a day); a single collection event requires two field days to set up and two field days to take down, for a total of 1200 miles per event, which will be repeated twice per year for three years. We anticipate processing approximately 3,000 specimens, which will be mounted on insect pins and deposited in the Sam Houston State University Natural History Collection.

Item	Supplier	Quantity	Price/unit	Extension
50 mL centrifuge tubes (1000)	Fisher	1	\$281.50	\$281.50
odorless dish soap	Amazon.com	1	\$9.99	\$9.99
insect pins (100)	Bioquip	30	\$4.30	\$129.00
point punch	Bioquip	1	\$64.35	\$64.35
archival paper for labels (100)	Amazon.com	1	\$10.45	\$10.45
glue for mounting specimens	Bioquip	3	\$3.12	\$9.36
insect boxes	Bioquip	20	\$37.95	\$759.00
ethanol, 200 proof (1 gallon)	Rice Chemistry Store	3	\$11.64	\$34.92
field vehicle usage (includes fuel)	Rice EEB Dept	7200	\$0.65	\$4,680.00
Total requested				\$5,978.57

References:

Agosti, D., Majer, J. D., Alonso, L. E., and Schultz, T.R *Ants: Standard Methods for Measuring and Monitoring Biodiversity* Smithsonian Institution Press, Washington, D. C. (2000)

Horn KC, Eubanks MD, Siemann E (2013) The Effect of Diet and Opponent Size on Aggressive Interactions Involving Caribbean Crazy Ants (*Nylanderia fulva*). *PLoS ONE* 8(6): e66912. doi:10.1371/journal.pone.0066912

LeBrun, Edward G., John Abbott, and Lawrence E. Gilbert. "Imported crazy ant displaces imported fire ant, reduces and homogenizes grassland ant and arthropod assemblages." *Biological invasions* 15.11 (2013): 2429-2442.

MacGown, Joe A., Heath Richter, and Richard L. Brown. "Notes and New Distributional Records of Invasive Ants (Hymenoptera: Formicidae) in the Southeastern United States." *Midsouth Entomologist* (2013).

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