

# Pigs and Prairies: Evaluating the Biodiversity Impacts of Prairie Restoration for Biogas Production

Contract no: F16AC00155

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Progress Report: 28 February 2018

**Overarching Objective:** Evaluate the impact of prairie restoration on biodiversity associated with renewable energy development; specifically, natural gas production through anaerobic digestion of hog manure and plant material.

**Progress Update:** During the first week of February, our partners at Roeslein Alternative Energy, seeded all treatment field blocks at Smithfield’s Ruckman Farm (Fig. 1). Sizes of 21 field blocks range from 2.1-19.2 acres (Fig. 2). Vegetation in treatment blocks will be allowed to emerge before biodiversity monitoring commences. Our next action is to deploy plywood cover boards after initial vegetation has emerged in mid-spring.



Fig. 1. Roeslein Alternative Energy drill seeder in treatment field block at Ruckman Farm 2/1/2018.

Before treatments were established, we assessed the baseline biodiversity of two key groups, birds (results in previous report) and bees, on 12-13 June, 2017. This assessment was conducted in the six blocks composed of fescue and brome grass that will be used as controls once other treatments are established in surrounding blocks. In each block, we used modified pan-traps (i.e. bee bowls) painted yellow, blue, and white to assess the bee community. Bee bowls were placed at four locations within each block and collected after 24 hours. All specimens were identified to the species level with exception of bees in the genus *Lasioglossum*.

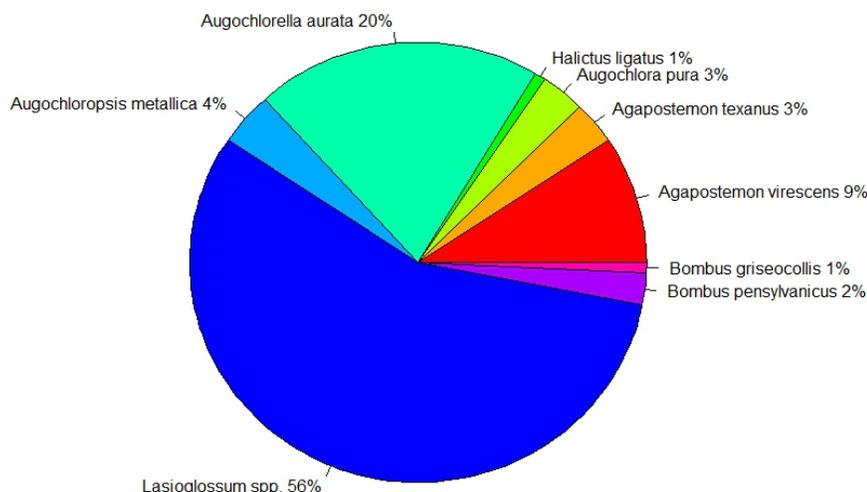


Fig. 3. Bee species collected in fescue-brome blocks at the Ruckman Farm in June 2017. Individuals represent  $\geq 9$  species.

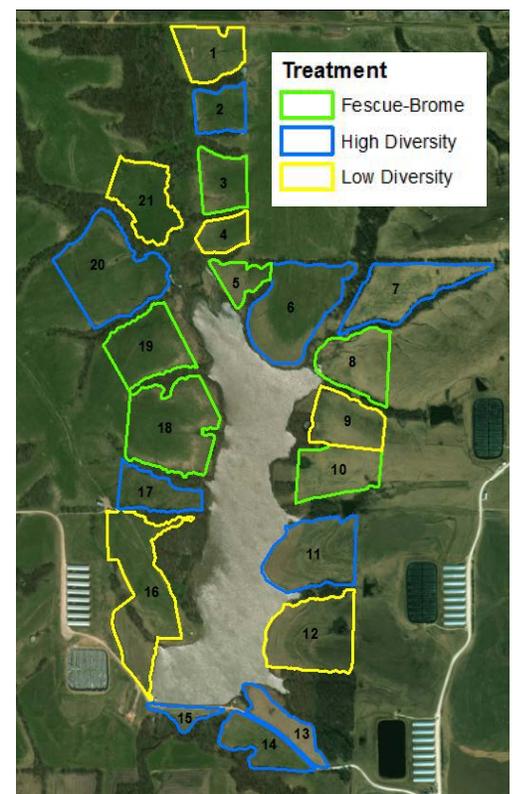


Fig. 2. Field blocks and treatments at Ruckman Farm.

Many of the bees collected in bee bowls (Fig. 3) are considered “sweat bees” with varied coloration, including metallic green sweat bees (*Agapostemon*). In addition to these smaller species, we collected a few more robust sized bumble bees (e.g. *Bombus*). Note that the genus *Lasioglossum* is composed of ~280 species in North America. Many of these species are ground-nesters and may have nests within these blocks.

**What It Means:** In control blocks, we observed species commonly observed in the Midwest in landscapes in which specific conservation practices are not executed. Going forward, we expect the addition of a more diverse prairie plant community to improve upon this baseline community, with subsequent increases in bird and bee diversity and abundance.

**Proposed 2018 Protocol :** Beginning in April 2018, field blocks will be instrumented with devices to investigate (a) seasonal bird occupancy, migration timing, and development of methods for automated detection of bees (i.e., autonomous recording units [ARUs]) and (b) amphibian, small mammal, and reptile occupancy (i.e., cover boards).

ARUs will be mounted on metal t-posts at a random point near the center of each field block. We will program units to record during the following periods:

- Dawn bird chorus (one hour beginning 15 minutes before sunrise); March - October
- Nocturnal bird migration (one hour from 12 a.m. to 1 a.m.; March - April, September – October
- Afternoon insect activity (one hour from 2 p.m. to 3 p.m.); May - August

For cover board deployment, we generated a random point per acre of each field block (Fig. 4). Each point is located at least 20 meters from the next and buffered from field edge by 10 meters. We will deploy 190 boards in total at Ruckman.

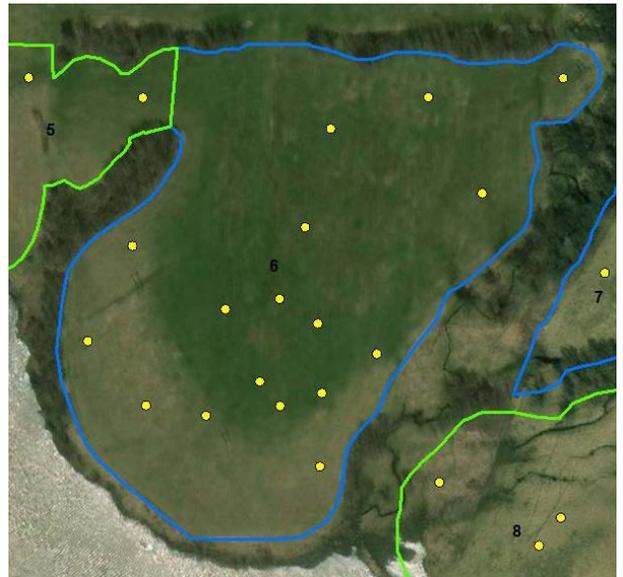


Fig. 4. Proposed cover board locations in Field Block 6.

Beginning in May 2018, we will conduct bi-weekly assessments of all taxa through the end of July. Cover board surveys and pollinator sampling will occur in all blocks while 18 blocks will also include bird point counts and ARUs. Protocol for bird point counts and pollinator sampling is still under development. We will also monitor vegetation diversity and structure in July. Using Environmental Defense Fund protocol, we will assess monarch butterfly habitat quality during regular vegetation surveys.

**Other:** We have established a project website for the reporting of project progress and findings:

<https://www.nrem.iastate.edu/landscape/projects/pigs-and-prairies-evaluating-biodiversity-impacts-prairie-restoration-biogas-production>

**Partners:** Roeslein Alternative Energy, Smithfield Foods, U.S. Fish and Wildlife Service, National Wild Turkey Federation, Eastern Tallgrass Prairie and Big Rivers LLC, Pure Air Natives, Environmental Defense Fund