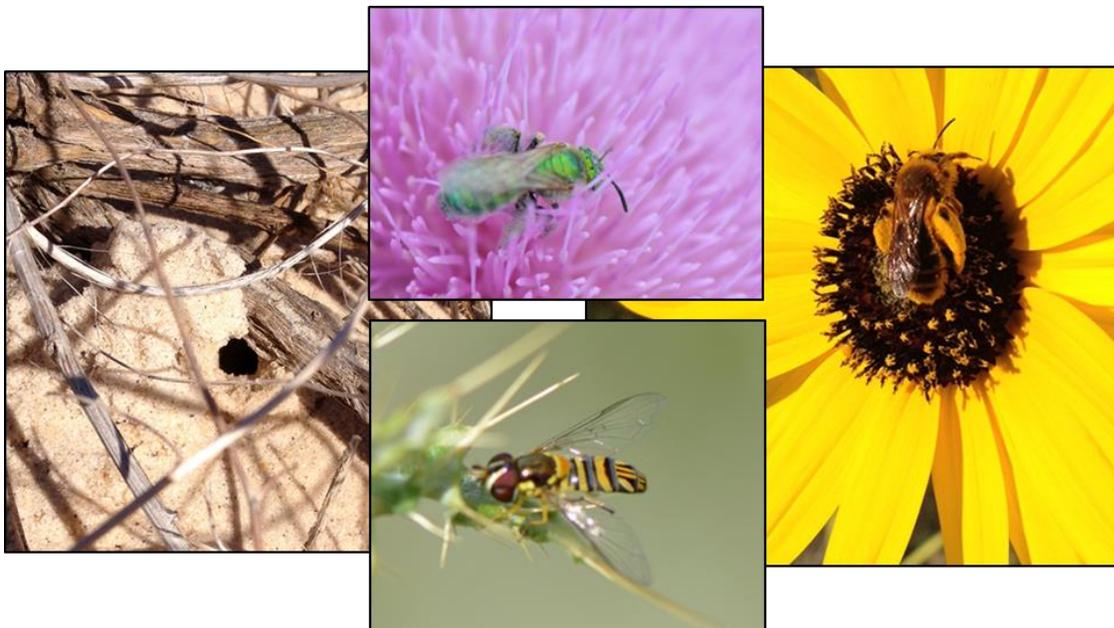


Research: Research in our lab focuses on endemic insects of the southern U.S. and the environmental conditions associated with occurrences, species-level biodiversity, and community structure of terrestrial and aquatic insect communities. An overall goal of the research is to provide information to help conserve native biodiversity and the ecological services and processes it supports.

Current Projects:

Ecology and Conservation of Insect Pollinators on the Southern High Plains - Insect pollinators are responsible for one in three bites of food humans eat. Losses of pollinators could have serious direct consequences to both global food production as well as nutrition for domesticated and wild animals and flowering plant biodiversity. Our lab is conducting numerous projects and studies to address pollinator decline and how existing habitat conditions and active and passive restoration to improve pollinator habitat in agricultural and urban areas influences pollinator communities. These include the following:

- Active and passive restoration of pollinator habitat in agricultural landscapes using USDA Natural Resource Conservation Service and monitoring changes to insect pollinator communities
- Attractiveness of drought tolerant plants to native bees and managed honey bees
- Assessment of different methods for pollinator seed mix germination
- Comparisons of pollinator communities across different land-use types
- Assessment of gamma diversity of pollinators across native rangeland, sandhills, agricultural and urban lands on the Southern High Plains
- Relationships of pollinator communities and local and landscape environments related to urban gardens
- Development and implementation of landscape designs for urban wildflower pocket prairies
- Effects of wildflower restoration in urban settings on pollinator communities
- Assessment of different restoration trajectories involving removal of giant reed grass and replacement with pollinator habitat in the lower Rio Grande Valley





Circle plots to investigate plant attractiveness to pollinators (above) and pollinator seed-mix germination experiments (left).



Feed-A-Bee – In 2015, Bayer Bee Health partnered with 50 organizations with a goal to grow 50 million wildflowers. The Department of Plant and Soil Science at Texas Tech is one of these partnering organizations. A current project supported by this partnership includes sowing seeds at various locations and conducting seed mix germination experiments at the Plant and Soil Science Quaker Farm.

"The Feed a Bee initiative will create forage areas with a diversity of bee-attractant plants for honey bees. To accomplish this goal, Feed a Bee will educate consumers about pollinator food shortage and work with them to plant 50 million flowers to increase bee forage areas. Feed a Bee will also tap into the power of collaborations by working with 50 organizations to plant thousands of acres of cover crops for bees." - <http://feedabee.com/>



FeedABee.com

Ecology and Conservation of Endemic Insects of the Monahans Sandhills

This research is focusing on nine insects occurring at the **Monahans Sandhills State Park** in western Texas. Our team deployed trap stations and collected insect samples from 2013-2014 to gain information on seasonal occurrences and habitat associations of these insects. The project will provide baseline information to further assess conservation needs for these species.



From *Frontiers in Texas Biodiversity: Discovering Populations, Documenting Change*. Nongame and Rare Species Program, Texas Parks and Wildlife Department:
<http://texasbiodiversity.com/2014/04/04/first-ever-comprehensive-survey-of-monahans-sandhills-endemic-insects/>

Ecology and Conservation of Endemic Hydroporinae of the Southern U.S. (*Heterosternuta* and *Sanfilippodytes*)

Ongoing studies are being conducted regarding the distributions and habitat of some groups of predaceous diving beetles (Coleoptera: Dytiscidae), especially the genera *Heterosternuta* and *Sanfilippodytes* of the Hydroporinae. These groups present interesting implications regarding the ecology, evolution and conservation of this group because these genera have been linked phylogenetically with closely related subterranean species¹. Changes in the surface freshwater conditions and dynamic linkages with groundwater habitat could influence these relationships and therefore environmental change becomes an important component regarding their conservation. Understanding species distributions and ecology across regions affected differently by drought and rainfall (Arkansas and Texas)



Ozark-endemic *Heterosternuta sulphuria*

could provide information to better understand the evolutionary processes of these groups. Furthermore, population conditions such as genetic population structures and the environments influencing these conditions could serve not only to protect and restore this biodiversity but occurrences, densities and other population conditions could also serve as biological monitoring targets across widespread small watersheds. For the Ozark-endemic *Heterosternuta sulphuria*, a current project involving habitat predictive modeling in northwestern Arkansas will help to determine conservations

actions to protect potentially isolated populations. Ongoing work with *Sanfilippodytes* includes resolving the taxonomy of specimens collected from springs and small streams on the Ozark and Edwards Plateaus in Arkansas and Texas, respectively. ¹Miller, K.B., A. Jean, Y. Alarie, N. Hardy and R. Gibson. 2013. Phylogenetic placement of North American subterranean diving beetles (Insects: Coleoptera: Dytiscidae). *Arthropod Systematics and Phylogeny*, 71: 75-90.

Images (clockwise from upper left) – *Heterosternuta sulphuria*, *Heterosternuta phoebeae*, *Sanfilippodytes* sp., larva of *H. sulphuria*.

