

Bees of the Bosque: What can they tell us about our restoration efforts?



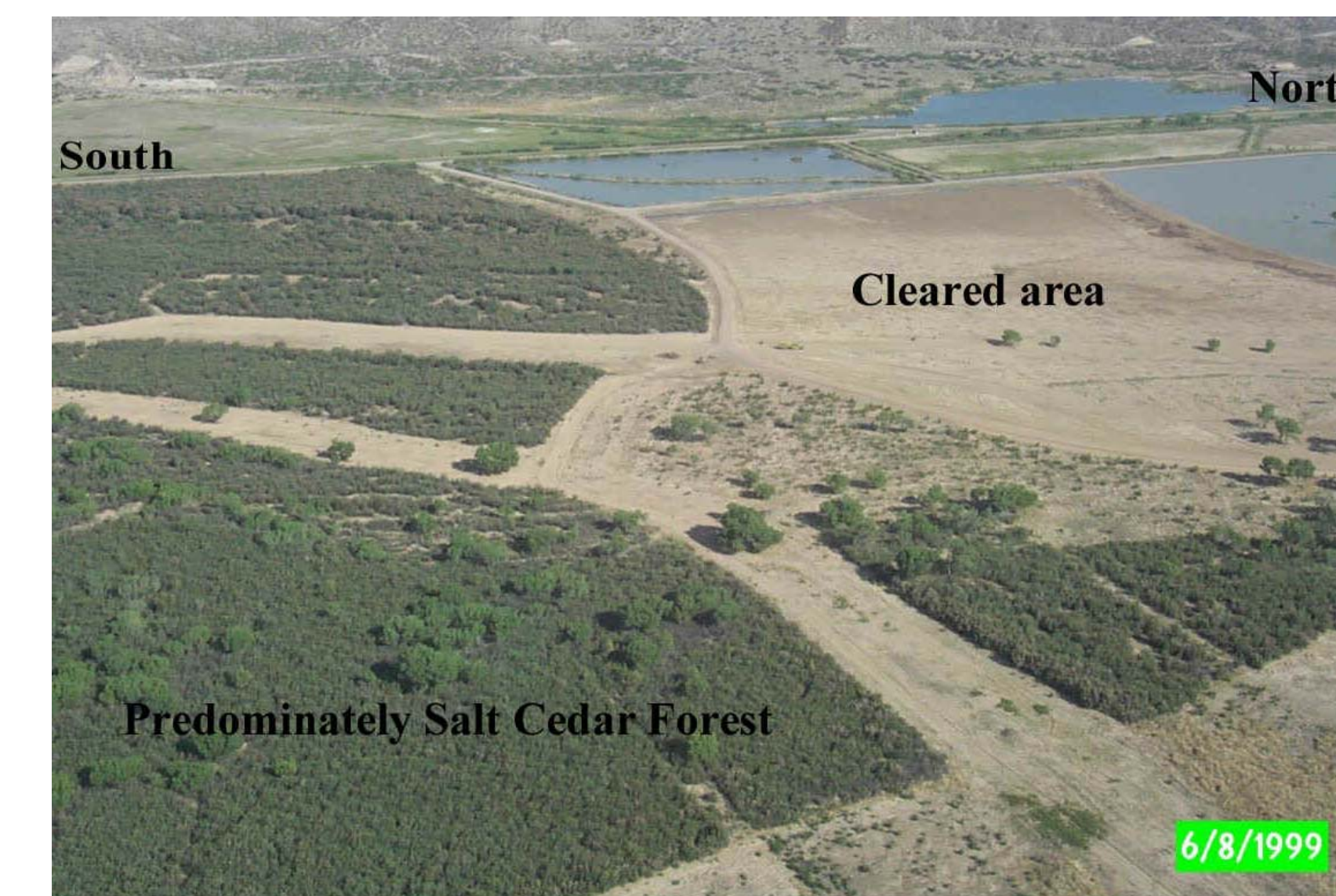
By Karen Wetherill, University of New Mexico, Albuquerque, NM 87106

ABSTRACT

Throughout the southwest, tamarisk has taken over riparian areas to form dense, monospecific stands leaving no room for the native vegetation. Before the tamarisk invasion, the Bosque was an area of high floral diversity. Huge efforts have been taken to physically remove tamarisk from the bosque to allow the native vegetation to recolonize. Due to the physical aspects of tamarisk removal, reintroduction of native vegetation (through seeding or natural recolonization) is a process that can take years to stabilize.

Many types of adult insects, such as bees, wasps, flies, and beetles, use nectar as a source of energy. However bees don't just drink nectar, they also use the pollen as a source of nutrition on which to rear their offspring. Tamarisk is an incredibly good source of nectar, but is a lousy source of pollen. Since it is wind pollinated, the pollen grains are small and not very nutritious. Insect pollinated plants on the other hand provide both nectar and nutritious pollen. Many of these native plants also have very tight relationships with their respective bees, in some cases one species of bee may only pollinate a single genus of plant. Native bees interact closely with their host plants and therefore, can be good indicators of habitat diversity and health. Bee traps are a low maintenance and low time commitment way of monitoring bees.

This study was designed to monitor and compare pollinator communities between areas where tamarisk has been removed and areas where tamarisk remains in dense thickets.



Photos by Paul Tashjan

Progress

All collections for 2008 and 2009 were completed by the volunteers of the Friends of the Bosque. Specimens from 2008 have been pinned and labeled by a high school volunteer, Alex Hendrickson. Specimens from 2008 have been identified, mostly to species by Karen Wetherill (UNM) and Terry Griswold (USDA Bee Laboratories, Logan, UT). The research project is expected to continue as planned through 2010.

Family	Genus species	females	males	cottonwood	tamarisk	saltgrass
Andrenidae	<i>Andrena aff. surra</i>	2	0	0	0	1
Andrenidae	<i>Andrena capricornis</i>	2	0	1	0	1
Andrenidae	<i>Andrena heilanti</i>	2	0	0	1	0
Andrenidae	<i>Andrena illinoensis</i>	1	0	0	0	1
Andrenidae	<i>Andrena monilicornis</i>	1	0	0	0	1
Andrenidae	<i>Andrena prima</i>	1	0	1	0	0
Andrenidae	<i>Andrena primifrons</i>	8	1	1	1	1
Andrenidae	<i>Heterosus aff. perlaeus</i>	1	0	0	1	0
Andrenidae	<i>Heterosus sp2</i>	1	0	0	1	0
Andrenidae	<i>Pardalis albigenis</i>	1	2	1	1	1
Andrenidae	<i>Pardalis apacheorum</i>	0	1	1	0	0
Andrenidae	<i>Pardalis asteris</i>	1	0	0	1	0
Andrenidae	<i>Pardalis callicerata</i>	12	6	1	1	1
Andrenidae	<i>Pardalis coreopsidis</i>	6	2	1	1	1
Andrenidae	<i>Pardalis dolichocephala</i>	1	0	1	0	0
Andrenidae	<i>Pardalis fallax</i>	4	0	1	1	1
Andrenidae	<i>Pardalis ignota_ignota</i>	1	0	0	1	0
Andrenidae	<i>Pardalis mentzeliae</i>	2	0	0	1	0
Andrenidae	<i>Pardalis new_species</i>	0	1	0	1	0
Andrenidae	<i>Pardalis perpulchra</i>	7	2	1	1	1
Andrenidae	<i>Pardalis sp1</i>	1	0	1	0	0
Andrenidae	<i>Pardalis sp2</i>	1	0	1	0	0
Andrenidae	<i>Pardalis verbesinae</i>	1	0	0	1	0
Apidae	<i>Anthophora affabalis</i>	2	2	1	1	1
Apidae	<i>Anthophora californica</i>	1	1	0	0	1
Apidae	<i>Anthophora lesquerella</i>	3	2	1	1	0
Apidae	<i>Anthophora montana</i>	2	0	1	0	0
Apidae	<i>Anthophora porterae</i>	3	5	1	1	1
Apidae	<i>Anthophora compactula</i>	0	1	0	0	1
Apidae	<i>Apis mellifera</i>	53	0	1	1	1
Apidae	<i>Bombus pennsylvanicus</i>	6	0	1	1	1
Apidae	<i>Bombus sonorus</i>	1	0	0	0	1
Apidae	<i>Ceratina acanthra</i>	1	0	1	0	0
Apidae	<i>Ceratina nanula</i>	1	0	1	0	0
Apidae	<i>Diadasia australis</i>	16	2	1	1	1
Apidae	<i>Diadasia diminita</i>	4	1	0	1	1
Apidae	<i>Diadasia ochracea</i>	1	0	0	0	1
Apidae	<i>Diadasia riononis</i>	254	33	1	1	1
Apidae	<i>Eucera ysa</i>	9	6	1	1	1
Apidae	<i>Evromalopsis solani</i>	4	0	1	0	1
Apidae	<i>Habropoda morrisoni</i>	6	7	1	0	1
Apidae	<i>Habropoda new_species</i>	6	3	1	1	1
Apidae	<i>Holcopasthes calliopsidis</i>	1	0	1	0	0
Apidae	<i>Melecta bohartorum</i>	5	3	1	1	0
Apidae	<i>Melecta pacifica</i>	3	5	1	0	1
Apidae	<i>Melissodes coloradensis</i>	3	0	0	1	1
Apidae	<i>Melissodes communis</i>	9	0	1	0	1
Apidae	<i>Melissodes spp</i>	48	11	1	1	1
Apidae	<i>Melissodes tristis</i>	130	0	1	1	1
Apidae	<i>Neolarra vigilans</i>	1	0	0	1	0
Apidae	<i>Normda sp1</i>	0	1	0	0	1
Apidae	<i>Norma triangulifera</i>	1	1	0	0	1
Apidae	<i>Svastra machaerantherae</i>	1	0	0	0	1
Apidae	<i>Svastra obliqua</i>	1	0	0	0	1
Apidae	<i>Xylocopa californica</i>	1	0	1	0	0
Colletidae	<i>Hyleaeus sp1</i>	0	1	0	0	1
Halictidae	<i>Agapostemon angelicus</i>	139	1	1	1	1
Halictidae	<i>Agapostemon femoratus</i>	184	0	1	1	1
Halictidae	<i>Agapostemon melliventris</i>	14	0	1	1	1
Halictidae	<i>Agapostemon spendens</i>	1	0	0	0	1
Halictidae	<i>Augochlorella aurata</i>	1	0	1	0	0
Halictidae	<i>Dufourea malacothricis</i>	0	1	1	0	0
Halictidae	<i>Dufourea marginata</i>	2	1	1	1	0
Halictidae	<i>Halictus confusus</i>	1	0	1	0	0
Halictidae	<i>Halictus ligatus</i>	33	1	1	1	1
Halictidae	<i>Halictus parallelus</i>	6	0	1	0	1
Halictidae	<i>Halictus tripartitus</i>	5117	0	1	1	1
Halictidae	<i>Lasioglossum aff. coactum</i>	7	0	1	0	1
Halictidae	<i>Lasioglossum aff. pervarum</i>	31	0	1	1	1
Halictidae	<i>Lasioglossum Dialictus_sp12</i>	7	0	1	0	1
Halictidae	<i>Lasioglossum Dialictus_sp15</i>	63	0	1	0	1
Halictidae	<i>Lasioglossum Dialictus_sp17</i>	42	0	1	1	1
Halictidae	<i>Lasioglossum Dialictus_sp18</i>	6	0	0	1	1
Halictidae	<i>Lasioglossum Dialictus_sp19</i>	3	0	0	0	1
Halictidae	<i>Lasioglossum Dialictus_sp20</i>	3	0	1	1	1
Halictidae	<i>Lasioglossum Dialictus_sp21</i>	2	0	0	0	1
Halictidae	<i>Lasioglossum Eulyaeus_sp1</i>	87	0	1	1	1
Halictidae	<i>Lasioglossum Eulyaeus_sp2</i>	4	0	1	1	1
Halictidae	<i>Lasioglossum Eulyaeus_sp3</i>	1	0	1	0	0
Halictidae	<i>Lasioglossum Eulyaeus_sp4</i>	1	0	0	0	1
Halictidae	<i>Lasioglossum Eulyaeus_sp5</i>	1	0	0	1	0
Halictidae	<i>Lasioglossum Eulyaeus_sp6</i>	1	0	0	1	0
Halictidae	<i>Lasioglossum hudsoniella</i>	65	0	1	1	1
Halictidae	<i>Lasioglossum noctivaga</i>	1	0	1	0	0
Halictidae	<i>Lasioglossum paraforbesii</i>	1	0	0	0	1
Halictidae	<i>Lasioglossum potasi</i>	1	0	0	0	1
Halictidae	<i>Lasioglossum semicaeruleum</i>	119	0	1	1	1
Halictidae	<i>Lasioglossum sisymbria</i>	12	0	1	1	1
Halictidae	<i>Sphindodes sp1</i>	4	0	0	0	1
Megachilidae	<i>Anthridium emarginatum</i>	1	0	0	1	0
Megachilidae	<i>Anthridium porterae</i>	1	0	1	0	0
Megachilidae	<i>Ashmeadiella bigeloviae</i>	2	6	0	1	1
Megachilidae	<i>Ashmeadiella mellioi</i>	12	3	1	1	1
Megachilidae	<i>Dianthidium curvatum</i>	2	0	1	0	1
Megachilidae	<i>Dioxys aff. pomonae</i>	2	3	1	0	1
Megachilidae	<i>Dioxys halictus</i>	1	0	0	0	1
Megachilidae	<i>Heriades variolosa</i>	0	1	0	0	1
Megachilidae	<i>Hoplitis grinnelli</i>	0	1	0	0	1
Megachilidae	<i>Lithurge apicalis</i>	0	2	0	1	0
Megachilidae	<i>Megachile fippiae</i>	0	2	1	0	0
Megachilidae	<i>Osmia ceres</i>	4	1	0	1	1
Megachilidae	<i>Osmia hudsoniella</i>	0	1	0	1	0
Megachilidae	<i>Osmia ignaria</i>	0	2	0	1	1
Megachilidae	<i>Osmia kogastri</i>	5	2	1	1	1
Megachilidae	<i>Osmia prunorum</i>	12	3	1	1	1
Megachilidae	<i>Osmia titusi</i>	4	3	1	1	1
Megachilidae	<i>Osmia watsoni</i>	3	1	1	1	1
Megachilidae	<i>Stelis robertsoni</i>	0	1	0	1	0
		6853	137	86	59	72

Hypotheses

- H1: Wasp, fly and beetle diversity and abundance will be higher in areas where tamarisk has not been cleared.
- H2: Bee diversity will be higher in areas where native vegetation has begun to reestablish.
- H3: Bee diversity will continue to increase years after grassland restoration.

Summary of Preliminary Results

A total of 109 morphotypes were found, 86 of which have been identified to species. This does not include male *Bombus* or *Dialictus*. The morphotypes of *Dialictus* and *Melissodes* are not finalized and are most likely an underestimate of true diversity. Two new species have been determined, but not yet named. And 5 species have been assigned as affinis which means that the specimens resemble a known species, but further study is needed to determine if it is new or not.

The site with the highest species richness is the saltgrass site with 72 species, followed by the cottonwood forest, 66 species, and the Tamarisk site has the fewest number of species at 59. The most common species *Halictus tripartitus* represents 75% of the total bee abundance. This species shows affinity to the tamarisk site and is represented by few individuals in the cottonwood site and only a handful of individuals at the saltgrass site.



Methods

Starting in the spring of 2008, Buchmann bee traps (see picture) are run for two weeks on and two weeks off over an eight month time period for three years in a row. Three habitat types have been selected. A tamarisk forest, a riparian forest, and a newly established grassland. Three blue and three yellow traps will be placed in each habitat type. The tamarisk forest and the riparian forest are comparable as both have a cottonwood over-story. These sites can be directly compared. The grassland site has no such equivalent tamarisk site. It is suggested that the same monitoring program be repeated at this site in a decade or more to examine the development of the bee community.

The specimens will be pinned and labeled, identified to the lowest taxonomic level possible, and deposited into the Museum of Southwestern Biology at the University of New Mexico. Statistical analyses will be run to compare diversity and abundance between sites and over time.

Acknowledgements: Thanks to the Bosque del Apache National Wildlife staff for hosting and supporting this research. Thanks to the Friends of the Bosque volunteers for collecting the samples in the field. Thanks to Alex Hendrickson for pinning and labelling the 2008 samples. Thanks to Andrew Garcia for volunteering. Additional thanks to the Sevilleta Long Term Ecological Research program and the University of New Mexico.