Greater Rio Grande Watershed Alliance Report prepared by the Bosque Ecosystem Monitoring Program

In partnership with UNM Biology and Sevilleta LTER

WORK COMPLETED BY:
Bosque Ecosystem Monitoring Program (BEMP), funded through the Friends of BEMP 501c3

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REPORT FOR PERIOD FROM:
May 20, 2025 - December 31, 2025

DATE SUBMITTED:
30 January 2026

OVERVIEW: This report and all associated billing is for programmatic work conducted by the Bosque Ecosystem Monitoring Program (BEMP) from May 20th, 2025 to December 31st, 2025. This work includes the field data collection and processing of *Diorhabda* spp. (the tamarisk leaf beetle), the work completed by BEMP staff.

Introduction

Saltcedar (*Tamarix* spp.) was introduced into the riparian forest throughout the Middle Rio Grande during the 19th and 20th centuries in order to reduce bank erosion along the Rio Grande. This exotic and invasive woody plant species has become highly established in riparian ecosystems across the Southwest. This species is resilient in highly saline soil conditions (Glenn and Nagler, 2005), has the capacity to propagate by root or seeds that spread from March to September, and obtain both deep and shallow water resources due to its root structure. These characteristics have enabled saltcedar to out-compete many native plant species throughout the Middle Rio Grande. Management efforts to remove this species by methods of manual or mechanical extraction, poisoning, or burning met with less than ideal degrees of success.

The USDA approved the release of *Diorhabda* spp., the tamarisk leaf beetle (TLB), as part of an experimental method to assist with the management of saltcedar. It was thought that the defoliation from the beetle in conjunction with management efforts would increase saltcedar mortality or suppress the tree species, enabling native vegetation to gain more access to resources (DeLoach et al., 1996). In 2001, the TLB was released in several states throughout the southwest with a high presence of saltcedar.

As riparian vegetation composition shifted throughout the years due to anthropogenic manipulation, stands of coyote willow, preferred nesting habitat for the endangered Southwestern Willow Flycatcher (*Empidonax traillii extimus*) (SWFL), were notably reduced. This bird has adapted to using saltcedar for nesting purposes. One of the unforeseen consequences of releasing the TLB was a negative effect on the hatching success of the endangered SWFL. The TLB's peak saltcedar defoliation occurred in conjunction with SWFL egg laying and chicks hatching. This defoliation exposes the eggs and chicks to predation and increased temperatures from direct sunlight, further reducing populations. Location for bird species of interest can be seen in Figure 1.

BEMP began to monitor the abundance and distribution of these beetles throughout the Middle Rio Grande in 2013 in order to inform managers of the progression of TLB impact and presence. In 2025, all sampling sites were located within the Middle Rio Grande Bosque from Alameda Open Space in Albuquerque, New Mexico, to the Bosque del Apache National Wildlife Refuge.

Methods

Protocols for sampling the tamarisk leaf beetle were based on sampling procedures modified from the Tamarisk Coalition (now RiversEdge West), the Colorado Department of Agriculture, and Santa Barbara University (BEMP Research Protocols). Nine of the 10 sites sampled in 2025 are a part of BEMP's long term research sites and have amassed several years of previous TLB, and other ecological data. The Rio Abajo site began to be collected in the 2022 collection season at the request of GRGWA (Figure 1).

Sampling for TLBs took place during the week of the third Tuesday of each month from May to August for all sites. A subset of five sites were sampled in September, including (North to South) Diversion, Rio Abajo, Crawford, Sevilleta, and Bosque del Apache (BDA) to see if any late season TLBs were active. At each site, five saltcedar trees approximately five meters apart were swept in an upward motion with an insect sweep net five times. The contents of the net were emptied into gallon sized zippered bags, field identification and counts of species of interest were documented. Species of interest include: *Diorhabda* spp., which were counted separately according to life stage: early TLB larvae, late TLB larvae, adult TLB and TLB egg masses. Other defoliators counted included *Coniatus splendidulus*, the splendid tamarisk weevil (and associated life stages), and *Opsius stactogalus*, the tamarisk leafhoppers. Generalist predators of the defoliators such as ants, spiders, and ladybugs were also identified, counted and recorded. Any additional captures are listed regardless of their impact on saltcedar defoliation or predation on the defoliators. After field identification and counts occurred, net contents were typically released. The majority of the trees sampled at BEMP sites have been sampled since 2013 and are marked by a metal identification tag to ensure their continuity, however due to tree mortality sampled trees have shifted over the years. While in the field, staff collected data on the percent of dead branches, yellow and brown defoliation, refoliation, and flowering for each tree sampled. Staff also took a photo from established photo points for each saltcedar each month in order to visually track the impact of the beetle on the trees.

Additional GRGWA site:

Rio Abajo

Rio Abajo is a riparian site, located near the river in the Middle Rio Grande Bosque in Valencia County, southwest of BEMP's Reynolds Forest site. The site is located along Rio Road off highway 304 and is accessed through Valencia Soil and Water Conservation District land. BEMP received permission to access the site in order to monitor selected tamarisk trees. Rio Abajo is characterized by a large open field that eventually leads to vegetated areas of bosque, including stands of tamarisk, wolfberry, Russian olive, cottonwoods, and yerba mansa.

Reporting and Visualizations

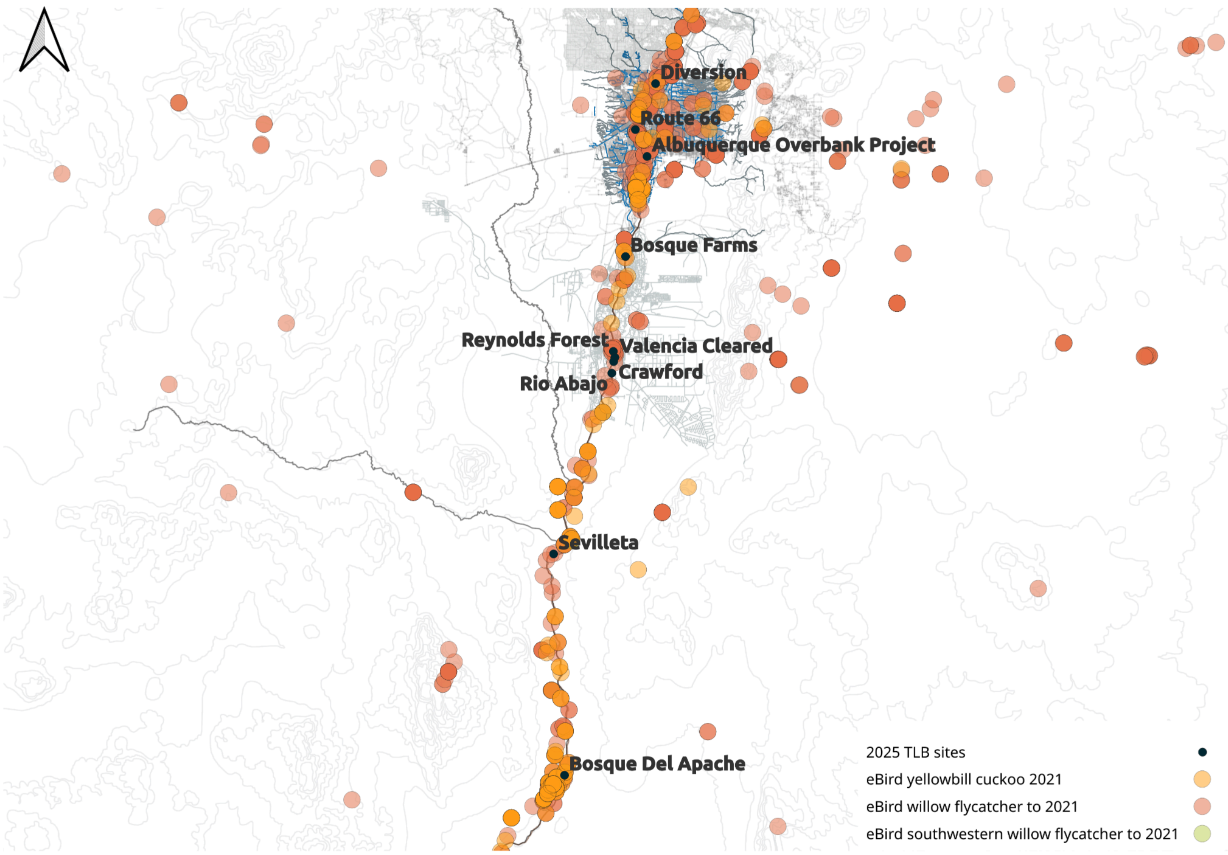

Figure 1. Current tamarisk leaf beetle monitoring sites for 2025. 500 foot contour intervals are in pale blue. Black circles are TLB collection sites. Tan-brown circles are ebird data from 2021 that are species of interest.

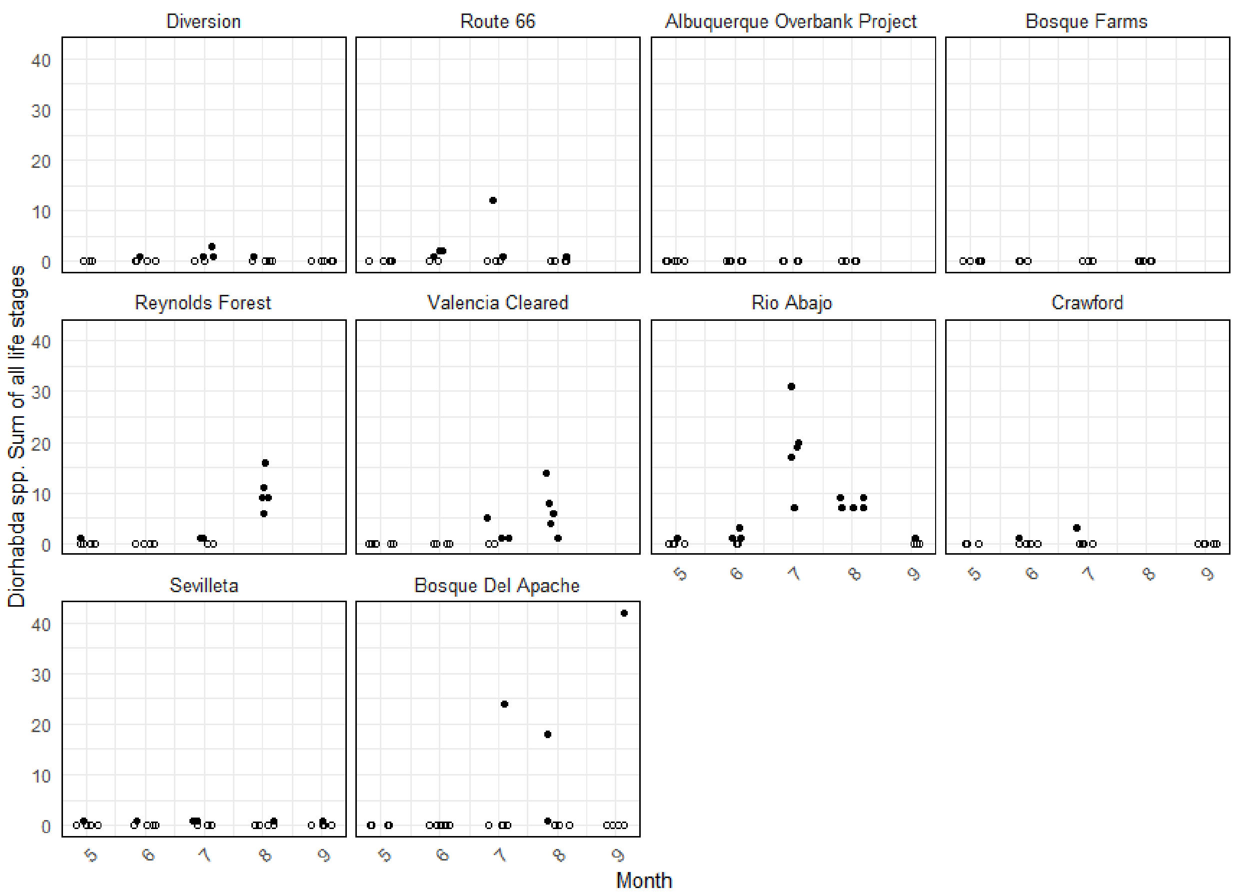

Figure 2. Total *Diorhabda* spp. for all life stages found at sites from May through August or September (five sites) 2025. All life stages include egg masses, early and late larvae, and adults. Hollow dots represent zeros. Sites are arranged from north to south.

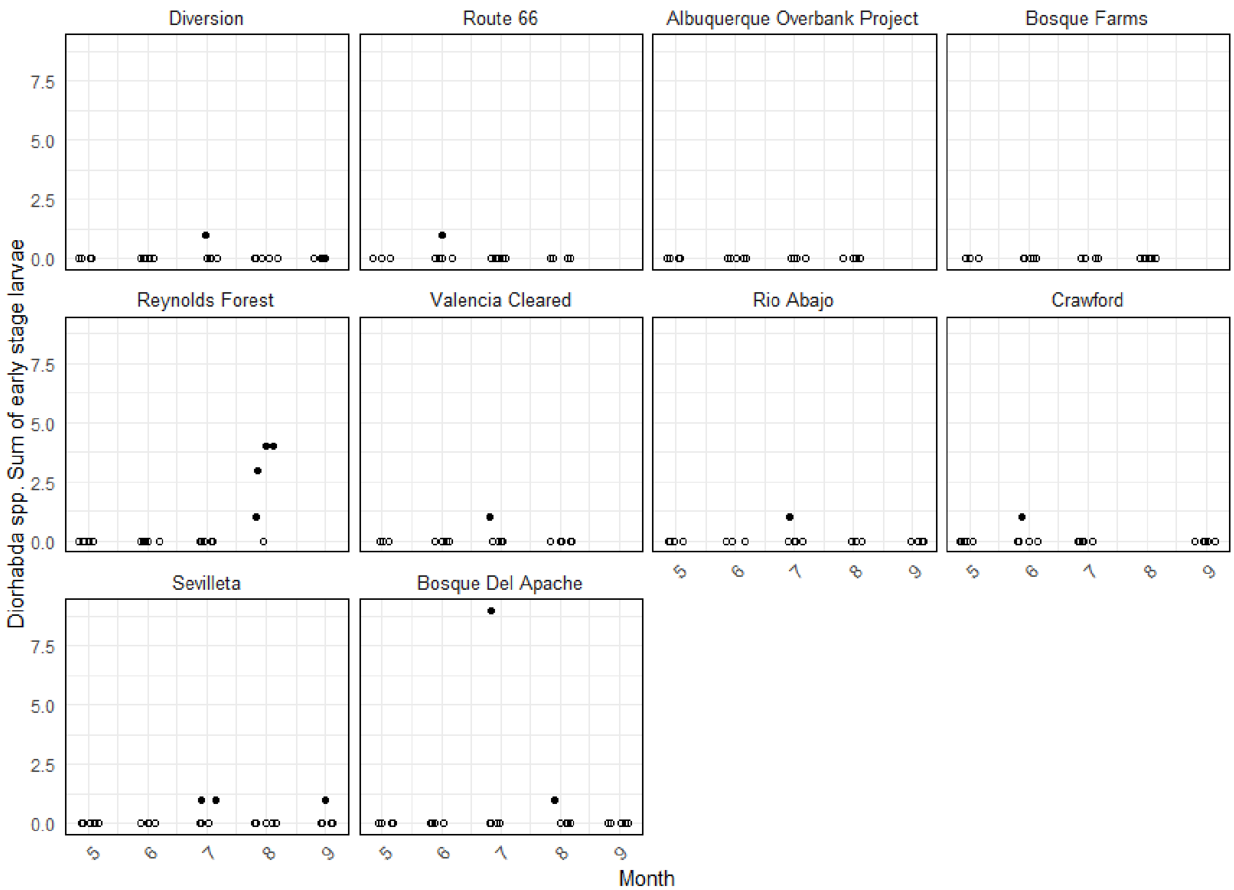

Figure 3. Total *Diorhabda* spp. early stage larvae found at sites from May through August or September (five sites) 2025. Hollow dots represent zeros. Sites are arranged from north to south.

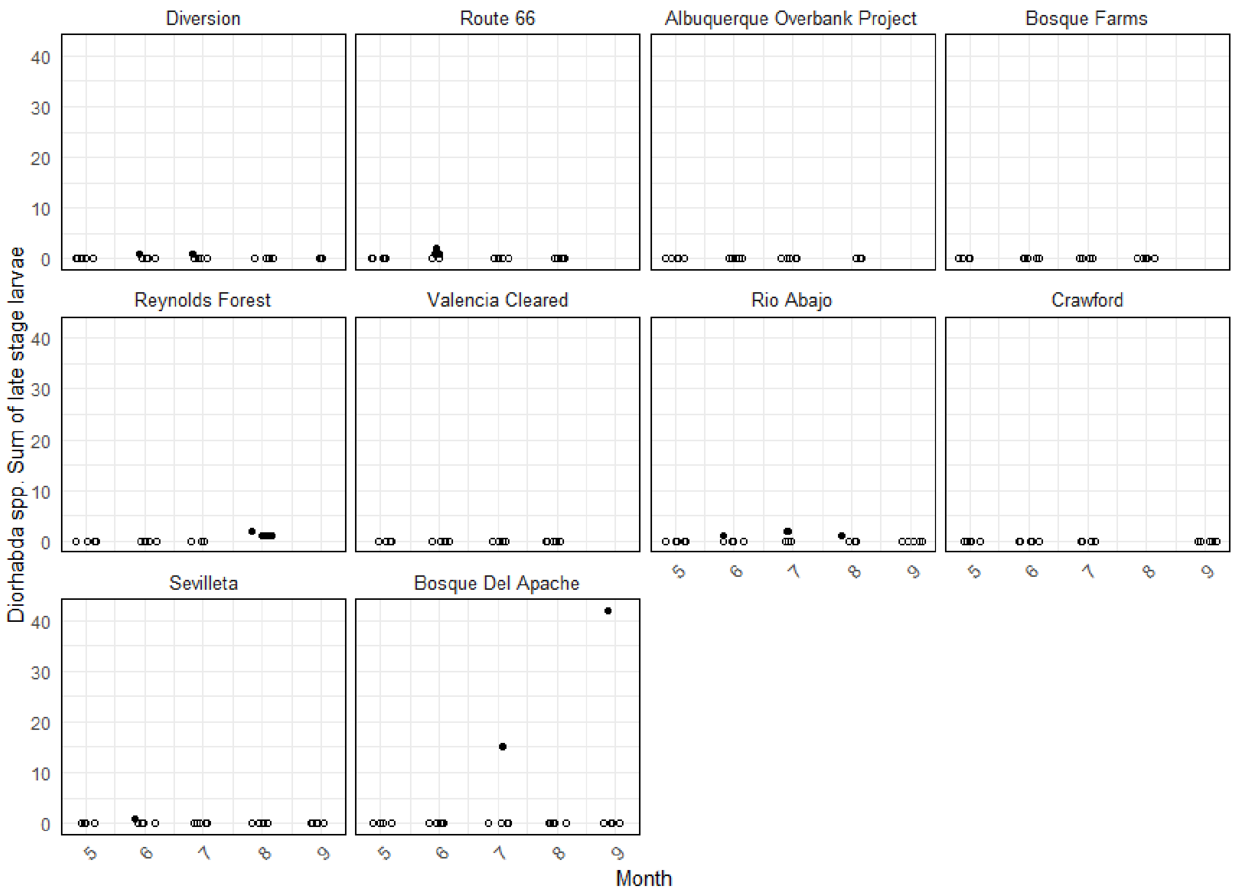

Figure 4. Total *Diorhabda* spp. late stage larvae found at all sites from May through August or September (five sites) 2025. Hollow dots represent zeros. Sites are arranged from north to south.

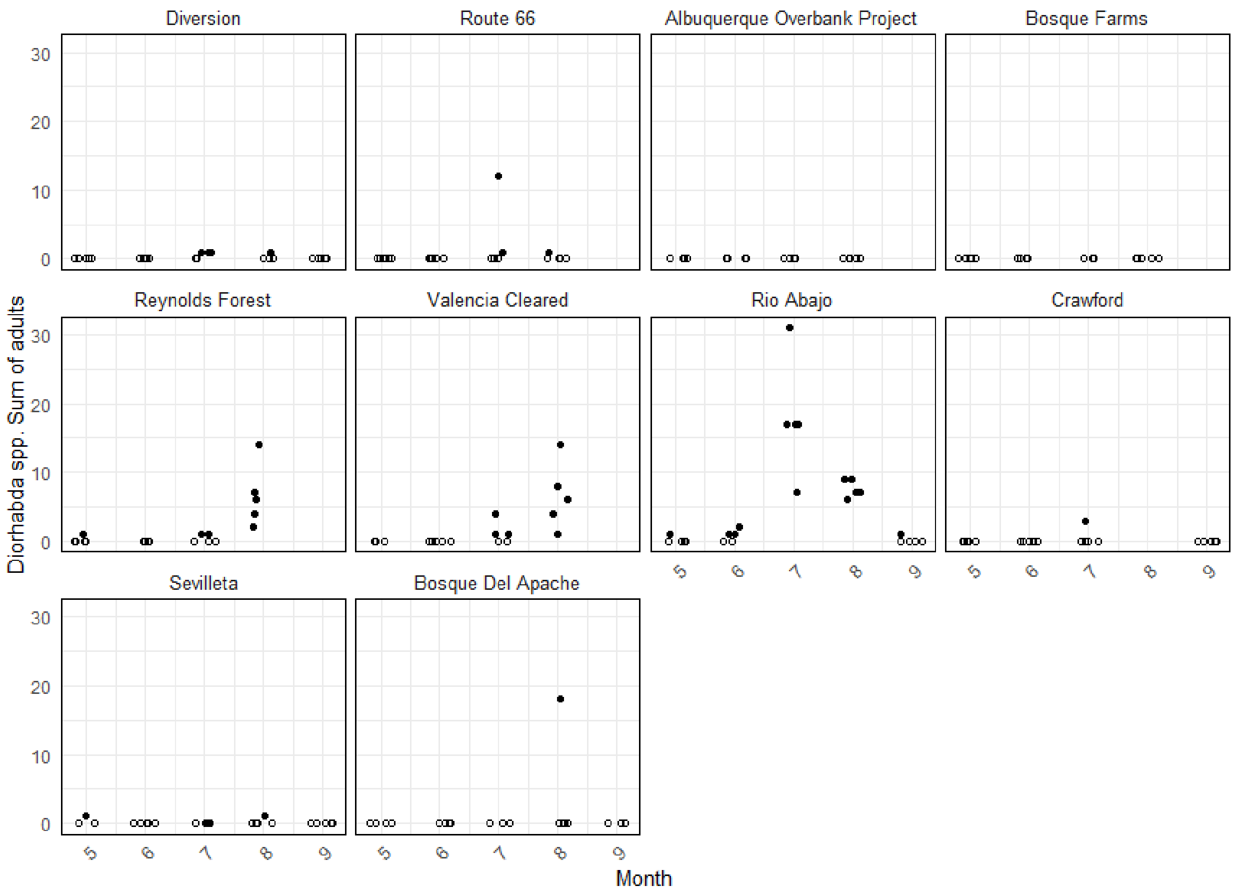

Figure 5. Total *Diorhabda* spp. adults found at all sites from May through August or September (five sites) 2025. Hollow dots represent zeros. Sites are arranged from north to south.

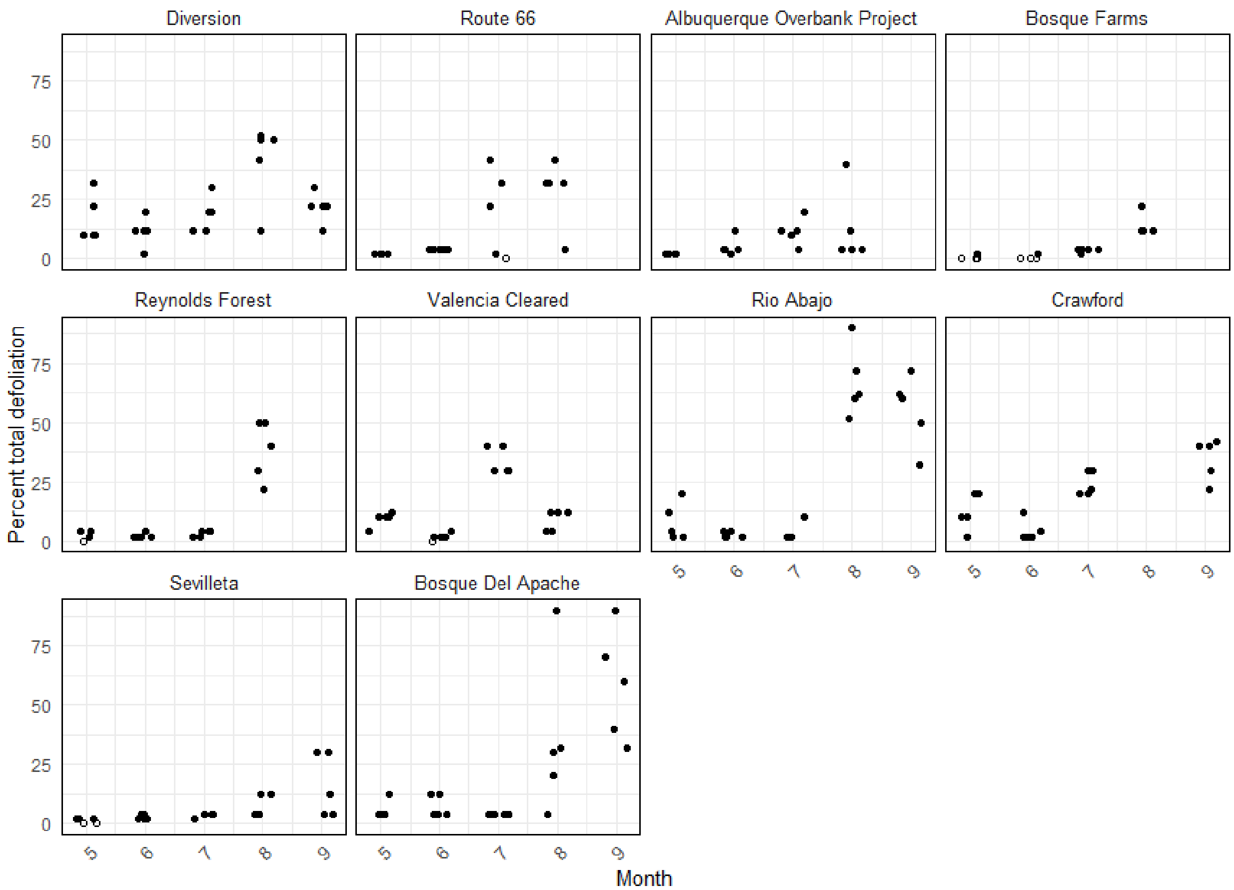

Figure 6. Percent total defoliation shown by tree across the sample sites for 2025. Total defoliation includes defoliation by both TLB and other defoliators. Hollow dots represent zeros. Sites are arranged from north to south.

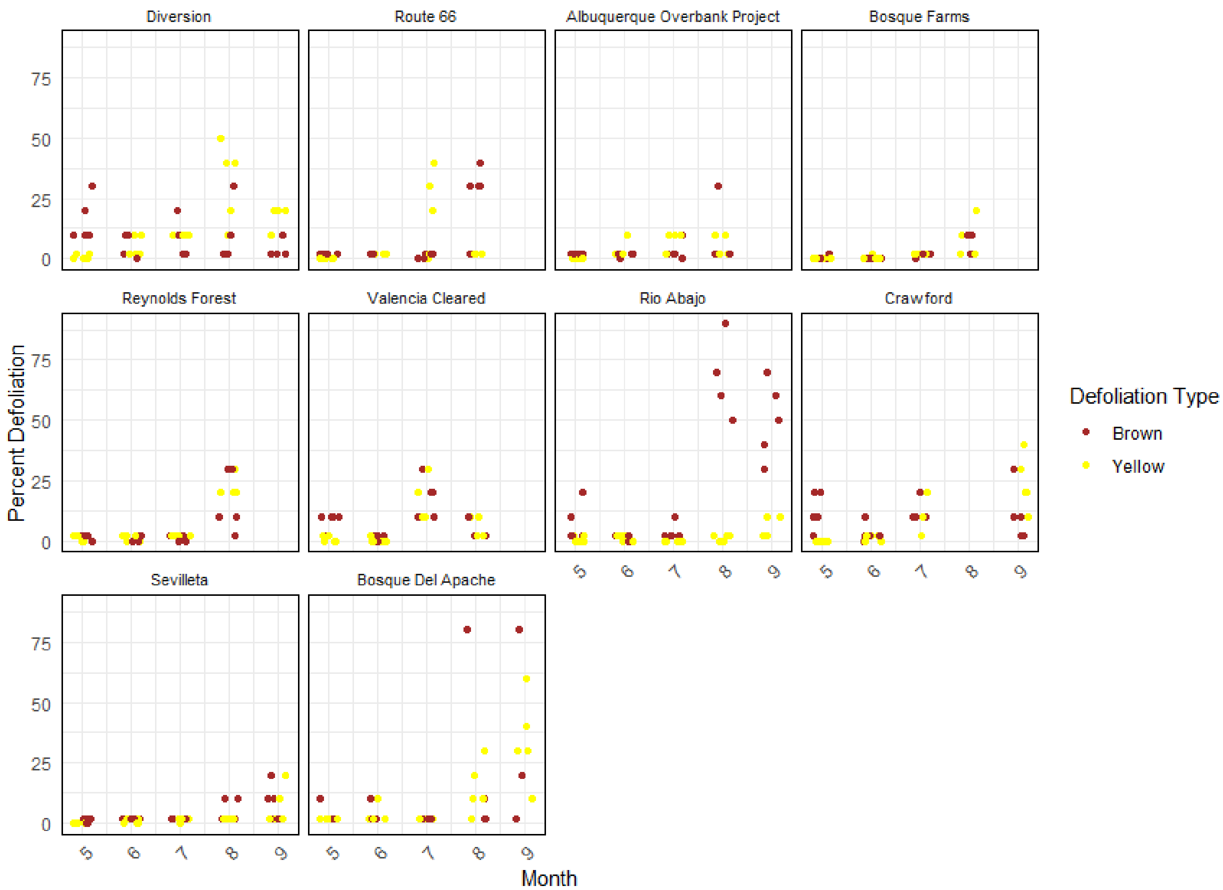

Figure 7. Percent yellow and brown defoliation shown by tree across the sample sites for 2025. Sites are arranged from north to south.

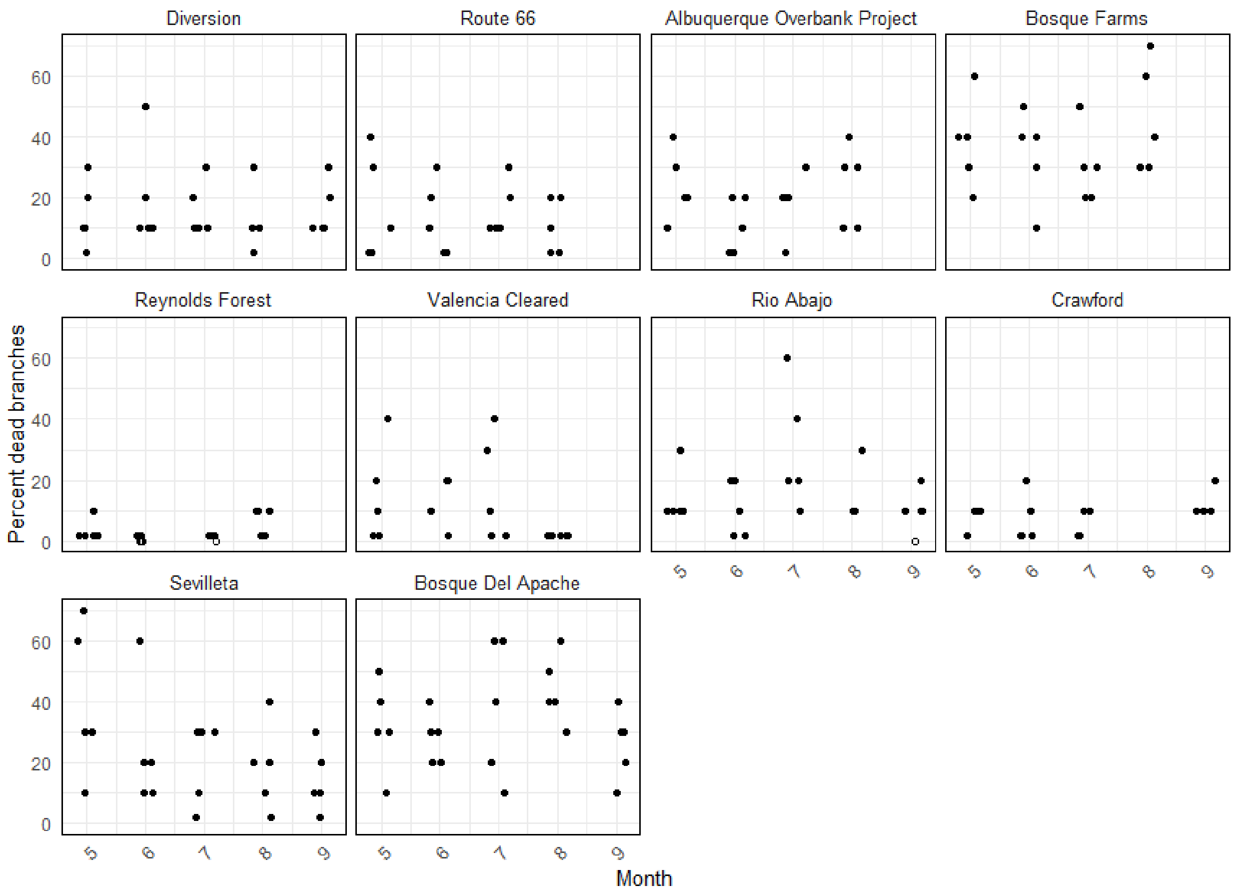

Figure 8. Changes in saltcedar dead branches over the course of the 2025 sample year by tree per site. Sites are arranged from north to south.

Site name	May	June	July	August	September	Total
Diversion	0	1	5	1	0	7
Route 66	0	5	13	1	-	19
Albuquerque Overbank Project	0	0	0	0	-	0
Bosque Farms	0	0	0	0	-	0
Reynolds Forest	1	0	2	51	-	54
Valencia Cleared	0	0	7	33	-	40
Rio Abajo	1	5	94	39	1	140
Crawford	0	1	3	-	0	4
Sevilleta	1	1	2	1	1	6
Bosque Del Apache	0	0	24	19	42	85

Table 1. Total TLB all life stages found at all sites May through September 2025. Sites arranged from north to south. "-" represents no sampling.

TLB presence

Tamarisk leaf beetles were collected at eight of the 10 sampled sites. The abundance varied from site to site and ranged from zero TLB collected (Albuquerque Overbank Project, and Bosque Farms) to 140 TLBs collected at the Rio Abajo site over the entire collection season (Figures 2–5, Table 1).

TLB peak abundances

The highest quantity of TLBs for all sites were collected in July with 150 individuals collected, followed by August with 145 individuals collected. This trend was driven by a large abundance of individuals collected at the Rio Abajo site with 94 individuals collected in July and 39 individuals collected in August and Reynolds Forest with 51 individuals collected in August.

September Sampling

During the September sampling, TLBs were collected at the Rio Abajo, Sevilleta, and Bosque del Apache sites, with none found at Crawford in Belen. Forty two individuals were collecting at Bosque del Apache in September marking the third year that a significant amount of TLBs have been collected during September, the only other year being 2023 (BEMP started doing September collections in 2018). Continued sampling needs to occur to determine if this is a phenological shift, an artifact of sampling efforts, or due to other environmental factors. Although sampling efforts ceased in September, during the October, 24th site visit, adult and late stage TLBs were noted on tamarisk trees at the Bosque del Apache BEMP site. Showing in appropriate conditions the beetles are able to remain active later in the season.

Defoliation

Despite the varied TLB numbers, defoliation levels ranged from 0 to 90% at the sites (Figure 6). Defoliation typically attributed to the tamarisk leafhopper, which results in yellow foliage, ranged from 0 to 60%, while defoliation typically attributed to the TLB, which results in brown/dead foliage, ranged from 0 to 90%, as was seen in total defoliation (which is both yellow + brown defoliation) (Figure 6 and 7). Many sites showed an increase in defoliation during August and September at sampled sites, including an increase in brown defoliation, typically associated with herbivory by TLB (Figure 6 and 7). This increase in brown defoliation continued to occur at sites where few or no TLB were collected. This phenomenon was notable at the Route 66 site, tree three, which jumped from an average of 2% brown defoliation in July, to 30% in August, despite only capturing 13 TLB in July, and 1 in August. This increase in defoliation underlines the importance of the full range of monitoring, as the beetle populations were potentially missed on the specific sampling date, but the evidence of beetle damage was still observable and quantifiable.

Dead branches

Another consistent way to track the impacts of TLB on tamarisk stands is to record the percent of dead canopy each month. This year, the percent of dead branches for individual trees ranged from 0 to 70% (Figure 8). In previous years percent dead canopy is shown to increase during the peak of TLB activity, which may be due to branches being denuded but not actually dead.

As refoliation occurs, branch death may seem to recover.

In the May sampling of this year, 60% dead branches were seen on tree #2 and 70% dead branches were seen on tree #5 at the Sevilleta site. During the July sampling for this site, percent dead branches on these two trees were recorded as 30% and 30% respectively indicating some of these branches were denuded but not actually dead.

Future sampling recommendations

Sites along the Middle Rio Grande should continue to be monitored for the presence of TLBs and other tamarisk defoliators. Sampling time frame should continue May to August, when TLBs are active; evidence supports continued sampling in September at a subset of sites to monitor for late populations of *Diorhabda* spp. as seen this, and previous years. If a better understanding of population fluctuations and peaking are desired, the total number of sites sampled can be decreased and the frequency of collections at a subset of the remaining sites can be increased. To achieve a better understanding of tamarisk and tamarisk defoliator interactions at particular sites it is important to periodically change the trees being sampled. This will ensure that continued sampling of specific trees does not influence the health of the trees or manipulate TLB presence.

Discussion

Currently, BEMP data show declines in tamarisk cover, increases in branch dieoff, and continued early leaf fall due to the TLB. Analyses do not currently show changes in vegetation communities following defoliation by TLB. Considering that the TLB have only been present at BEMP sites for about 10 years, fewer for southern sites, this is not surprising. Perennial vegetation is well-established and slow to change without other disturbances in the landscape. Annual vegetation should be the first to respond positively to declines in tamarisk, but will likely need corresponding precipitation and soil disturbance events to become established. These analyses will be included in the BEMP annual report.

BEMP TLB data are available by request, and will be posted on GitHub
https://github.com/BEMPscience/bemp_data

References

DeLoach, C. J., Gerling, D., Fornasari, L., Sobhian, R., Myartseva, S., Mityaev, I. D., ... & Cisneroz, J. (1996, January). Biological control programme against saltcedar (Tamarix spp.) in the United States of America: progress and problems. In *Proceedings of the IX International Symposium on the Biological Control of Weeds* (pp. 19-26). Cape Town: University of Cape Town.

Glenn, E. P., & Nagler, P. L. (2005). Comparative ecophysiology of Tamarix ramosissima and native trees in western US riparian zones. *Journal of Arid Environments*, *61*(3), 419-446.

BEMP Budget funded by GRGWA

Budget Category	*Description*	*GRGWA Funded*
Personnel	*BEMP Staff (July-September 2026)*	*$7,000*
Personnel	*Partial funding of BEMP staff for reporting and data visualization*	*$4,100*
Travel	*Travel to field sites*	*$1,3100*
Equipment		*$90*
	Subtotal	*$12,500*
Overhead	*20% of total project for administrative overhead and project supervision*	*$2,500*
	Total	***$15,000***