Floral Resources in an Erosion Mitigation Seed Mix Enhance Wild Bee conservation: A Case Study[1]

J. Berry, C. G. Fair[2], and S. K. Braman[3]

Department of Entomology, University of Georgia, Athens, Georgia 30602 USA

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Abstract Pollination by bees plays a critical role in the viability of life on this planet from food crop productivity to biodiversity of ecosystems; however, their populations, globally, are in decline. Contributing factors include pesticides, climate change, diseases, and invasives, but most notable, are habitat degradation and fragmentation due to agricultural intensification and urbanization. Research has shown that conservation and restoration of land can help to restore bee abundance and diversity. One opportunity to establish habitat which will attract and provide resources for bees is eroded lands. Recommendation for restoration of eroded land usually includes planting with a number of quick growing native and non-native grasses, which do little for bee conservation. In our study, we incorporated floral resources into an erosion mitigation seed mix specifically selected for their ability to attract bees and thrive in the Piedmont region of Georgia. Plots that incorporated these flowering plants had a greater abundance, richness, and diversity of bees compared with those plots that only contained grass. Bees were 30 times more abundant in wildflower-enhanced plots. Of the flowering plants selected, the ones that survived and bloomed well were *Rudbeckia hirta* L. (Black-eyed Susan), *Chamaecrista fasciculata* (Michaux) Greene (partridge pea), *Eryngium yuccifolium* Michaux (rattlesnake master), *Pycnanthemum muticum* (Michaux) Persoon (mountain mint), and *Coreopsis lanceolata* (L.) R. Brown (Lanceleaf coreopsis). The most numerous bees collected by direct observation capture "bee to flower" or cross plot sweep netting "sweeps" were in the genera *Lasioglossum*, *Halictus*, and *Bombus.*

Key Words wild bees, pollinators, floral resources, erosion mitigation

Ecosystem services provided by insects include pest control, decomposition, wildlife nutrition, and pollination. These services help make life possible for humans on this planet (Noriega et al. 2018, Schowalter et al. 2018). Estimated global values of crop pollination services, adjusted for inflation in March 2020, range widely from US$267 to $657 billion annually (Porto et al. 2020). Twenty percent of counties in the United States produce 80% of total economic value attributable to insect pollinators (Jordan et al. 2021). More than 75% of the worlds flowering plants (Robinson and Morse 1989) and 35% of food plants require animal pollination (Klein et al. 2007), with bees (Hymenoptera: Anthophila) undoubtedly being the most important of the world's pollinators for agriculture and natural

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[2]University of Georgia Griffin Campus, Griffin, Georgia 30223.
[3]Corresponding author (email: kbraman@uga.edu).

systems (Buchmann and Nabhan 1996, National Research Council 2007). Global declines in bees, however, are on the rise (Dicks et al. 2021) with the related ecological impacts still being identified (Cane and Tepedino 2001, Lima et al. 2022, Potts et al. 2010, Russo 2016, Thomson 2016).

Factors contributing to the decline of bees include pesticide over-use, introduction of non-native species, and climate change (Lima et al. 2022), with habitat loss and fragmentation among the most significant drivers (Decourtye et al. 2019, Potts et al. 2016). Undisturbed land converted into agriculturally dominated systems also has contributed to a reduction in bee phylogenetic diversity and pollination services (Grab et al. 2019). Conserving and enhancing pollinator habitat through land restoration may slow the decline of bees by reducing habitat loss (Winfree et al. 2009). Compared with larger animals, bee pollinators have relatively small functional requirements. They need an overlapping food source throughout their active periods, an area in which to nest, and protection from pesticides. Studies also have shown the effectiveness of habitat restoration for bees in agricultural systems (Buri et al. 2014, Dicks et al. 2010, Kremen and M'Gonigle, 2015, M'Gonigle et al. 2015, Sutter et al. 2017) and how cities are providing refuge for bees even though their populations are in decline (Hall et al. 2017). Suitable nesting sites also can be a limiting resource for bee abundance and richness in urban lawn settings. Forested or natural undisturbed areas typically supply nesting habitat for many bees with fallen dead wood, bare ground, twigs, and other materials for cavity and soil nesters (Proesmans et al. 2019, Roberts et al. 2017).

Providing native bee habitat on farms and roadsides offers other opportunities for conservation. Establishment of flower-rich habitat within or around intensively farmed landscapes to increase the availability of pollen and nectar resources can include cover crops, field borders, shrubby hedgerows, and grass buffer strips (used to manage erosion and nutrient runoff) which are supplemented with flowers. Stabilization mixes are often comprised solely of native and non-native grasses which offer little in the way of resources for bees. Recouping and seeding eroded land with wildflower material, along with stabilization mixtures, can enhance pollinator habitat and benefit other ecosystem services (Wratten et al. 2012). A dearth of information and availability of locally adapted stabilization mixes that incorporate floral resources for pollinator conservation efforts limits application.

In the present study, we compared bee abundance, diversity, and richness between regionally adapted, pollinator-attractive plants alongside a quick growing, grass-based seed mixture typically used for erosion mitigation. The flowering plants selected were used to complement soil stabilization and habitat restoration plus attract bee pollinators. We predicted that areas planted with additional floral resources would have greater bee abundance and richness.

Materials and Methods

Plot establishment. The research site took advantage of a hillside at Iron Horse Farm in Watkinsville, GA (N33°43 W83°17) that was intensely eroded by logging and borrowing soil to create level areas for buildings. The 2-ha area initially consisted of highly erodible saprolite (weathered bedrock) exposed on a steep slope. Although the area was seeded with cereal rye to stabilize the slope, the highly acidic and low-nutrient saprolite did not support vegetative growth, and the

Fig. 1. Aerial and ground photos of the 2.02-ha field site with plots 1–10 shown in red and blocks shown in black in Greene Co., GA, showing erosion and stabilization prior to planting.

area experienced extensive erosion (Fig. 1). The research area presented a confluence of 5 habitats on the Iron Horse Farm: restored eroded land, agricultural production, early succession (adjacent logged area), wetlands, and mature bottomland hardwoods. Although the erosion presented a serious problem, it provided a unique opportunity to offer a living laboratory for a research and extension case study.

The eroded area included the shoulder and top portion of the slope where erosion began, gullied, and alluvial areas. Based on soil test recommendations, lime and poultry litter were applied to adjust soil pH and provide nutrients. Because compost socks and blankets have been successfully used to stabilize and revegetate slopes in the Southeast and elsewhere (AASHTO 2010, Risse and Faucette 2015, US EPA Office of Water 2012), mulch/compost blankets were applied to retain water and stabilize the soil on the shoulder (Fig. 1). These are a type of contained, three-dimensional compost filter berm, often replacing traditional sediment control practice such as silt fences or straw bale barriers. Here, mesh tubes filled with composted mulch were placed perpendicular to the direction of flow to contain sediment. A compost sock berm was established near the juncture of the shoulder and the slope which began to control runoff at the top of the slope. Working down the slope, blankets and berms were applied as needed. The site provided an opportunity to integrate the best management practices for erosion control and site stabilization with pollinator habitat restoration.

Two treatments were compared: (a) a standard grass stabilization mix and (b) the same mix that was flower enhanced with a seed mix of native, southern, ecotype pollinator attractive plants. Grass and flower mixes by percentage and species (Table 1) represented both standard practice and locally adapted plants. Each plot measured 16.8 $\times$ 45.7 m with the entire site encompassing a dimension of 167.6 $\times$ 45.7 m. The entire site was planted with the Georgia Department of Transportation recommended grass stabilization mix and sown at 111 kg/ha. The flower enhanced mix provided by Ernst Seed Company (Meadville, PA) was planted in October 2019 and again in April 2020 into the designated flower plots at 20.4 kg/0.4 ha.

The site was organized in a randomized complete block design with five blocks where each treatment (grass or flowers) was randomly assigned to one of the two plots within each block (Fig. 1). The goal of the blocks arranged along the gradient of the erosion was to account for the variation in the physical characteristics of each plot that were not the focus of the study. Flower and grass seeds were mixed with sand and placed into individual buckets and spread by hand throughout each of the randomly assigned plots. To help ensure establishment, rooted plugs were also planted in the flower-enhanced plots. Flower seeds obtained from Ernst Seed Company were also planted into individual pots and grown in a greenhouse. Once the plantings had reached a suitable height, but were not flowering, and the danger of frost was over, plants were transported to the field, divided equally among the five flower plots (15 each per plot), and planted and watered. Two additional flowering plants were selected and grown in the greenhouse and then transplanted to the field: *Pycnanthemum muticum* Michaux (mountain mint) and *Bidens frondosa* L. (tickseed sunflower). Plots were irrigated until establishment. No insecticides or herbicides were applied. Grass plots were mowed approximately twice per month. Flower plots were mowed in the fall after establishment.

Bee sampling for context. Weekly pan trap sampling during the establishment year (2020) using a set of three colored plastic pan traps (white, yellow, and blue) on wire stands at 30 cm above the ground, 1 m apart and filled with soapy water (Dawn dishwashing soap) allowed us to gain general insight about bee species in the sample area. We were particularly interested in learning if there were bee species captured in pan traps that were not represented in subsequent bee to flower aerial net or beat net samples of restored eroded areas. Pan traps were left out for 24 h. Insects were strained from the pooled (white, yellow, and blue pan trap) samples from each of 10 plots and stored in ethanol until bees could be sorted, pinned, and identified. Bees were identified by Sam Droege (US Geological Survey, Eastern Ecological Science Center, Laurel, MD) with determinations and collection information entered into the Discover Life Data Base.

Bee sampling after establishment. Sweep (beat net) samples and bee to flower (aerial net) samples were obtained approximately weekly during bloom periods on 19 sample dates from April to August in 2021 and 2022. Samples were

Table 1. Grass and flower seed mixes by percentage and species.

	Percent Mix	Common Name	Species and Ecotype
Grass Mix	33%	Pensacola Bahiagrass	*Paspalum notatum* Flüggé
	33%	Un-hulled Common Bermuda	*Cynodon dactylon* Linnaeus
	34%	Browntop Millet	*Urochloa ramosa* (L), T.Q. Nguyen
Flower Mix	46.7%	Little Bluestem ‘Prairie View’	*Schizachyrium scoparium* IN Ecotype (Michx.), Nash
	24.5%	Beaked Panicgrass	*Panicum anceps* GA Ecotype Michaux
	21.8%	Virginia Wildrye	*Elymus virginicus* PA Ecotype Linnaeus
	1.8%	Black-eyed Susan	*Rudbeckia hirta* Coastal Plain NC Ecotype Linnaeus
	1.3%	Partridge Pea	*Chamaecrista fasciculata* FL Ecotype (Michaux.), Greene
	1.3%	Lanceleaf Coreopsis	*Coreopsis lanceolata* Linnaeus
	0.7%	Orange Coneflower	*Rudbeckia fulgida* Northern VA Ecotype Aiton
	0.5%	Sensitive Pea	*Chamaecrista nictitans* NC Ecotype Kuntze
	0.5%	Rattlesnake Master	*Eryngium yuccifolium* SC Ecotype Michaux, 1803
	0.3 LB%	Giant Ironweed	*Vernonia gigantea* FL Ecotype Walter
	0.2%	Spiked Wild Indigo	*Baptisia alba* SC Ecotype (L.) Robert Brown

Table 1. Continued.

Percent Mix	Common Name	Species and Ecotype
0.2%	Starry Rosinweed	*Silphium asteriscus* GA Ecotype Linnaeus
0.2%	Leavenworth's Tickseed	*Coreopsis leavenworthii* FL Ecotype. Torrey & A. Gray

collected in both grass and flower plots on sunny days once temperatures reached 16°C during the bloom period. Bee collection for both years began when plants within the flower treatment group were established and blooming. Data collection continued weekly during the entire bloom season to capture as many of the bee species present.

Sweep beat net collection. Sweep (beat net) sampling was conducted across both the grass and flower plots. Starting at the upper NE corner of each plot, 50 sweeps along a diagonal transect were collected until the lower SW corner was reached. The contents of the sweep net were emptied into a large plastic bag. Specimens were placed into a cooler and transported to the laboratory. Chilled bees were then removed, placed into vials, labeled, and frozen for safe storage.

Direct observation/bee to flower aerial net collection. Researchers positioned themselves next to a flowering plant and, during a 5-min period, collected all the bees visiting the flowers with an aerial net. Only bees actively engaged (probing the flower for nectar and collecting pollen) in and on the flower surface were collected. Specimens were placed into plastic bags, tightly tied, labeled, and placed into a cooler with ice packs to chill the specimens so they would not damage themselves flying inside the bag. Specimens from both collection methods were later pinned, labeled, and identified. They were identified by CGF using an established reference collection and a variety of printed and online resources (Gibbs 2011; Gibbs et al. 2013; Mitchell 1960, 1962; https://www.discoverlife.org). Voucher specimens are retained at the University of Georgia Natural History Museum (Athens, GA).

Floral density. Average floral density/m^2 estimates were obtained a total of 10 times during 2021 and 2022 by noting the number and species of flowers in randomly located 1-m^2 area in each plot. The total number of flowers was recorded. Floral density estimates began as soon as the first bloom was observed and continued through August of each year. There were 10 replications of each m^2 count per plot on each of the 10 sample dates.

Data analysis. To test our hypothesis that bee abundance, richness, and diversity (Shannon's [H'] diversity, diversity hereafter) would be greater in the flower plots compared with the grass plots, we fit generalized linear mixed models using the *glmmTMB* function (Brooks et al. 2017) with treatment the fixed effect and block as the random effect. Data were pooled over both sampling years. Through testing appropriate distributions, we determined the Poisson distribution fit best for abundance and richness data, and the Gaussian distribution for the diversity data. We then completed post-hoc tests using the emmeans function (Lenth 2022) to calculate the estimated marginal means and the *cld* function (Hothorn et al. 2008) to create the compact letter display for the pair-wise comparisons.

Data visualizations were completed using ggplot (Wickham 2016) and show violin plots and the mean and ±SE. Different letters show significant differences between treatment groups (alpha = 0.05). To analyze the plant pollinator network collected from the bee-to-flower data, a bipartite graph was constructed using the *plotweb* function (Dormann et al. 2008), and additional interactive bipartite graphs (supplemental materials) were constructed using the *bipartite_D3* function (Terry 2021).

Results

Bee sampling. During 2021 and 2022, aerial net (direct bee to flower observation) and beat net sweeps collected 3,391 specimens representing 4 families, 19 genera, and 59 species (a detailed listing is available at https://site.caes.uga.edu/bramanlab/2024/10/floral-resources-in-an-erosion-mitigation-seed-mix-enhance-wild-bee-conservation-a-case-study/; last accessed November 29, 2024). There were 1,483 bees collected in the sweep sampling and 1,908 bees collected using the bee-to-flower collection methods. Bees in the genera *Lasioglossum*, *Halictus*, and *Bombus* were the most numerous. Pan trap samples captured 47 of these 59 species plus 37 species not observed in direct bee to flower observations or in the beat net sweep samples across all plots (a detailed listing is available at https://site.caes.uga.edu/bramanlab/2024/10/floral-resources-in-an-erosion-mitigation-seed-mix-enhance-wild-bee-conservation-a-case-study/; last accessed November 29, 2024).

Beat net sweeps—grass alone versus flower enhanced plots. Abundance, richness, and diversity of bees were greater in the flower-enhanced plots compared with the grass plots (Fig. 2A, B, C; $\chi^2 = 42.961$, $P < 0.001$; $\chi^2 = 46.131$, $P < 0.001$; $\chi^2 = 6.624$, $P = 0.010$, respectively). The abundance in the flower plots had an average of ∼277 specimens compared with the grass plots with an average of ∼12 (Fig. 2A). The richness of wild bees, number of species collected in the plots, had an average ∼26 for the flower plots and ∼5 for the grass plots (Fig. 2B). The diversity, which is the relationship between the number of species collected and the number of individuals in each species, had an average of 2.19 for flower plots and 1.36 for the grass plots (Fig. 2C).

Direct observation/bee to flower aerial net collection. Of the 3,391 total specimens, 1,908 specimens were collected directly from the flower with 46 species represented. There were 13 species that were only found in the sweep samples and 11 that were unique to the bee to flower data. There were 37 species found in both sweep and bee to flower samples. The most successfully established flowering plants were *Rudbeckia hirta* L. (black-eyed Susan), *Chamaecrista fasciculata* (Michaux) Greene (partridge pea), *Eryngium yuccifolium* Michaux (rattlesnake master), *P. muticum* (mountain mint), and *Coreopsis lanceolata* (L.) R. Brown (Lanceleaf coreopsis). There was little to no establishment of *Baptisia alba* (L.) R. Brown, (spiked wild indigo), *B. frondosa*, (tickseed sunflower), *Chamaecrista nictitans* Kuntze (sensitive pea), *Coreopsis leavenworthii* Torrey. & A. Gray (Leavenworth's tickseed), *Rudbeckia fulgida* Aiton (orange coneflower), *Silphium asteriscus* L. (starry rosinweed), and *Vernonia gigantea* Walter (giant ironweed) during the 2-yr sampling period. Vetch

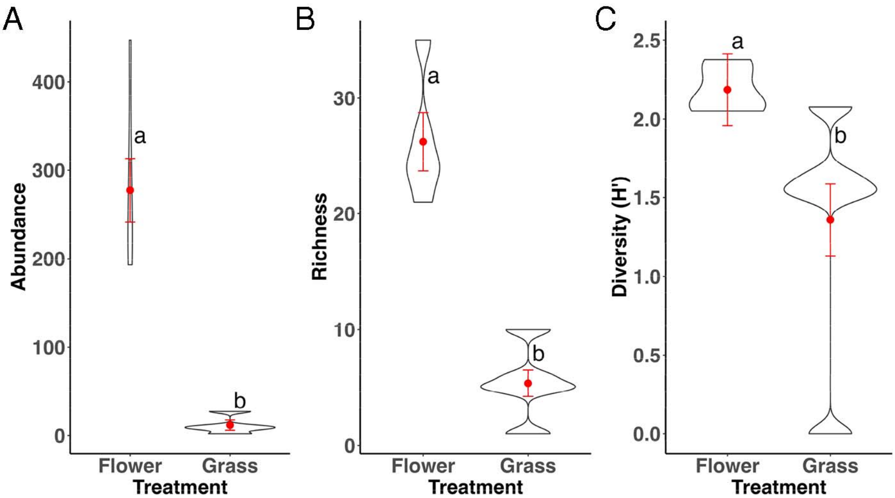

Fig. 2. Violin plots showing the distribution of raw bee abundance (A), richness (B), and diversity (C) in grass alone versus flower-enhanced plots in an erosion mitigation plant mix.

and Brazilian verbena were not planted by us but germinated as volunteer plants that bees were obviously visiting, so are included in our observations. The most frequently visited flowers were *R. hirta* (704 bees), *C. fasciculata* (601 bees), and *E. yuccifolium* (355 bees, Table 2).

We developed a visualization of a pollinator network (Fig. 3) illustrating the variation in visitation among bees and flowers. *Nomia nortoni* Cresson, for example, was

Table 2. Abundance and richness of wild bees collected on individual flowers or by sweeps.

Flower	Abundance of Wild Bees	Richness of Wild Bees
Black – eyed Susan	704	27
Brazilian verbena	1	1
Coreopsis	91	9
Mountain mint	139	21
Rattlesnake master	355	15
Partridge pea	601	26
Tickseed sunflower	9	4
Vetch	8	2
Sweep	1,483	49
Total	3,391	59

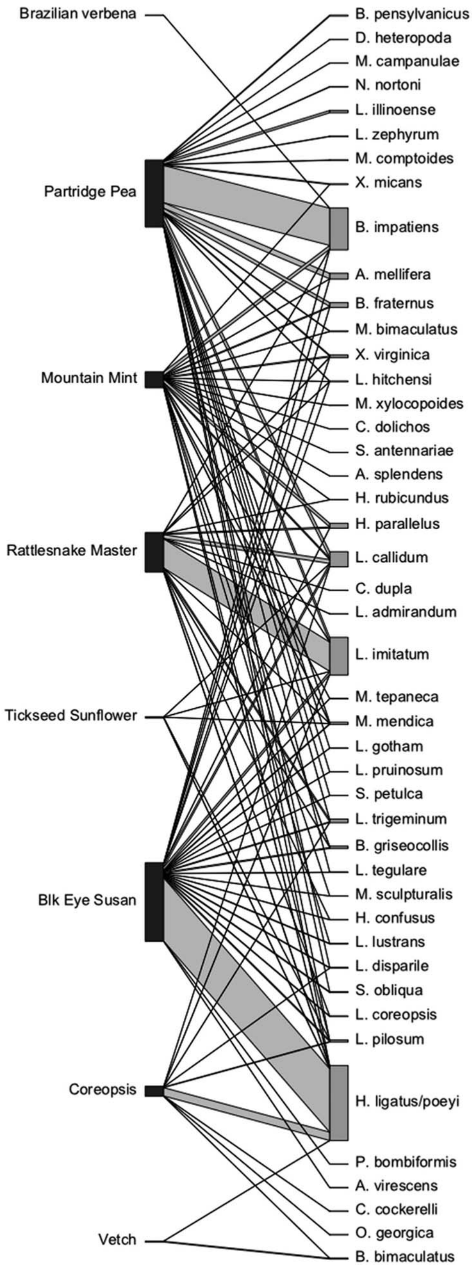

Fig. 3. Network diagram that shows flowers and the bee species that visited each flower species (the width of each band shows the relative frequency of visitation interactions) in a flower-enhanced erosion mitigation mix evaluated for pollinator conservation during 2021 and 2022 in Georgia, USA.

only captured from *C. fasciculata* while *Lasioglossum callidum* Sandhouse and *L. imitatum* (Smith) were captured visiting 5 or 6 of the flower species (Fig. 3). The more abundant bee species varied in their range of visitation (additional detailed network figures are available at https://site.caes.uga.edu/bramanlab/2024/10/floral-resources-in-an-erosion-mitigation-seed-mix-enhance-wild-bee-conservation-a-case-study/; last accessed November 29, 2024). *Bombus impatiens* (Cresson) represented 19.7% of bee observations and was found 89.1% of the time on *C. fasciculata*, but also was observed foraging on 4 other species of flowers. *Halictus ligatus/poeyi* Say represented 35.4% of all observations, was most often collected from *Rudbeckia hirta* (84.4%), but was also collected from 6 other species. *Lasioglossum imitatum* (Smith) represented 17.8% of direct observation captures, 77.6% of the time from *E. yuccifolium* and visited 5 other species. *Lasioglossum callidum* represented 7.1% of observations and was more evenly distributed among 6 floral resources. *Rudbeckia hirta* was visited by 27 bee species, representing 36.8% of all observations with 80.7% of the bees observed being *H. ligatus/poeyi*. *Eryngium yuccifolium* was visited by fewer bee species (15) with 18.5% of all observation from that plant and 74.1% of those being *L. imitatum*. Twenty-one bee species were captured from *P. muticum* and were more evenly distributed in abundance among species with 7.5% of total observations taken from that species. *Chamaecrista fasciculata* represented 31.4% of observations with *B. impatiens* being 55.6% of the 26 species observed.

Floral density. Initial bloom during 2021 was observed in late May, with *C. lanceolata* and *R. hirta* being the first to flower and continuing through August with peak bloom in June (Fig. 4). *Eryngium yuccifolium* and *P. muticum* began blooming in June, continuing through August with peak bloom in July. *Chamaecrista fasciculata* bloomed in August 2021. A similar pattern was observed during 2022. *Halictus ligatus/poeyi* was more frequently observed earlier in the sampling period when *R. hirta* were in full bloom, while *Bombus impatiens* was most often observed later in the season as *C. fasciculata* blooms became more common. *Lasioglossum imitatum* and *L. callidum* also became more common as the season progressed and *E. yuccifolium* and *C. fasciculata* floral density increased.

Discussion

To date, there have been few studies that have focused on the effects of incorporating flowering plants into an erosion mitigation seed mix for wild bee enhancement. The results from this field experiment demonstrate that floral resources incorporated into erosion control methods can achieve success for multiple conservation objectives. The flowers planted in companion with erosion controlling grass species attracted more beneficial pollinating insects compared with the grass species alone, which accounted for only 3.9% of the total number of bees collected by sweeping. Furthermore, the different species of flowers chosen attracted different components of the pollinator community including 59 different species of bees among the 96 total bee species documented in this study. This approach of combining methods of conservation can be adopted to address critical drivers (Burkle et al. 2020, Marshall et al. 2023, Potts et al. 2010, Winfree et al. 2009) of pollinator declines (Goulson et al. 2015) including habitat degradation and fragmentation (Ganser et al. 2021) while also supporting efforts to alleviate impacts of erosion in agricultural and residential lands.

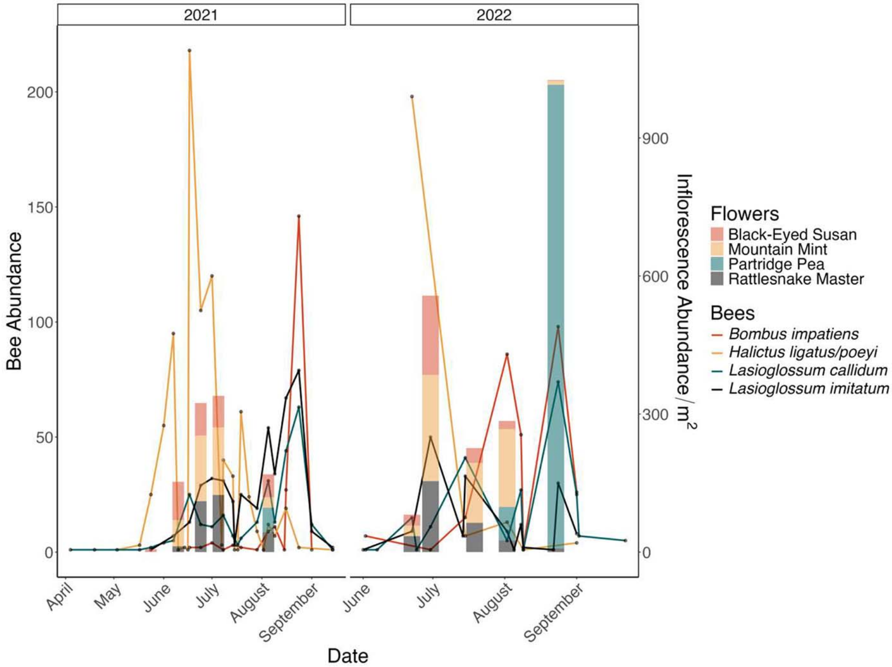

Fig. 4. Seasonal abundance (line graphs) of four bee species and flower density (bar graphs) of four flower species in flower-enhanced plots in an erosion mitigation plant mix during 2021 and 2022 in Georgia, USA.

Of the five common families in Georgia, we collected four in plot sweeps and bee to flower observations. While we did not collect any commonly occurring Andrenidae in either sweep or bee to flower methods, we collected 15 *Andrena* spp. in full season pan traps in the same area. They were active in the early spring months and were rare to find in summer or fall (Herrera et al. 2023). Not only was our collection time-frame (in-plot blooming flowers) outside of their active period, *Andrena* spp. often utilize early season tree and herbaceous ephemeral spp. for pollen and nectar. This conservation approach is not meant to be a panacea for pollinator declines broadly, and it should be designed with targeted interventions to support pollinators needing floral resources during the bloom periods of the flowers included in the seed mixes.

The flowers that thrived in the field were *R. hirta*, *C. fasciculata*, *E. yuccifolium*, *P. muticum*, and *C. lanceolata*. Their success was, in part, due to these plants being unsavory to deer browsing. *Baptisia alba*, *B. frondosa, C. nictitans*, *C. leavenworthii*, *R. fulgida*, *S. asteriscus*, and *V. gigantea* were either very slow to establish or quickly destroyed by deer (pers. obs.), certainly a consideration for plant selection in many areas. *Baptisia alba*, for example, established but did not bloom during the time frame of our study as is typical for some native species. *Rudbeckia hirta* and *C. fasciculata* were often the densest of the flowering species, however, *E. yuccifolium* and *P. muticum* were also well-visited by numerous bee species (Table 2). The choice of flowers to be included in a proposed seed mix to support pollinators and prevent erosion should consider how likely the flowers will establish in an area and the potential for damage due to deer grazing.

Future research not only needs to address how to incorporate flowering plants into disturbed habitats, but also which flowering plants are best to include (Purvis 2021). There are several wildflower seeds mixes available, but with closer investigation, a number of these do not contain native species. Mixes also need to have a diversity of native flowering plants that have a succession of bloom times, from early spring to late fall to provide necessary nutrition for early arriving pollinators. Nesting sites and distance to floral resources for wild bees also need to be considered when restoring natural areas.

Our study documented the use of floral resources in a particular reclamation site and identified important bee to flower interactions within the context of a landscape with relatively low floral abundance. We did not assess population increases or decreases over time nor the landscape context in relation to the addition of wildflowers. McCullough et al. (2021) in a study of 22 sites over 2 yr, determined that, while wildflower plantings did not alter bee communities independently, bee richness and abundance peaked when semi-natural habitat was approximately 40%. Their results suggest that addition of wildflower plantings when surrounding semi-natural habitat is low to intermediate was most likely to realize a benefit from the plantings. Landscape context was an important influence on the conservation value of wildflower plantings in that study. Urban/suburban bee abundance, diversity, and functional groups also responded to landscape scale and context as well as local factors, especially at the urban/forest interface (Braman et al. 2023, Edelkind-Vealey et al. 2024, Janvier et al. 2022) emphasizing the importance of remnant forest in addition to local floral resources for conservation value. The use of flowers in tandem with erosion control measures should consider the landscape context and density of floral resources in the surrounding area to determine the relative improvement the local pollinator community may receive from increases in floral resources.

The conservation of pollinators is of crucial concern given their economic and ecological significance. Efforts to support conservation should be made judiciously and with limited effort and resources directed at targets that are most likely to yield improvement of conditions that support a diverse pollinator community. Including flowers in seed mixes to mitigate erosion can also support native pollinators. However, careful planning and consideration of the plant-pollinator interactions, local growing conditions (e.g., herbivore pressure, native species, etc.), and landscape context is needed to be successful.

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Data Availability

Supplemental supporting tables and figures are available to the reader on our program website (https://site.caes.uga.edu/bramanlab/2024/10/floral-resources-in-an-erosion-mitigation-seed-mix-enhance-wild-bee-conservation-a-case-study/; last accessed November 29, 2024) and are available upon request.

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