The Effects of Climate-Driven Phenological Shifts on Plant-Pollinator Interactions and Plant and Pollinator Reproductive Success

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Climate-warming is causing shifts in seasonal flowering periods and pollinator emergence dates (i.e., phenologies) that are species-specific in magnitude and direction, which has altered the amount of phenological overlap between coevolved plant and pollinator species. The objective of this project was to experimentally investigate the effects of such phenological shifts on plant-pollinator interactions and plant and pollinator reproductive success. To achieve this, I controlled the phenologies of forbs and solitary bees such that spring and summer flowering forb species flowered at the same time and spring and summer emerging bees emerged at the same time. Blooming forbs and emerged bees were then placed in mesh-sided enclosures following a factorial design based on their phenological life histories (i.e., spring or summer). Forb-bee interaction patterns were assessed by conducting bee visitation observations and documenting the quantity and duration of bee visits to flowers. Plant reproductive success will be determined by quantifying the number and mass of seeds produced for each plant species. Bee reproductive success will be assessed by determining the identity and quantifying the number of offspring produced in bee nests housed within each enclosure. Empirical evidence generated by this study will elucidate underlying mechanisms driving the effects of climate change on plants and pollinators and will help pinpoint plant and pollinator species most vulnerable to the negative effects of climate change. Results will contribute to a better understanding of the ecological effects of climate change on species interactions and inform conservations strategies.