



Research Project Statement 20-131 FY 2019 Annual Program

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| Title: | Evaluating Fall Monarch Butterfly Roadkill Hotspot Incidence and Potential Roadkill Mitigation |
| The Problem: | <p>The monarch butterfly (<i>Danaus plexippus</i>) was petitioned for protection under the federal Endangered Species Act in 2014. Overwintering populations of the eastern migrating monarchs in central Mexico are estimated to have declined by 82 percent in the 24 years from 1995 to 2018. The rate of decline indicates an exponential population loss of 7.2 percent annually. A decision on federal listing of the monarch as threatened or endangered is due from the U.S. Fish and Wildlife Service (USFWS) in June of 2019.</p> <p>Monarch road mortality during the fall migration has been implicated as a possible factor in the population decline. A butterfly roadkill survey study estimated 500,000 monarchs were killed along interstate highways in Illinois over a single week of September 1998. Monarch roadkill surveys in Texas yielded estimates of about 74,000 monarchs were killed in October 2016 along a roadkill hotspot along a 60-mile section of Interstate Highway (IH) 10 from Sonora to east of Sheffield. Additional incidences of roadkill were observed along this hotspot in 2009 and 2015. The 2016 roadkill event was accompanied by TxDOT observations of a large overnight roost of monarchs in live oak trees along IH 10 west of Sonora at the Sutton County Westbound Safety Rest Area. Negligible monarch roadkill was found over the Sonora-Sheffield hotspot during a similar 2017 survey. About 3 million monarch roadkill were estimated in 2016 from Oklahoma to Mexico throughout the monarch Central Funnel core migratory pathway of the Central Flyway. This estimate represented about 3.5 percent of the Mexican overwintering population for 2016 (47.9 million), and about half of the average annual 7.21 percent decline in the monarch overwintering population. In the fall of 2018, new monarch roadkill hotspots were found in the vicinity of Del Rio and Eagle Pass in the Central Flyway, and around causeways near Point Comfort and Corpus Christi in the Coastal Flyway.</p> <p>Further study is first needed to finely analyze temporal and spatial distribution of monarch road mortality across the Texas core migratory pathways in the Central and Coastal Flyways. The relationship of monarch roadkill to behaviors such as overnight roosting and nectaring also requires study. Analyses should determine the influence of roadway and landscape features on monarch roadkill. Estimates of monarch roadkill mortality, analysis of roadkill hotspots and factors influencing roadkill, and a literature review of potential roadkill mitigation measures will further prepare TxDOT to contribute to the recovery of this iconic butterfly species which is the state insect of Texas.</p> |
| Technical Objectives: | <p>This project will study and analyze the spatial and temporal distribution of monarch roadkill in relation to landscape and highway features in the core migratory pathways of the Central and Coastal flyways in Texas. The literature on roadkill mitigation for butterflies and other insects will be reviewed. A review should be made of the literature on potentially effective techniques to mitigate roadkill in butterflies and other insects. Geographic Information System analyses will be used to model roadkill occurrence in relation to local topographic, climatic and infrastructure features.</p> <p>The expectation of this project is that the end product will obtain a TRL level 8.</p> |
| Desired Deliverables: | <ol style="list-style-type: none"> 1. Technical memorandum for each task completed. 2. Monthly progress reports. 3. Value of Research (VoR) that includes both qualitative and economic benefits, to be included in the final research report. 4. Research report documenting the findings of the research, including a detailed analysis of monarch road mortality incidence on Central and Coastal Flyways. 5. Project Summary Report. |



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| Proposal Requirements: | <ol style="list-style-type: none">1. Utilize the "Proj/Agre" and "PA_Form" templates located at the TxDOT RTI website.2. Proposals will be considered non-responsive and will not be accepted for technical evaluation if they are not received by the deadline or do not meet the requirements stated in RTI's University Handbook, which is also located at the RTI website.3. Proposals should be submitted in PDF format, 1 PDF file per proposal. File name should include project name and university abbreviation.4. This project will be tracked during the life of the project using a Technology Readiness Level (TRL) scale. For more information about the use of a TRL, click. |
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