Native orchid protection and conservation subject of new AgriLife Research study

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COLLEGE STATION – Navasota ladies'-tresses, a wild orchid native to East and Central Texas, has been listed as an endangered plant species for three decades, but two Texas A&M AgriLife Research scientists are trying to help the flower "put down roots" in years to come.

Dr. Fred Smeins and Dr. Bill Rogers, both professors in the Texas A&M University ecosystem science and management department, have been awarded a $215,570 grant by The University of Texas at Austin's Lady Bird Johnson Wildflower Center.

Navasota ladies'-tresses, a wild orchid native to the Brazos and Navasota river areas, will be the subject of grant focusing on critical habitat identification by Texas A&M AgriLife Research scientists. (Texas A&M AgriLife Research photo by Martha Ariza)

Smeins and Rogers, who have both done extensive work on the habitat and growth of the endangered Navasota ladies'-tresses, will collaborate with Dr. Rose Wang and Dr. Bill Grant, both in the wildlife and fisheries department, on the use of computer models to identify critical areas of this wild orchid's habitat that may be lost, and also identify regions that could be used to expand its habitat in the future.

Navasota ladies'-tresses is a cream-colored flower arranged in a spiral on a thin stemmed spike. It was listed as endangered by the U.S. Fish and Wildlife Service in May 1982 and was listed as endangered by the State of Texas soon afterwards. They occur primarily along creeks, drainages and intermittent tributaries of the Brazos and Navasota rivers.

The one-year Endangered Species Conservation Grants are to conduct conservation research or set aside habitat to assist the recovery of bird and plant species listed under the Endangered Species Act, according to information from the Lady Bird Johnson Wildflower Center.

Smeins and Rogers have been collaborating on studies investigating the flower and its habitat since 2006. Under this latest grant, they will determine the possibility and effectiveness of purchasing habitat to create a conservation corridor for the wildflower.

Members of their research team will study the genetic composition of the plant's populations in Central and East Texas to determine whether a lack of genetic variability threatens its survival and infer the spatial scales at which effective gene flow and seed dispersal are occurring.

Also, they will analyze the genetic variability of the symbiotic fungi growing with the populations in order to determine habitat suitability and long-term population viability, Smeins said.

Urban and industrial developments are the largest contributors to the native habitat loss and degradation, he said.

"We are losing preferential habitat rapidly," Smeins said. "An understanding of the ecology, population dynamics and genetic variability of the species with an emphasis on factors important to establishment, recruitment and maintenance is essential for the conservation of Navasota ladies'-tresses in Central and East Texas.

“With this knowledge, we hope to develop a conservation plan that is compatible with human population growth and continued development and will ensure recovery of this endangered species.”

Their plan is to provide a framework for development of future studies and also provide background information for others interested in the wild orchid’s conservation and management.

“Unfortunately, this species has been viewed as the opponent of progress, given the overlap of its range with one of Texas’ fastest growing areas of urban and industrial development,” Smeins said. “The development and sprawl has removed a significant amount of its native habitat.”

He said on-going threats can only be counteracted by increased knowledge and protection of imperiled habitats.

“To date, our research team has been the leader in studies assessing the natural history, ecological requirements, population dynamics and plant demographic characteristics of this species,” Rogers said. “Nevertheless, critical gaps exist in our current understanding of population variability and genetic variation within and among populations.”

The key conservation needs identified by the two scientists are: creation of a conservation corridor management plan for threatened and fragmented populations; developing region-wide predictive models using data on both ecological niches and spatial-temporal population dynamics; and determining the extent and distribution of genetic variation within populations and the diversity of the species’ mycorrhizal fungal associations.

“We plan to separately address each critical need and then synthesize our collective efforts into a region-wide, permanent protection and recovery plan for Navasota ladies’-tresses,” Rogers said.

Currently it is not known what impact habitat fragmentation has on the wildflower, but they intend to try to use conservation easements to potentially link fragmented populations with other viable populations on both public and private lands, he said.

“We intend to work with a wide variety of stakeholders to identify potential conservation easements containing important Navasota ladies’-tresses populations needed for maintaining genetic viability and dispersal connectivity,” Smeins said. “We also plan to continue our long-term population monitoring and collect additional habitat and plant demography data.”

They will examine genetic traits and related species to infer the spatial scales at which effective gene flow and seed dispersal can occur, Rogers said. This information can help provide mechanistic assessments of habitat suitability and long-term population viability.

“Using this knowledge in conjunction with our past efforts on Navasota ladies’-tresses ecology and our ability to successfully propagate and transplant individuals in new reserves, we will collaborate with other conservation entities in the development of a regional management plan,” he said. “We hope that ultimately leads to the recovery of this endangered species.”
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