

## Study bolsters case for adding a rare sunflower to the endangered species list

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Photo of the whorled sunflower. Credit: Christopher Brown, Vanderbilt University

For several months last spring, the Vanderbilt greenhouse held more members of a rare species of native sunflower than are known to exist in the wild.

This unusual bounty was the result of research being conducted by Jennifer Ellis, a doctoral student in the biological sciences department, working under the supervision of Professor David E. McCauley.

The species is called the giant whorled sunflower, *Helianthus verticillatus*. It was discovered in 1892 in Tennessee but was thought to be extinct until 1994 when it was rediscovered in Georgia. Today, it is

known to exist in only four locations in West Tennessee, Alabama and Georgia. It has been a candidate for listing as a federal endangered species since 1999.

In the last four years Ellis has conducted a series of genetic studies of the whorled sunflower that significantly increase the odds that this gangly plant will make the endangered species list. Once a species is listed then the federal government is empowered to take a number of steps to protect it.

“Her study came at a perfect time and gave us answers that we really needed,” says Cary Norquist, assistant field supervisor and botanist in the Ecological Services Field Office of the U.S. Fish and Wildlife Service in Jackson, Miss., who has recommended upgrading the sunflower’s application for listing from a low to a high level as a result of the new information.

One of the questions that Ellis’ research answered was whether the whorled sunflower was a distinct species or a hybrid of two common varieties. If it was a hybrid then it would not qualify as an endangered species. “Her work definitely confirmed that it is a distinct species,” says Norquist.

The other answer that Ellis has provided is a more accurate count of the number of genetic individuals that exist in the wild. According to previous estimates, there were several thousand whorled sunflowers growing in Coosa Valley Prairie in Alabama and Georgia, about 7,000 acres of which is owned by Temple-Inland Inc. The area contains two other listed threatened or endangered species – Mohr’s Barbara Buttons and Tennessee Yellow-eyed Grass – so in 1992 the timber company donated a 929-acre conservation easement on the most sensitive portion of the area to the Nature Conservancy. Population estimates of the whorled sunflower at the other known locations were much smaller.

However, the size of the Georgia population plus the conservation easement reduced the sense of urgency attached to its case for listing.

The genetic study proved that the field observations of the sunflower had been misleading. The sunflower propagates clonally as well as by sexual reproduction. As a result, many stalks that appear to be individual plants are genetically identical to their neighbors. “I went out and sampled a whole bunch of stalks and then genotyped them,” Ellis says. “I found that the whole population consists of about 20 to 40 genetic individuals. If they have the same genotype then they are the same genetic individual. There can be ten stalks growing together that you would think are ten plants. But, when you genotype them, you find they are all the same genetic individual.”

The fact that there are so few individuals at the Georgia site increases the importance of protecting the other sites, Norquist says.

One hundred of the plants that Ellis grew in the greenhouse are adding to the population in a more direct fashion. She gave them to researchers at Freed-Hardeman University in Henderson, TN who are restoring a wetland that is a suitable environment for the whorled sunflower. They will be using the plants in an experiment designed to identify the environmental variables that have the greatest effect on the sunflower’s fitness.

Source: Vanderbilt University

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