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Wyoming Natural Diversity Database Receives National Award for Top Technological Innovation

Arlington, Virginia — The Wyoming Natural Diversity Database, a service and research unit of the University of Wyoming, has received an award for Outstanding Technological Innovation from NatureServe, a non-profit conservation group. The award highlights the program's work on "predictive distribution modeling"—a relatively new scientific technique for forecasting where particular species of plants and animals are likely to occur or not to occur.

The Wyoming Natural Diversity Database (WYNDD) was selected for special recognition from among an international network of 75 state and national conservation data centers coordinated by NatureServe. The award was presented by NatureServe president and CEO Mark Schaefer at the group's Leadership Conference in Tucson, Arizona in November.

"The staff at the Wyoming Natural Diversity Database are doing innovative scientific work that is influencing their peers around the country," said Schaefer. "Their practical approach to predicting the ranges of species, in particular, has great value in informing land use decisions."

Predictive distribution modeling uses statistical algorithms to map the likely distribution, or range, of plants and animals. The idea behind predictive distribution modeling itself is straightforward. First, identify the places where a particular species is known to occur, and summarize the environmental characteristics, such as soil type, vegetation, and climate, of these places. Then, based on these characteristics, construct a model that maps all places within a region with similar environmental traits. Because most plants and animals prefer particular habitat types, these are the places where the species in question is most likely to be found.

In practice, however, the analyses required for accurate modeling are enormously complex. Recent advances in geographic information systems (software for geographic analysis and mapping) and in statistical modeling have made the concept a reality, and scientists at several universities have developed a number of different statistical algorithms for performing the complex calculations required.

The contribution of the biologists and data experts at WYNDD has involved taking several of these theoretical methods and testing them under real-world conditions. They have applied predictive distribution modeling to several species of concern in Wyoming, such as the pygmy

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rabbit, boreal toad, and Ute ladies tresses, a threatened plant species found in wet meadows. Scientists at WYNDD have developed models to predict the occurrences of hundreds of plants and animals tracked in their database, and these models have in many cases led to finding new populations of these species, as well as determining the likely limits to their range.

“These predictive models are important tools to point out where rare species are likely to occur and, sometimes more importantly, where they are likely not to occur,” said Dr. Gary Beauvais, a zoologist and director of the Wyoming Natural Diversity Database. “The goal is for this information to lead to appropriate management strategies—strategies based on reasonable extrapolations of field data rather than on broad-brush maps.”

By helping to determine which species are truly rare and which are more common than previously thought, this approach contributes to better natural resource management decisions. Specific applications of the technique include:

- guiding biological field inventory—in other words, helping biologists with limited field time decide where to search for a particular species with the highest likelihood of finding it;
- predicting which invasive weeds are most likely to spread rapidly, and where, which can have enormous economic consequences for farmers and ranchers;
- identifying sites where species that have been extirpated can be successfully re-introduced;
- estimating the effects of future climate change on species;
- identifying places that are likely to be rich in biological diversity and rare species.

Recognized by their peers as national leaders in predictive distribution modeling, staff from WYNDD joined with NatureServe to co-present three training workshops on the subject this fall. The workshops were attended by more than 50 scientists and conservation professionals from the United States, Canada, and several Latin American countries.

The Wyoming Natural Diversity Database, established in 1979, develops objective scientific information on the biology, location and status of Wyoming’s native plant and animal species and natural communities to inform natural resource management decisions. By providing comprehensive and up-to-date biological information, WYNDD contributes to reasonable and balanced natural resource management policies. The program’s information and analyses assist management of state and federal lands and enable resource managers and developers to more easily and effectively comply with state and federal environmental regulations (see <http://uwadmnweb.uwyo.edu/WYNDD/>).

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NatureServe is a non-profit conservation group dedicated to providing the scientific information and technology needed to guide effective conservation action. Representing a network of 75 natural heritage programs and conservation data centers in the United States, Canada, and Latin America, NatureServe is a leading source for detailed scientific information about threatened plants, animals, and ecosystems. Visit us online at www.natureserve.org.