Idaho Team Develops DNA-Based Forecasting Framework to Assist in Species Recovery

April 06, 2021

MOSCOW, Idaho — April 6, 2021 — A University of Idaho, Boise State University and Idaho State University study published in Restoration Ecology demonstrates how genomic data could be used in conservation efforts, specifically translocation, or the moving of plants and animals from one location to another. Translocation is a key component of many conservation plans.

Genome sequencing allows scientists to read the information encoded across all the DNA in a plant or animal. Because DNA is the foundation for variation within all species of life, biologists are excited about the potential for genome sequencing to inform conservation action for threatened species.

Genome sequencing could enable scientists to identify varieties of threatened species likely to thrive in particular environments. This information could help establish new populations of plants and animals by matching locally adapted varieties with particular sites where they are likely to succeed.

The goals of translocation include reintroducing populations that have gone extinct and preventing inbreeding in existing, but small, populations. The research team — funded through the Idaho GEM3 grant — asked when genomic information could help improve the success of translocation efforts.

The research team identified several challenges to applying genomic data to computer model forecasts to predict the success or failure of translocation. The overarching challenge is that real-world complications, such as barriers to movement, could undermine predictions based on genomic information. For example, a variety of fish that is genetically well-adapted to thrive in mountain rivers may fail to establish if there are dams in the river.

The GEM3 research team developed a solution to combine many types of real-world data together with the predicted performance of plants and animals from genome sequencing. The proposed solution involves using computer models to integrate many different sources of information, in addition to genomic data, and using this information to forecast population growth for plants and animals.

This model-based forecasting would be similar to weather forecasting, which combines meteorological data from different sensors to predict whether a given day will be rainy or sunny. The models could eventually predict whether translocated plants and animals will thrive in a new location.

“We hope this work will improve translocation success across the globe to help with conservation efforts,” said Travis Seaborn, a postdoctoral researcher in the Department of Fish and Wildlife Resources at U of I and lead author of the study.

The study will provide new ways for lab- and field-based researchers to collaborate and share information to help save threatened species.

This project, “RII Track-1: Linking Genome to Phenome to Predict Adaptive Responses of Organisms to Changing Landscapes,” was funded under National Science Foundation grant OIA-1757324. The total amount of federal funds for the project will be $20 million, which amounts to 83% of the total cost of the project. The total amount of non-federal funds for the project will be $4 million, which amounts to 17% of the total cost of the project.

—

Media Contacts

Travis Seaborn
Idaho NSF EPSCoR GEM3 Postdoctoral Research Associate
Department of Fish and Wildlife Resources
University of Idaho
tseaborn@uidaho.edu

Trevor Caughlin
Assistant Professor
Department of Biology
Boise State University
trevorcaughlin@boisestate.edu

Leigh Cooper
Science and Content Writer
Communications and Marketing
406-781-4969
leighc@uidaho.edu

Redband trout is one of the species of focus for current research on genomics and climate change in Idaho through the GEM3 program. Image Credit: Courtesy of Travis Seaborn.

About the University of Idaho

The University of Idaho, home of the Vandals, is Idaho's land-grant, national research university. From its residential campus in Moscow, U of I serves the state of Idaho through educational centers in Boise, Coeur d'Alene and Idaho Falls, nine research and Extension centers, plus Extension offices in 42 counties. Home to nearly 11,000 students statewide, U of I is a leader in student-centered learning and excels at interdisciplinary research, service to businesses and communities, and in advancing diversity, citizenship and global outreach. U of I competes in the Big Sky and Western Athletic conferences. Learn more at uidaho.edu