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Date: 22 August 2018

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Sampling Generations: a little species in a big, complex world.

Archbold Biological Station is world-renowned for their long-term data collection on plant and animal species, spanning several generations. Many of these species are rare, and found only in Highlands County. Therefore, protecting populations is critical in preventing further declines in numbers and risking extinction. However, even if protected, the surrounding Florida scrub habitat can be a harsh place to live. Months of little to no rain during Florida's dry season followed by June's almost monsoon-like weather can be harsh for any living thing, especially when you are a young, 15 cm tall, yellow-flowered Highlands scrub *Hypericum* plant. Luckily, long-term demographic data collected by Archbold scientist have helped reveal just how well this little plant survives under these conditions.

The Highlands scrub *Hypericum* (*Hypericum cumulicola*) is very limited in its distribution, found on Florida's Lake Wales Ridge on knolls of rolling ancient sand dunes in rosemary scrub, the highest and driest habitat in the Florida scrub. High above the water table, it is too dry for common shrub species like oaks to grow quickly, so shrub vegetation becomes stunted, leaving open spaces called gaps for smaller, less competitive species to thrive. While small in stature, healthy populations of scrub *Hypericum* can be an indicator of good land management practices, such as prescribed burning. "These plants are adapted to fire," explains Eric Menges, director of the Plant Ecology Program. "Our data have shown positive responses immediately post-fire. New seedling recruits pop up everywhere. Not only are there more plants, but they are more likely to survive, grow faster, and start to flower sooner than plants of the same age in areas not affected by fire."

How do we know this? With data, and lots of it. Menges and his collaborator, Pedro Quintana-Ascencio, a professor at the University of Central Florida, have been following fluctuations in scrub *Hypericum* populations since 1994. “Using this long-term data, we can predict populations that are increasing and population at risk of declining to extinction,” declares Quintana-Ascencio.” Using measures such as habitat type, number of years since the last fire, and proximity to another scrub *Hypericum* population, mathematical models were able to predict where populations would occur, and predict when they might go extinct. But how do you test a model to see how accurate it is? You send a field-hardy crew of post-baccalaureate interns on a mission to search for populations of scrub *Hypericum*!

During the summer months, these young scientists searched every rosemary scrub patch at Archbold for scrub *Hypericum*. That’s over 100 patches across 5,000 acres! “It was difficult with most roads being too flooded to drive on, so we did a lot of wet hiking” described intern Riley Book. With the data collected, Quintana-Ascencio was able to test his model, the results of which were recently published in the *Journal of Ecology*. “It turns out the model was really good at predicting where Highlands scrub *Hypericum* is, but less so where it isn’t. Ultimately, there is a lot of habitat out there that would be great for this plant, but it just isn’t there” explains Quintana-Ascencio.

Scientists also learn new things about a species and its habitat when working with these complex models. In this case, with models using only fire, habitat, and proximity, results were mediocre. But, adding relative elevation above the water table, a variable previously not explored, significantly improved predictions of scrub *Hypericum* presence. Why the plant isn’t found in otherwise suitable habitats is a new mystery. So, it’s back to the drawing board to determine how this new piece of the puzzle fits into the larger, complex universe, and how this information can be used to better manage habitat for rare species.

**Photo 1: Intern, Katherine Tisshaw marks seedlings of Highlands scrub *Hypericum* from a germination experiment. This is one of many data projects that contributed to the projection models for presence and absence of this rare species (Photo by Olivia Karas).**



**Photo 2: Yellow, pin-wheel flowers of Highlands scrub Hypericum (Photo by Reed Bowman).**



**Photo 3: A crew of Archbold scientist mark all plants of Highlands scrub Hypericum in a rosemary scrub patch at Archbold Biological Station (Photo by Stephanie Koontz).**

