PHYS.ORG

Study on wildlife corridors shows how they work over time

December 1 2008

At the Savannah River Site in South Carolina, there are five strange looking "patches" cleared out of the surrounding forest. No, they're not crop circles carved by aliens.

They're actually budding longleaf pine forest ecosystems. Biologists at Washington University in St. Louis and their collaborators at North Carolina State University, the University of Florida, and the University of Washington have created these ecological patches with the help of the United States Forest Service-Savannah River to understand whether "corridors" help plants and animals survive habitat fragmentation.

The Washington University biologists are Ellen Damschen, Ph.D.,and John Orrock, Ph.D., both assistant professors of biology in Arts & Sciences.

Corridors are thin strips of habitat that connect isolated habitat patches in fragmented landscapes. The landscape is composed of central square "patch" of habitat that is connected by a corridor to a peripheral square habitat patch. There are also two other types of peripheral patches that help determine how corridors work. Unconnected "rectangular" patches control for the addition of habitat area that comes with the implementation of a corridor. The unconnected "winged" patches control for the change in the shape of the patch that results from adding a corridor.

Conservation biologists interested in predicting how corridors work can make use of "movement ecology," a new framework that can describe how traveling species enter habitats in modern landscapes, which are seldom continuous and vast.

In 2006, Damschen and Orrock and their colleagues published the first definitive evidence that corridors are effective in extending plant biodiversity in fragmented large-scale habitats in a paper published in Science.

Their new paper in the *Proceedings of the National Academy of Sciences*, published on-line Dec. 1as part of a special issue on movement ecology, reveals that by understanding how species move, you can predict if and how corridors work.

"The design and scale of this study are remarkable," said Orrock. 'Nothing has been done like this for plants before. It's the largest, best-replicated study of corridors in the world. "

"We knew coming into this study that corridors work, but we wanted to predict how they work for species, based on simple life history traits that are readily available," said Damschen, who painstakingly counted 300 different plant species that have occupied the patches since 2000 when the research began. "One of the important things we show is not only how a corridor works and affects a community of species in a single year or a few years, but how they work over much longer time scales."

Patches

In general, the researchers found that, overall, there were more species in the patch connected by a corridor than the unconnected ones. But they predicted that groups of species would respond differently depending on how they were moved around the landscape. Seeds are dispersed by wind, birds, or they move almost imperceptibly, dropping a few inches away from the parent plant, and thus are called unassisted.

Damschen can tell the source of dispersal by seed type. Wind-dispersed plants have a fuzzy feature, like a dandelion, called a pappus; bird-dispersed plants have fleshy fruits, and unassisted plants have plain, dull, little round seeds, similar to poppy seeds.

For birds, the researchers had great predictive power. There were more bird-dispersed species in the connected then in either the unconnected rectangle or winged patches, which was the result of a detailed understanding of how birds move and forage.

For wind-dispersed plants, the researchers predicted that patch shape – an increase in habitat edges relative to cores – would increase the number of species in the community. They found this, but also found that corridors operated through connectivity effects.

All about being connected

"We did not predict this," Damschen said. "In hindsight, this makes a lot of sense. Wind can be channeled between physical structures. For example, think of when wind speeds up as you walk between tall buildings in a city. Corridors may similarly funnel wind and carry seeds down them. We are now testing for this kind of effect. My postdoc, Dirk Baker, and our technician, Colin Kremer, are using a model of wind dispersal in patchy landscapes to predict where these seeds might go based on wind dynamics. We then determine if the model accurately predicts where seeds go by releasing artificial seeds that literally glow in the dark. We release them into the wind and then find them again at night with a black light. We can record where the seeds go by using a GPS and match what is happening in reality to the model's predictions."

For unassisted species, the researchers predicted that corridors would have no effect because they assumed that their seeds were dropped near the parent plant, traveling no more than a few meters a year. Therein was the surprise.

"We found a really strong response to corridors, contrary to what we expected," Damschen said. ""We think these plants must be being assisted in some way, and we think it's possibly from mammals. Unassisted plants exceeded our expectations by a long shot."

Other studies suggest that some mammals incidentally ingest seeds while foraging, so perhaps they are providing assistance.

In order to find out if this is a plausible explanation, Caleb Hickman, a graduate student in the WUSTL Ecology, Evolution, and Population Biology Program, has collected fecal samples from a variety of mammals at the experimental sites and is literally planting them in soil in the WUSTL greenhouse to see if plant species emerge as seedlings that would have previously been classified as "unassisted."

"We think if we have a better understanding of unassisted dispersal and the impacts of wind, we'll have better predictive power," Orrock said.

Source: Washington University in St. Louis

Citation: Study on wildlife corridors shows how they work over time (2008, December 1) retrieved 18 April 2024 from https://phys.org/news/2008-12-wildlife-corridors.html