

The Toadflax Needle in the Wilderness Haystack

Using technology to detect and map new invasive species arrivals

The wording of this article has been adjusted to a 7-8th grade reading level. Andrea Barbknecht of the Wyoming Wildlife Federation made the revisions as part of the organization's curricula to engage kids in exploring their Wyoming landscape.

The original article, written by Sara Teter for Western Confluence magazine, can be found [here](#).

By Sara Teter (May 2020)

The Noxious Weed

Since dalmatian toadflax was introduced in Wyoming, it has checked all the boxes of an invasive species. It outcompetes native plants. It reduces **biodiversity**. It is not edible for wildlife or livestock.

Land managers in Wyoming still have a shot at reducing or eliminating the weed. To do this, they need to locate the plants before they can grow to large **populations**. Finding them is the tricky part. Dalmatian toadflax grows in dry gravelly soils. One place this soil is found is the South Fork of the Shoshone River on the east side of Yellowstone National Park. The rocky ground makes it too difficult and dangerous to survey for the weed. Any small populations can grow into a full-on invasion and threaten one of the world's most cherished ecosystems.

The Map

Land managers don't have the time or money to spray every plant. Creating effective strategies to fight invasive species like dalmatian toadflax means mapping their locations. In Wyoming, our maps of invasive species are less complete than you would think.

Current mapping strategies use a handful of people driving Wyoming's roads and entering data. Wyoming has thousands of square miles of remote country to survey. It is not possible for a few people to survey it all, especially secluded areas where there may be only a few individuals of an invasive species.

The Researchers

Chloe Mattilio, a PhD candidate at the University of Wyoming, is researching ways to overcome the current obstacles to mapping. Her current work focuses on

detecting invasive plants from aerial pictures. She is also working on using maps to create management plans. Chloe's advisor, Dan Tekiela, is an assistant professor and extension specialist in the UW Department of Plant Sciences. Dan works with federal, state, and local agencies as well as private land managers to create more efficient plant management strategies.



Chloe Mattilio flies a quadcopter. (Illustration by Cal Brackin.)

The Quadcopters

To solve Wyoming's mapping problem, Chloe and Dan turned to an unexpected solution—drones. They fly **quadcopters** that anyone could buy to take pictures of the landscape. The drones are mounted with special sensors that can detect five different bands of light. The researchers can identify



invasive species by the wavelengths of light their leaves and flowers reflect. Using drones, surveyors can search large, dangerous, and secluded areas for invasive species.

The Future

Dan says this research is getting a lot of interest from managers, landowners, and others. It's no mystery why. The images the drones collect could create more complete maps of invasive species in Wyoming. Then managers can prioritize which areas to target.

Dan is careful to say that practical results are a bit farther down the road. This technology does have the potential to save land managers time, money, and energy as they fight invasive plants. The biggest hurdle is creating software that is affordable and easy to use for analyzing the data. Then the technology can become more widely available.

"When you have so few people, that's the important thing. If you can chip away at the fact that we don't have those eyes on the ground by using sensors, I think it could have major implications," Dan says.

Glossary

Biodiversity The variety of life in the world or in a particular habitat or ecosystem

Population All the organisms of the same group or species who live in a particular geographical area

Quadcopter A drone with four rotors