Managing Invasive Plants

Research on the Use of Dogs in Detecting Invasive Plants

Slide 1: Detector dog searching for invasive plants

Slide 2: Hunting dog with pheasant and beagle sniffing luggage

Throughout history, dogs have been trained to find specific targets. Dogs have been trained to retrieve hunted birds and to detect illegal substances like narcotics or prohibited agricultural products in luggage at airports.

Slide 3: Detector dog's head and nose

Dogs make good detectors because of their acute sense of smell, their ability to be easily trained, and their desire to please. It isn't surprising that the federal government's Office of Technology Assessment identifies detector dogs as the most effective and broadly usable detection technology currently available.

Slide 4: Small spotted knapweed plant among other plants

Kim Goodwin at Montana State University is testing "detector dog technology" as a method to find invasive plants when their populations are very small and before they start to spread. The plants can be hard to see and are often missed by people conducting surveys on foot.

Slide 5: Cinder blocks identified as target and non-target

Following the protocol used to train dogs to detect narcotics, Goodwin works with professional dog trainers who condition the dogs to associate the scent of spotted knapweed with a reward such as play and praise. The first step in the training is to hide the small knapweed plants (the target), and soil or other plant species (non-targets) in cinder blocks. The blocks containing the soil or other plant species are "controls." The control blocks are used to make sure that dogs are responding to the target scent of spotted knapweed.

Slide 6: A building containing cinder blocks in a line and a detector dog sniffing a cinder block

Next, a dog is led down a line of cinder blocks placed ten feet apart and is encouraged to smell each block. When the dog reaches a cinder block containing spotted knapweed, it is immediately rewarded. Once the dog learns to associate knapweed with a reward, the dog is trained to indicate that it has found the target by sitting or scratching the ground. After this training, the dog is ready for field testing in outdoor drills.

Slide 7: Video of an outdoor drill

In this outdoor drill, Rio detects the knapweed scent and moves in the direction of the target. He finds the plant and then checks the area for more plants. Rio then returns to the plant and looks at his handler, indicating he has found the target. The handler confirms the target and rewards Rio. Rio detected the target scent from 50 feet.

Slide 8: Video of an outdoor drill

In another drill, Nightmare detects the knapweed scent and works the area back and forth. When she finds the target plant, Nightmare quickly looks to her handle as an indication that she has found it. She checks the area for more plants, returns to the plant, and looks again at her handler. The handler "nudges" Nightmare to encourage her to dig as an indication that she has found the target, and rewards her.

Slide 9: Detector dog and surveyor searching for invasive plants

After the dogs have perfected their outdoor skills, Goodwin tests the skills of dogs against those of experienced invasive plant surveyors. Dogs and surveyors are tested for how well they can detect knapweed plants and the distances at which the plants are detected.

Slide 10: Results of tests

The results of the tests suggest that dogs do a better job than the surveyors in finding spotted knapweed plants. Dogs found the plants on average 86% of the time compared to 70% for the surveyors. The dogs also were better at detecting knapweed plants from greater distances. The average distance from which they detected plants was 29 feet compared to 11 feet for the surveyors.

Slide 11: Ways that detector dogs can improve surveys

The research has convinced Goodwin that using detector dogs can help improve invasive plant surveys. Dogs can quickly cover large areas, are more accurate at finding the plants than surveyors, and can find young (small) plants that are easily missed by surveyors.

Slide 12: Detector dog and dyer's woad plants

This new "detector dog technology" will be used to locate and eradicate dyer's woad, which is a new invader to Montana. The ability of the dogs in finding plants that may be missed by surveyors could help increase the long-term success of this eradication effort. Goodwin will be leading this effort for the Montana Dept. of Agriculture with assistance from Working Dogs for Conservation Foundation.