

NOSE THE KNOWS

How scent-detecting dogs locate fishers, lynx, and other hard-to-find wildlife species

By Kathryn Socie

Near Lolo Pass, along Montana's border with Idaho, a light drizzle falls on larches lining steep mountainsides. Pepin, a tall, lanky, fawn-colored dog with a dark muzzle, paces in the back of the car, panting excitedly and steaming up the windows. When his handler, Megan Parker, opens the door, he bounds out and wildly races in circles. Parker calls for the dog to sit and places an orange vest around his chest. "Go to work," she says. He races off into a thick cedar-hemlock forest, followed by Parker and Lisa Holsinger, whose job is to keep the team from getting lost.

Pepin is a Belgian Malinois, a European breed trained for drug and explosives detection, search and rescue, and personal protection (it's the only breed used by the U.S. Secret Service). Pepin's line of work differs slightly. He has been trained to smell the scat (feces) of fishers, a large member of the weasel family. Fishers are one of the rarest animals in the Rocky Mountains. Researchers at the Missoula-based U.S. Forest

Service Rocky Mountain Research Station are working with Parker, co-founder of the Montana-based Working Dogs for Conservation Foundation (WDCF), and her canine crew to locate the rare predators and better understand why so few exist.

FROM FUNGI TO FECES

Teaching a dog to find weasel scat may seem odd, but it's part of a long tradition of canine domestication that goes back thousands of years. Dogs were first tamed and trained to protect livestock and guard homes. Later they learned to perform a wide range of other services, from retrieving ducks to pulling sleds. People have also utilized the species's 220 million scent-sensitive cells—more than 40 times the number in a human nose—to sniff out information. For centuries, Europeans have used poodles and other breeds to find the underground fungi known as truffles. Dogs are also used to detect hidden bombs, sniff out heroin, and find people buried in earthquake rubble. Some scientists claim they have even been able to train dogs to detect lung



KEEPS ON GOING Still fired up after an hour of intense work, Pepin plays tug-of-war with his handler, Megan Parker, as a reward for locating fisher scat in the Lolo National Forest. Conservation dogs possess an obsessive drive to work, matched with an unrelenting focus on toys and play.

and breast cancer by smell, helping with early detection. Small wonder the ability of some dogs to distinguish odors of animal scat, urine, hair, and other sign has caught the attention of wildlife researchers.

It can be nearly impossible for a human to locate rare animals such as fishers or lynx. Trapping sometimes works, but it can injure or kill the animal. Obtaining photographs from a remote-control camera requires that the subject walk in front of the lens. And scientists cannot obtain hair samples for analysis unless the animal rubs against barbed

wire or leaves hair in a track. Researchers have found that analyzing scat is often a more reliable way to gather data. Scat persists in the field for months and is found whenever and wherever an animal naturally travels. Most important, collecting scat does not require that an animal visit a particular site or behave in a specified fashion—major drawbacks of trapping, photography, and other information-gathering techniques.

For decades, scientists have examined scat to learn about an animal's diet. In recent years, they have learned to extract DNA from

feces and determine the species, gender, and even identity of individual animals. The only problem with scat analysis is finding the droppings. That's where the dogs come in.

Not just any old Sadie or Max can become a scent-detection dog. The WDCF looks for high-energy animals with an obsessive drive to work and a fixation on toys. Because hyper animals like these can make difficult pets, many dogs used for conservation work come from shelters or overwhelmed private owners. Another essential characteristic, Parker says, are dogs "with confidence and

the ability to withstand chaos." The larger, more athletic breeds generally perform better under the demanding conditions of conservation work. But nearly any breed can be trained in scent work. Pedigrees aren't necessary, "but we need a dog that works not just for a toy, but also for the work," says Parker. Only 1 of about 250 dogs makes it through initial screening; of those, only 40 percent pass the rigorous training.

First, a dog is taught to find a specific scent and to indicate the discovery by sitting next to the sample. It also learns to ignore dis-

tracking scents. Next, the dog and its handler work on finding scents where neither knows the location. Later, the team works on directional hand and voice commands so the dog can work from a distance.

NOSE JOB

Once trained, the dogs go to work for science and conservation. Kim Goodwin, a conservation biologist at Montana State University, has studied the effectiveness of using dogs to find spotted knapweed, dyers woad, and other noxious weeds. In one study, teams of dogs were far more effective than humans in finding isolated plants, including tiny specimens that survey crews completely missed. She also found that canines can find plants that have not yet emerged from underground. “Dogs tested in the laboratory recognized root material, indicating they are capable of cuing in on portions of the plant that humans can’t see,” says Goodwin.

According to the biologist, dogs can discern the scent of one type of plant in a landscape containing 100 or more species. She explains that all plants produce certain chemicals, but each species gives off its own unique combination. Dogs are trained to detect the specific chemical ratios in what are known as the “vapor constituents” of target weed species.

Weed control works best when noxious invasives are eradicated before they gain a foothold in a native plant community or crop field. Dogs help weed control specialists find the early invaders, which then can be pulled or sprayed before spreading.

Montana Fish, Wildlife & Parks biologists have used scent-detection dogs to find and track wolves. Whenever a new pack enters an area of southwestern Montana, Liz Bradley, an FWP wolf management specialist, faces the difficult task of trapping a member so she can fit it with a radio collar and track the pack. Trapping a wolf can take weeks, due to the difficulty of finding where wolves consistently travel. “But dogs can pick up sign, such as urine posts, that people can’t identify,” Bradley says. In 2005, she used a WDCF dog near Philipsburg where ranchers had reported a new wolf pack. “He located wolf sign that

Kathryn Socie is a writer in Missoula.

How your dog smells the treat in your pocket

Ethmoid labyrinth: A spongelike structure that aids in warming and moistening the air as odor particles flow through the nose.

Nasal concha: Paper-thin scrolls of bone that protrude into the breathing passage of the nose. They are covered in mucous membranes that provide humidity that preserves the delicate scent cells keeping olfactory receptors healthy.

Olfactory bulb: A part of the brain devoted to identifying smell.

Vomeronasal organ: This detects pheromones (body scents), which may explain (scientists are still unsure) a dog’s ability to identify and recognize individual animals and people by smell alone.

Alar fold: A bulbous obstruction just inside the nostrils that opens and closes to create suction that helps the dog inhale even more odor-laced air.

A dog has two nasal openings. When it takes a big sniff, the nostrils widen, allowing more air in. The sniff also straightens the nasal cavity so the odor molecules in the air travel straight back to the scent receptors, located within special cells deep in the snout in structures called concha, or turbinates. The moisture on and inside the nose acts as a magnet to catch odor molecules in the air and on the ground. The collision of odor molecules and scent receptors creates nerve impulses, which travel along olfactory nerves to the olfactory bulb and then the rest of the brain. A dog has roughly 220 million scent receptors in an area that, if unfolded, would cover a dinner plate, while a human has about 5 million receptors over an area the size of a quarter.

helped us find good places to set traps, and we were able to catch a wolf that first night,” she says.

WDCF dogs have also been used in New Jersey to detect pine snakes, Nevada to locate desert tortoises, and California to find the scat of endangered San Joaquin kit foxes. In Kenya, biologists use the dogs to better understand why cheetah populations are declining. In Argentina, scent-detection dogs are used to locate rare Andean cats.

A GOOD DAY'S WORK

At Lolo Pass, Pepin is still racing through the forest in search of fisher scat. Parker and Holsinger try their best to keep up, struggling to wade a swift river and then thrashing through dense vegetation and over rain-slickened downfalls. After an hour, the dog hasn't scented any fisher scat, so Parker “focuses” him. She takes out a test sample found the

previous week and sends Holsinger far ahead to hide the specimen. “Find it,” she tells Pepin. He launches up the hill, scenting the air, head high, mouth open. He works the area wide then narrows in, tail wagging furiously. Suddenly he stops and sits. “Good boy!” says Parker, who pulls a toy from her pack and begins a game of tug-of-war as a reward. This is the dog’s first work assignment, and though he doesn’t find any new fisher trace, he proves himself up for the task.

Back at the car, Pepin jumps into the back and promptly lies down, apparently satisfied with today’s expedition. At just a little over a year old, this leggy dog with off-the-charts energy has shown a tremendous drive for his vocation. To him, it’s all just an exciting game. He has no idea that his innate scenting ability and extensive training will someday contribute to conservation work that helps biologists better understand the natural world. 🐾



MELISSA BEVERIDGE/NATURAL HISTORY ILLUSTRATION

HURRY UP! Pepin waits for Parker to cross a river during his first day at work. Biologists have found that highly motivated scent-detection dogs are one of the best tools for monitoring populations of elusive species such as fishers (below). Bottom left and right: Used exclusively by the U.S. Secret Service, Belgian Malinois are a breed known for their intense focus when on task—and even when taking a water break.



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