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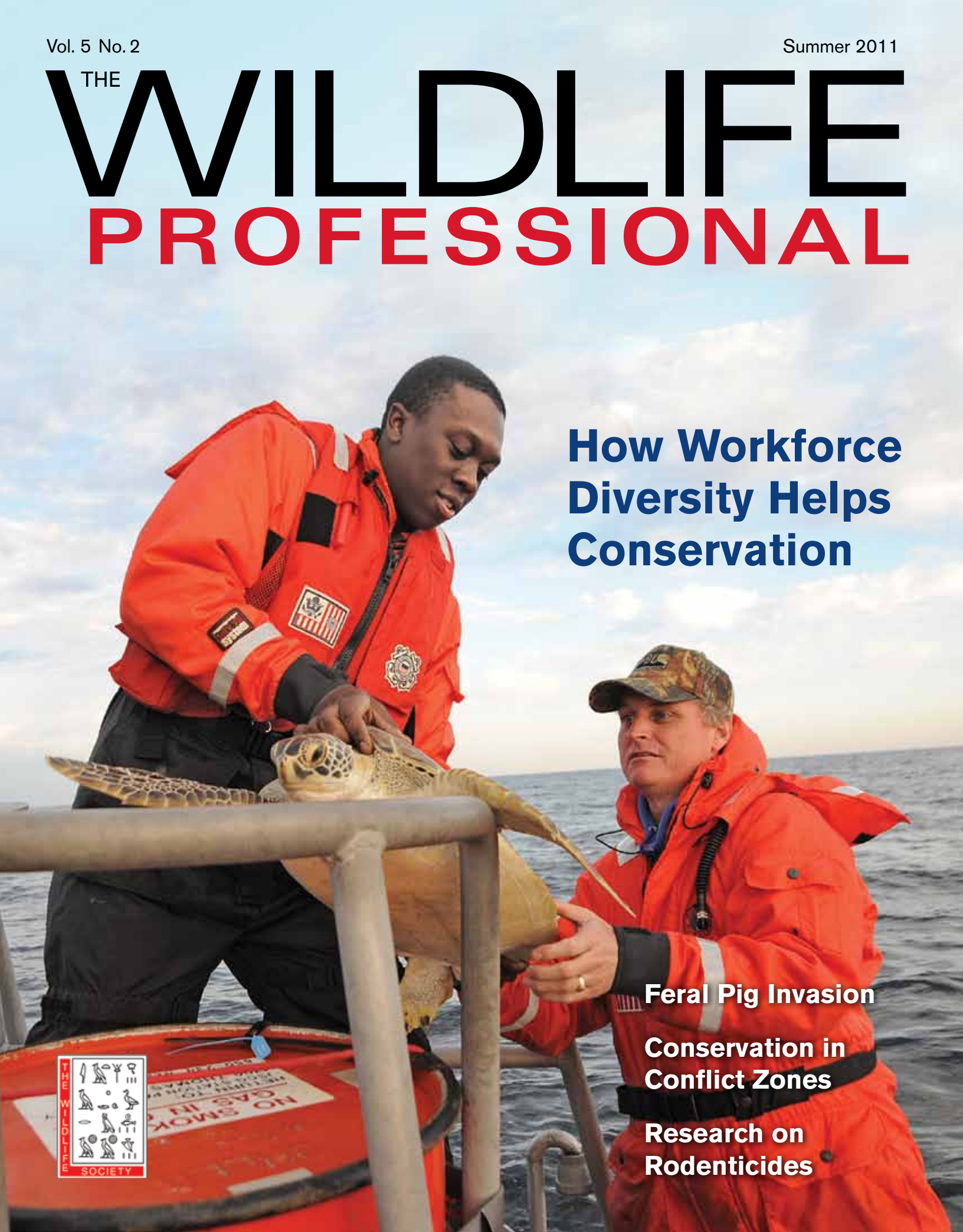

How Workforce Diversity Helps Conservation

Feral Pig Invasion

Conservation in Conflict Zones

Research on Rodenticides

THE WILDLIFE SOCIETY

THE WILDLIFE PROFESSIONAL

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Wildlife Detection Dogs

SPECIALLY TRAINED, THESE CANINES WORK HARD FOR CONSERVATION

By Megan Parker, Ph.D.

Pepin's nose twitches and his head snaps to the right, his body following as he swiftly changes direction. His feet are wet with morning dew from the grasses of southwestern Montana's Centennial Valley. A Belgian shepherd, Pepin ducks his head to catch a stronger stream of scent, the humid air helping odor molecules rise a few feet off the ground, the perfect height for a dog's nose. His mouth opens, gulping air and scent, then closes, taking in this information. His tail begins to circle, telling me that he is on a target scent—in this case, wolverine scat, which we're seeking for a population survey of the rarely seen carnivores.

Finally, Pepin spots the target, throws his body to the ground, and stares at me, willing me to approach. I scramble over rocks and through brush to get near him, but can't see the scat, which is hidden beneath vegetation. I ask him to show me, and he half-rises to point his nose directly toward the small, dried scat, then he plops down again, staring hard. I finally see it, then pull a tug toy out of my backpack as another researcher gathers data around the site and collects the scat. I watch Pepin's eyes dilate wildly, his body quivering in anticipation of play, his paycheck for hard work.

Scenes like this are playing out more frequently across the nation and the globe as wildlife researchers harness dogs' unique abilities to detect scent, a talent that has elevated them to a status as crucial conservation tools.

Special Skill Fills a Need

Since humans began the process of domesticating wolves roughly 15,000 years ago, we have helped give rise to hundreds of dog breeds, each with specialized traits. We rely upon our dogs' superior ability to run fast, guard us and our livestock, retrieve hunted game, and act as faithful companions. More recently, we have also learned how to train dogs to detect a phenomenal range of scents, including bombs, narcotics, bed bugs, and cancer cells. And in the last two decades, humans have taken the finely tuned noses of dogs and put them to work to help conserve rare and elusive wildlife species by seeking out, of all things, feces.

Thanks to advances in laboratory genetics in the 1990s, wildlife scat has become a sought-after, data-rich commodity. It is now commonplace for scientists to use scat to extract DNA, measure hormone levels, and acquire disease and diet information—in other words, obtain much of the same information as from a blood sample, with less disturbance to wildlife, less risk to biologists handling animals, and often lower costs. Furthermore, scat is collected and mapped at locations where animals naturally occur without baiting, providing unbiased information on habitat use.

Since the mid-1990s, dogs have served as natural assistants to scientists seeking scat samples in the field. Dogs have also been called upon to locate invasive species, from plants to snails to snakes. Seeing a growing need for these specially trained animals, in 2000 I worked with Deborah Smith, Aimee Hurt, and Alice Whitelaw to establish Wor-

Credit:Jeff Burrel

Megan Parker, Ph.D., (shown here with her dog Pepin) is Co-founder and Executive Director of Working Dogs for Conservation, based in Three Forks, Montana.

Credit: Tyler Roady

Traversing the scenic Centennial Valley of Montana, Working Dogs for Conservation co-founder and associate director Aimee Hurt and her black lab mix Wicket survey the landscape for signs of grizzly bear, black bear, wolf, and mountain lion.

ing Dogs for Conservation (WDC), a nonprofit organization that provides human-canine teams to support a host of scientific investigations. Since then, our dogs and others have proven themselves indispensible on hundreds of projects around the globe, in every conceivable habitat, working to find target odors, discriminate among species, and even differentiate individual animals.

Credit: Chad Hardy

Detection dog Wicket displays the "pinpointing" behavior, using her sensitive nose to indicate a rosy wolf snail for her handler. Invasive species like this snail—which has driven three-quarters of native Hawaiian snails to extinction since being introduced to the islands in the 1930s—are just one of the quarries of specially trained dogs.

How do we convince dogs to do this? The best working dogs have an over-the-top obsession with a certain toy or treat, like Pepin, who can't get enough of playing tug-o-war with a rope toy. The kinds of dogs that make good candidates for detection work may be too high-energy and hyper-focused to be easy family pets and therefore often end up in animal shelters. Shelters and rescues are where we find most of WDC's dogs, which (besides Pepin) include German shepherds and Labrador and border collie mixes.

Once we find a dog that we think will meet our needs, we use basic operant conditioning so the animal learns that locating a target odor will result in getting its favorite toy or treat. Once a dog locates its target, it is taught to alert the handler by sitting or lying down, then staring at the handler while awaiting its reward. The intensity of training increases over time until a dog can work in highly distracting field environments for long days while maintaining a focus on finding the target scents.

Dogs have an even greater ability than chimpanzees (our closest relatives) to understand human intention from vocal and body language (Hare *et al.* 2002). Even so, training is a time-consuming process, taking up to two months and costing roughly $15,000 from the time a dog is selected to being ready for field work. Handlers learn how to use well-timed body language and verbal commands to cue the dogs to search methodically for the target scent. For instance, if a handler has trouble finding a scat—perhaps it's small or camouflaged by vegetation—she may shrug her shoulders and ask the dog to "pinpoint" the sample, pointing with its nose but not touching the scat. Likewise, handlers must learn how to "read" the dog's behavior, figuring out when to make small corrections to keep the dog on track.

Canine Contributions

A dog's value in the field extends far beyond its ability to sniff out a pile of feces. Among the many strengths and advantages that dogs provide:

Accuracy. Though difficult to measure, we know that dogs have a sense of smell magnitudes greater than our own. This acute ability has been used since the late 1990s in California's Central Valley, where trained dogs have been detecting scat of the endangered San Joaquin kit fox (*Vulpes macrotis mutica*, Smith *et al.* 2003, 2005). From these scat samples researchers have gathered DNA that has yielded information about kit fox presence, sex ratios, relatedness, movement patterns, scent-marking behavior, and home range. These scientists also confirmed the remarkable ability of dogs to discriminate among sympatric predator scats: Of the 1,298 scats that dogs signaled as belonging to kit fox, every one was confirmed accurate through DNA analyses (Smith *et al.* 2003).

Range. Dogs can search for multiple odors simultaneously and can pick up scents from a great distance. For a study in the mountains and valleys between Yellowstone National Park and central Idaho's wilderness, for example, dogs were trained to find scats of wolves (*Canis lupus*), mountain lions (*Felis concolor*), black bears (*Ursus americanus*), and grizzly bears (*Ursus arctos horribilis*). The aim of the study was to reveal how large carnivores travel across various land jurisdictions, primarily public cattle- and sheep-grazing allotments. Covering hundreds of square miles over several years, researchers turned piles of scat into mountains of information and produced predictive models that are now being used to advise land planners and managers on development options to reduce disturbance to these four species (Beckmann unpublished data). And recently, researchers at the University of California-Berkeley, who worked with WDC to train dogs to find carnivore scats, published a study in *The Journal of Wildlife Management* indicating that dogs could detect scat up to 33 feet off their transects, while human

searchers visually located scats only three to five feet away (Reed *et al.* 2011).

Efficiency. In Vermont in 2003 and 2004, researchers pitted dog handler teams against camera traps and hair snares to survey for black bears (*Ursus americanus*), bobcats (*Lynx rufus*), and fishers (*Martes pennanti*) across the state. Detection dogs proved 13 times more effective on average at finding signs of these elusive animals (Long *et al.* 2007). The same study also noted that while using dogs requires a larger up-front cost than the other methods—a leased detection dog costs $316 per site compared to $214 for camera traps and $157 for hair snares—it often entails visiting a site just one time to gather information on a wide range of species.

Durability. Trainers have asked dogs to perform increasingly difficult work for conservation in a variety of habitats. Dogs have beat through Guam's thick jungles to find invasive brown tree snakes (*Boiga irregularis*, WDC, USGS), dodged cacti to find the burrows of desert tortoises (*Gopherus agassizii*) and black-footed ferrets (*Mustela nigripes,* Cablk and Heaton 2006), and stood on the bow of a small boat in the Atlantic Ocean to sniff out the scat of northern right whales (*Eubalaena glacialis,* Rolland *et al.* 2006).

Noses to the Ground

In just the past two years, dogs have worked on species as diverse as Javan rhinocerous (*Rhinoceros sondaicus*), gila monsters (*Heloderma suspectum*) in Nevada, and a suite of species on gas and oil lands in Canada (Wasser in press). In the Russian Far East, Russian scientists trained dogs to identify individual Amur tigers (*Panthera tigris altaica*) from scats picked up during snow tracking surveys (Kerley and Salkina 2007). The dogs' ability to identify individual tigers helps researchers map individual tiger movements and territory use. With such critically endangered species, knowing where individuals move in relation to threats can determine how to manage them.

Plants are likewise part of our dogs' expanding repertoire, in part because the dogs' olfactory abilities help them locate young plants that are too small to be seen by humans. In New Zealand, dogs are seeking an unusual parasitic plant, the wood rose (*Dactylanthus taylorii*), as well as rare skinks and tuatara (*Sphenodon* spp.). In the United States, dogs have sniffed out invasive Chinese clover (*Lespedeza spp.*) on a refuge in Iowa (Morse and Leggett 2010), and they're being trained out West to detect rare native plants and invasive weeds. In Oregon, one such plant under study is a rare native lupine flower, *Lupinus oreganus kincaidii*, host to the endangered Fender's blue butterfly (*Icaricia icarioides fenderi*, Vesely 2008). By finding and eventually protecting lupines, conservationists hope that Fender's blue butterflies will also be saved.

Dogs contribute to field work with their agility, stamina, and uncanny olfactory senses. They can cover far more ground than humans on a survey, increase sample sizes, reduce human observer bias, and decrease labor costs. The mounting pile of peer-reviewed publications about the value of scent-detecting dogs is a testament to the successes of dogs over the past 15 years for surveying and monitoring elusive species. Clearly for conservationists, working with dogs is not just an art, it's also good science. ■

Credit: Megan Parker

Credit: Megan Parker

As part of a training session, working dog Pepin searches a rock pile for bear scat (left). Successful detection dogs aren't deterred by distracting field conditions or foreign objects and scents, and work hard for the promise of a reward. For Pepin, that means a tug on his favorite rope (right)—a toy he has since destroyed with passionate chewing.

Read this article online at *www.wildlife.org* for additional photos of conservation dogs at work and for a full bibliography.