

# COUNTING WOLVES BY PHONE

How scientists at the University of Montana, FWP, and the U.S. Geological Survey created a more accurate and cost-effective way to monitor the state's wolf population

By Paul Queneau

During the past four decades, Diane Boyd has witnessed firsthand the growth of Montana's wolf population from just a handful to more than 800 today. Boyd, a Montana Fish, Wildlife & Parks regional wolf specialist in Kalispell, has also witnessed a marked change in the way FWP counts wolves.

For years, biologists and wolf specialists monitored wolf populations using a radio-collar method she first started using while a college student in Minnesota. Now she and her Montana colleagues employ a method that costs less, uses less labor, and produces more accurate results.

It's based on thousands of phone calls.

Boyd first learned to count wolves in the mid-1970s as an undergraduate student working with renowned wolf biologist David Mech in the dense forests of northern Minnesota. After trapping and tranquilizing a wolf, she and Mech fit it with a collar containing a radio transmitter. Wolves were located later from airplanes using a radio receiver that beeped when it picked up the collar's signal.

In 1979 Boyd moved to Montana, where she continued to study wolves as a University of Montana graduate student. The large carnivores, protected by the Endangered

Species Act, were just starting to repopulate the state's northwestern region, where they had not been seen since the 1930s. Wolves had begun crossing from Canada into Glacier National Park and the North Fork of the Flathead River watershed. Boyd set out to trap and collar some of those wolves, refining the techniques she'd learned earlier.

Biologists didn't need to collar every wolf. The carnivores travel in packs, so by following just one wolf, Boyd and other researchers could track the movements of a half-dozen or more.

Boyd spent as many winter days as funding, weather, and pilot availability allowed, crammed into a two-seater airplane, documenting wolf numbers and ranges. "Some winters the weather was so terrible we couldn't fly and find the wolves we'd collared," Boyd says. Yet she and other wolf researchers were eventually able to document, in 1986, the first wolf den in the west-



**SPIED AND VERIFIED** Aerial view of a wolf pack



ern United States since the species was extirpated (made regionally extinct) and track individual animals roaming as far as 500 miles to start new packs.

## MIXED BLESSING

Counting wolves in dense, remote forests is difficult and costly. Airplane rental and pilot fees add up to tens of thousands of dollars each year. Because wolves were an endangered species, the U.S. Fish & Wildlife Service paid for research and management. Funding increased further after the federal agency reintroduced wolves to Yellowstone National Park and a central Idaho wilderness in the mid-1990s.

By 2002, the radio-collar method had helped state and federal biologists show that Montana, Idaho, and Wyoming were home to at least 663 wolves and 43 breeding pairs. That exceeded the federal wolf recovery goal for the Northern Rockies of 300 wolves and 30 breeding pairs. The population increase triggered a federal process of delisting wolves as an endangered species. In 2011, following lawsuits and other delays,

Montana was granted full management of its wolf population. It was a mixed blessing.

Though Montana wanted management authority, delisting meant federal funds for monitoring populations would soon dry up.

By the time wolves were delisted, five FWP wolf management specialists worked in western Montana. They spent summers trying to trap and collar at least one wolf from every pack. Each year the work became more difficult. Packs were expand-

ing faster than FWP crews could find, trap, and collar wolves. "Even with five wolf specialists, we couldn't keep up with the 500-plus wolves out there," says Justin Gude, head of the FWP wildlife research program. Yet Montana needed accurate population information to ensure that regulated hunting and trapping seasons on wolves, now a game species, maintained a viable and connected population.

Back in 2006, FWP had teamed up with

the Cooperative Wildlife Research Unit at the University of Montana to think up new ways to track the rapidly growing wolf population. "We eventually hit on the idea of using patch occupancy modeling (POM)," says Mike Mitchell, who leads the unit. He volunteered his team to work with Gude and others at FWP to study the feasibility of using the method to estimate wolf numbers.

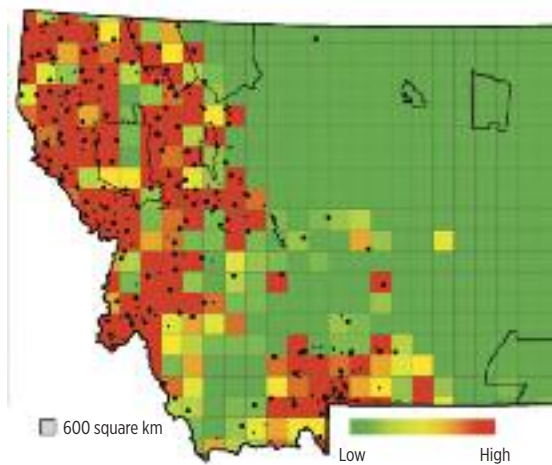
It's a simple idea. With POM, scientists make a grid of the entire state. Each grid cell, or patch, measures 600 square kilometers (232 square miles)—the average wolf pack territory in Montana.

Next comes the "occupancy" part. Scientists determine if each patch on the map is occupied by wolves or not and assign it a probability ranging from 0 to 1. Patches with no wolf sign (dark green in the map on page 38) are close to 0, while those in which wolves

**DIGGING DEEPER** U of M graduate student Allison Keever and Mike Mitchell, leader of the Cooperative Wildlife Research Unit in Missoula, discuss how wolf harvest from regulated trapping and hunting may affect population dynamics.



LEFT TO RIGHT: MONTANA FWP; DONALD M. JONES; PAUL QUENEAU



SOURCE: MONTANA FWP

### PATCH OCCUPANCY MODELING

This 2012 map shows how researchers divide the state into cells, or patches, each 600 square kilometers (232 square miles), the average range of a wolf pack in Montana. The colors show the predicted probability that a wolf pack is in each patch, ranging from near 0 (low) to near 1 (high). The patch probabilities are added up and multiplied by the average pack size to obtain an estimate of Montana's statewide wolf population. The large dots represent wolf packs verified by radio collars, while the small dots represent a harvested wolf, another indicator of wolf pack presence.

have been confirmed (dots on the map), such as with radio collars, are assigned a 1.

Between those two ranges are patches with varying degrees of probability, ranging from near 0 to near 1. For instance, patches with little wolf habitat or those far from patches with verified wolf occurrence might be assigned a 0.25 probability.

Once researchers determine the probability of wolf presence in each patch, they add up the numbers and multiply the total by the average size of a Montana pack: five to seven wolves, depending on the year.

That produces an estimate of how many wolves, living in packs, inhabit the state.

The biggest challenge was figuring out wolf occupancy in each patch. Mitchell and Gude knew that FWP would soon lack funding to collar enough wolves to provide a steady source of occupancy information. So they proposed instead to try using elk and deer hunter observations. "During the general five-week hunting season, there are more people out there, more eyeballs in the woods, than we could ever get any other way," Gude says. Montana deer and elk hunters collectively spend more than two million days afield each year. If wolves exist in a hunting area that has ample public access, the odds are good that somebody will see them.

### PROCESS IN PLACE

Fortunately, FWP already had a process for querying hunters. Every year from early December through May, phone surveyors call roughly 100,000 hunters to learn how many game animals were harvested in each hunting

district or county and how many days they spent afield. Wildlife managers use the information to help estimate overall harvest and adjust harvest regulations.

Starting in 2007, phone surveyors began also asking, "Did you see any wolves during the five-week deer and elk firearms season?" They have asked it every year since, building a database of sightings.

“With hunters, we essentially have an army of surveyors who can help us understand what’s going on out in the field.”

FWP is also using post-season phone surveys to assess the presence and distribution of moose, which biologists are concerned may be declining.

"With hunters, we essentially have an army of surveyors who can help us understand what's going on out in the field," says FWP wildlife biometrician Kevin Podruzny, who coordinates the surveys.

Of course, some hunters may mistake a coyote, dog, or other canid for a wolf, a type of error known in statistics as a "false positive." Also, many wolves aren't seen but are in fact there, something known as a "false negative." To figure out the best way to factor these and other variables into the POM study, Gude and Mitchell enlisted the help of statistics and population modeling experts at the U.S. Geological Survey Patux-

ent Wildlife Research Center in Maryland.

"When you go out and count animals, you can be sure you're missing some because you can't see or hear everything that's in the woods," explains Jim Nichols, a senior scientist at the center. "That requires a set of statistical models to factor in that variable."

The same logic applies to false positives. Based on detailed information gathered by FWP biologists during previous wolf surveys, POM researchers knew that the likelihood of a single hunter mistaking a coyote, dog, or other canid for a wolf, during a particular week of the deer and elk season in any given patch, is about 1 in 10. The odds decline to 1 in 100 if two hunters saw wolves. And if three hunters reported seeing wolves in the same area in one week, the odds that all three were mistaken drop further, to about 1 in 1,000.

To factor out false negatives and ensure no anti-wolf bias influenced hunters' reports, FWP set an extremely high bar for classifying patches as occupied: In any given week of the deer and elk firearms season, at least three

hunters had to have each seen two or more wolves (indicating a pack).

To test the accuracy of the POM method, researchers compared hunter phone survey results from 2007 to 2009 to data from the traditional trap-and-collar method. At the time, FWP still maintained a full team of wildlife biologists and wolf management specialists using radio collars to provide minimum population estimates. Though the POM numbers were higher, the two methods tracked almost exactly over the three-year period. "We got excited but also really skeptical because, as researchers, we don't trust results that look too correct," Mitchell says. "So we picked the data apart and tried to find some reason that it might be wrong. But we just couldn't."

POM confirmed that the traditional



“SEE ANY WOLVES?” FWP wildlife biometrician Kevin Podruzny (right), who coordinates the department’s annual winter survey of hunters, discusses a wolf sighting by an elk hunter with phone surveyor Butch Beaudry. For years phone surveyors have asked big game hunters (below) about their deer and elk hunting success. Since 2007, they’ve also asked about wolf sightings.

approach had been underestimating wolf numbers. "For years, what we publicized were Montana's 'minimum' wolf populations, because that's the number we could substantiate," Gude says. "We always knew more wolves were out there, but if the wolf management specialists couldn't trap them to verify sightings, we couldn't include those wolves in our population count." FWP knew it was underestimating wolf numbers, says Gude, "but that ensured we were meeting the federal population recovery goals, which was our priority at the time."

The POM method estimated that the statewide Montana wolf population was 1.34 to 1.46 times the minimum counts for each year of the survey—about what FWP had previously suspected, Gude says.

### AFFORDABLE AND ACCURATE

The POM results were so solid that FWP has transitioned to using it to officially estimate Montana's annual wolf population. Thanks to Federal Aid in Wildlife Restoration (Pittman-Robertson) funding, plus a \$50,000 grant from the Rocky Mountain Elk Foundation, Mitchell's graduate students are verifying the model's accuracy by examining how wolf hunting and trapping affect average pack and territory size. "We want to be sure both the patch size and wolf numbers per



pack we're using in our population models remain accurate," Mitchell says.

FWP biologists and wolf specialists also continue to look for and collar wolves. For instance, when phone surveys report previously unknown wolf locations, FWP crews head into the field to verify the existence of those animals. Crews also monitor packs that contain wolves with radio collars, especially in areas where the carnivores are known to attack cattle or sheep, as required by state law. The information helps wolf specialists respond to livestock depredation problems.

It also goes into the POM model, giving researchers information to compare with phone survey results.

But for estimating Montana's wolf population, POM is the more affordable and accurate choice. "We were really lucky it has worked out so well," Gude says. "We knew that so many deer and elk hunters are out there that some of them have to be seeing wolves. And it turns out they are." 🐾

*FWP harvest surveyors are still calling hunters and will continue through May.*

TOP TO BOTTOM: THOM BRIDGE; ED COYLE