How many DEER do you see?

Wildlife managers count deer from helicopters when estimating an area's deer population. How many deer can you count in this cornfield? Find the answer on page 45.

AERIAL VIEW BY DNR. WHITE-TAILED BUCK PHOTOS BY STEPHEN B. ANTUS JR.

BY Bob and Jan Welsh

COUNTING Critters

Math is fun when you're adding up loons and wolves and bears.

Maybe you've heard this old joke: How do you know there's been an elephant in your refrigerator? Answer: By the footprints in the butter.

Now, you probably don't have elephants in your house, or even your neighborhood. But you do live near other wild creatures—deer, frogs, birds, and butterflies, to name a few. You know critters are nearby because you see them or their tracks. Sometimes you hear them calling or rustling in the bushes.

If you wanted to count all the critters in your neighborhood, how could you do it?

Wildlife managers for the Department of Natural Resources try to keep track of all kinds of wildlife in Minnesota. How

BALD EAGLE AND EAGLET ON NEST BY STEPHEN B. ANTUS JR.

do they count wolves, bears, moose, eagles, and other creatures in the wild? And why do they count them?

Why Count?

Wildlife managers help take care of *wildlife populations*. Just as all the people living in a city or a country make up a population, all the animals of one species make up an area's population. For example, moose living in northeastern Minnesota make up that area's moose population. Minnesota's loon population is made up of all the loons that fly north to Minnesota lakes to breed in spring and raise their young in summer. To know if a population is healthy, wildlife managers must find out if the size of the population is increasing, decreasing, or staying the same.

Wildlife managers work with other scientists, conservation officers, and volunteers to count wildlife populations. They paddle, fly, drive, and walk to count critters on the land, on the water, and in the air. Collecting this data outdoors is called *conducting a wildlife survey.*

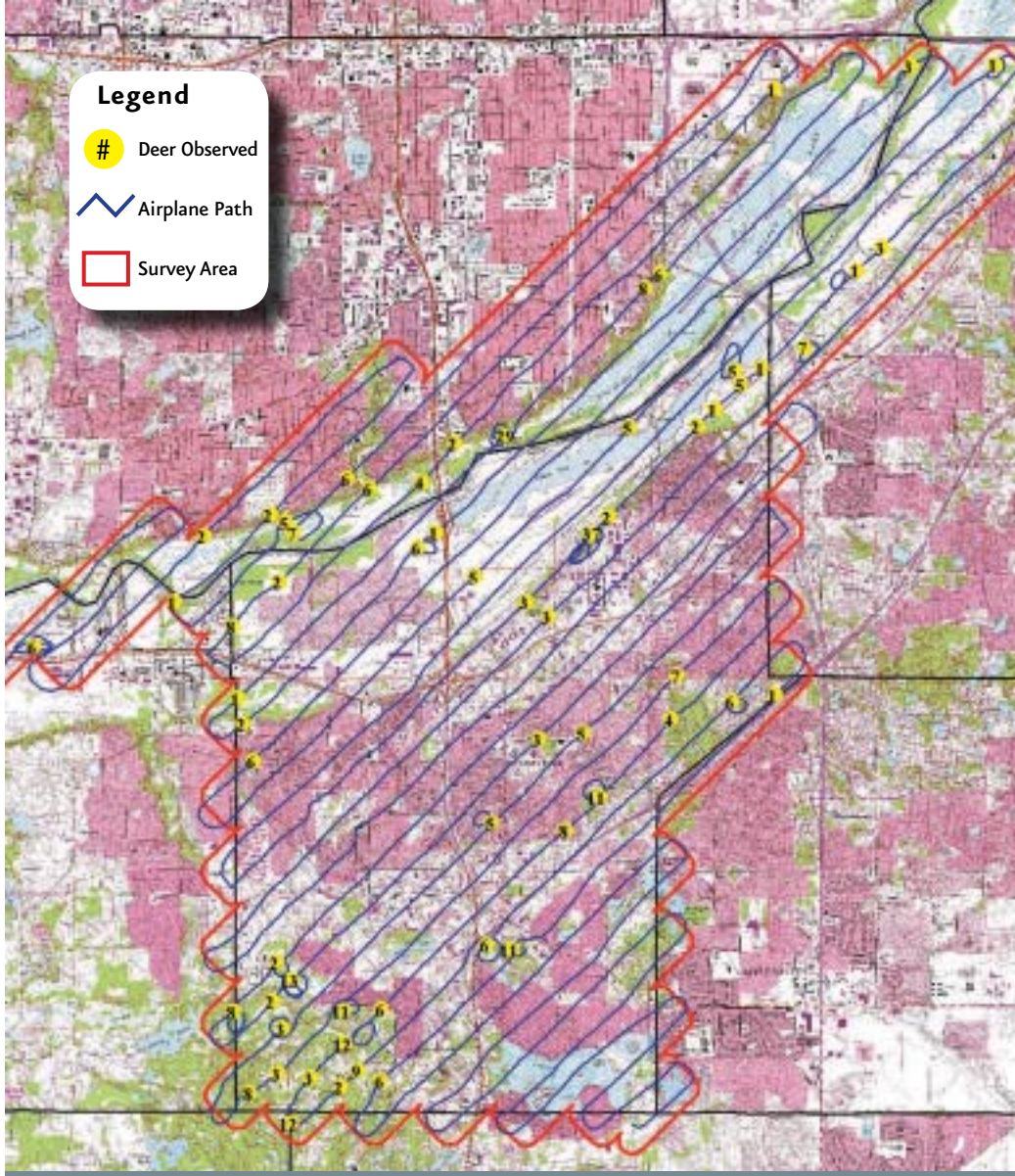
Wildlife surveys are one of the best tools for wildlife managers to understand wildlife populations in their area. For example, a survey can help a manager see when a deer population is increasing and becoming out of balance with its food sources. Then the wildlife manager might call for more hunting of female deer to help limit the size of the deer population.

If a survey finds too few of a species, then wildlife managers might call for special protection to help increase the population. For example, a survey in 1963 found only 417 nesting pairs of bald eagles in the lower 48 United States. In 1973 bald eagles were protected under a new federal law called the Endangered Species Act. Today, surveys show bald eagle populations have increased to 9,789 nesting pairs in the lower 48 states. The bald eagle is no longer considered an endangered species.

WHEN AND WHERE TO COUNT

From the Sky

Airplanes and helicopters can help wildlife managers find animals in the wild. Aerial surveys work best in winter or spring when trees don't have leaves. Then a conservation officer pilot flies



AERIAL GRAPHIC BY DNR

This DNR aerial deer **SURVEY MAP** shows the results of a deer count conducted in Burnsville. Yellow dots show where deer **WERE COUNTED.** The numbers show how many deer were counted in each spot. In some areas, the helicopter pilot flew in circles to be sure all the **DEER** were tallied.

LOONS BY RICHARD HAMILTON SMITH

with a wildlife biologist in search of wolves, moose, deer, waterfowl, eagle nests, or heron rookeries. The GPS (Global Positioning System) onboard helps track the survey route and record the locations of animals and nests.

Last January, helicopters were flown to count moose in northern Minnesota.

Moose are spotted and counted in a DNR aerial winter survey.

DNR PHOTO

Wildlife biologists spotted 420 moose in 40 rectangular plots they surveyed from the air. DNR wildlife biologists then *extrapolated*—or predicted a larger estimate based on a small sample number—that the total population in northern Minnesota was about 6,460 moose.

On the Water

Every year wildlife biologists and about 400 volunteers survey loons on about 600 of Minnesota's lakes. In early July (after loon chicks have hatched), loon counters head out for 10 days to count all the loons they can find on their assigned lakes. Counters can survey some small lakes and wetlands from shore. They use boats or canoes to survey larger lakes. Minnesota's loon population has held steady around 12,000 individuals since the first volunteer survey in 1994.

By the Road

Let's say you're a wildlife manager, and your challenge is to get a handle on how many ring-necked pheasants are around for the upcoming hunting season. You could hire a gazillion people to go out and try to count every pheasant across the landscape. Or you could take advantage of what you know about pheasant behavior. In early August young pheasants are large enough to travel with their mother, and they don't like to get wet. So early in the morning, when fields are cold and wet with dew, a mother pheasant takes her brood of young pheasants out on the roadside—where they can catch some sunshine to warm up and dry off. This provides a great opportunity for wildlife counters to drive country roads to count pheasants.

Each counter drives a route 25 miles long and records what he or she sees. The information gathered gives managers and hunters an idea of pheasant abundance and shows if the population size is going up or down from previous years. In 2007 roadside counters surveyed 170 routes and counted about 106 pheasants for every 100 miles of road they drove.

Roadside wildlife surveys also count gray partridges, eastern cottontail rabbits, and other species.

CLEVER COUNTING TACTICS

Tune in the iToad

People who survey anurans (frogs and toads) count by ear. They are trained to listen for the calls of Minnesota's 14 species. Volunteers travel set routes along roads near wetlands at night listening for calls. They head out three times during the year—in early spring, late spring, and early summer—since different frog species call at different times.

During this anuran dating season, males go all out attracting females with their amazing calls. To count them, the volun-

DETECT INVADERS

Sometimes wildlife counters discover critters where they don't belong. While conducting frog and toad surveys last spring, biologists found bullfrogs outside of their native range (original home territory). In Minnesota, bullfrogs belong only near the Mississippi River in the far southeastern corner of the state. Because bullfrogs have big appetites for everything from fish to birds to other frogs, they can upset the balance in the food chain in places outside their native range.

BULLFROG BY ALLEN SHELDON

This **BEAR TOOTH** has pairs of yellow tetracycline lines running through it, which means it came from a bear that ate two tetracycline-laced baits set by DNR biologists. The tetracycline is visible when the tooth is exposed to ultraviolet light and viewed through a microscope. Biologists mark bears with tetracycline as part of the process of estimating Minnesota's bear population.

DNR PHOTO

BLACK BEAR BY STEPHEN B. ANTUS JR.

teer stops 10 times at specified spots near potential breeding sites and records all the frog calls heard during five minutes. In recent surveys, counters have heard fewer spring peepers and gray treefrogs. If that trend continues this year, it may indicate a problem with these frog species in Minnesota.

Find a Tooth Mark

How do you dare count bears? Very carefully. In fact, wildlife managers use a clever method of calculating the number of live bears by examining the teeth and bones of dead bears.

When hunters shoot and kill a bear in Minnesota, they must turn in one of its teeth and a piece of rib bone to the Department of Natural Resources. Using some ingenuity and simple math, the DNR is able to turn this collection into a population estimate. Here's how it works.

First the teeth and bones of some live bears must be marked. To do this, managers get bears to eat tetracycline, a common antibiotic that stains the inside of the growing parts of teeth and bones. How do wildlife managers get a bear to eat tetracycline? They hide tetracycline pills in bacon. Then they hang these baits in trees spaced several miles apart across the range of the bear. Wildlife managers come back and visit these trees a few weeks later to see how many baits are gone. They also see how many of the trees have claw marks from a climbing bear. So now they know the number of bears that ate baits and have tetracycline marks inside their teeth and bones. But how do they convert that number into a population estimate?

When researchers at the DNR receive the teeth and bones from hunters, they cut them with a diamond saw and then examine the slices under a microscope to see how many have tetracycline marks. The last time this count was done, in 2002, hunters turned in about 3,400 teeth and bone samples. Of those, 105—or 3 percent—were marked.

To get a population estimate, we assume that if 3 percent of the bears that hunters shot were marked, then 3 percent of all bears in the population must be marked. In 2002, 700 bears ate tetracycline baits, and if these represent 3 percent of the whole population, then the population is 23,000 (700/0.03), more or less a few thousand.

IT'S THE INDEX THAT COUNTS

Listen for Drummers

If wildlife professionals could count every individual critter in a population, it would be called a *census*. But that's impossible, especially considering most wild animals aren't willing to be seen and counted. Some critters, such as ruffed grouse, are especially hard to see and count because they live in dense stands of trees. So wildlife biologists count the number of times they hear grouse

RUFFED GROUSE DRUMMING ON A LOG BY STEPHEN B. ANTUS JR.

drumming. This count creates an *index*. An index is a way to use animal clues to monitor the health of a population without counting individuals. It measures whether a population of animals is increasing or decreasing. A higher index means more animals, and a lower index means fewer.

Drumming is a spring ritual for grouse. Male ruffed grouse drum by rapidly beating their wings, causing the air to thump with each beat to attract a mate. Some people say the drumming sounds like an old tractor starting up on a cold Minnesota morning. Every year wildlife biologists drive routes within the grouse range and listen for these drumming sounds. Increases or decreases in the number of drumming grouse heard from year to year are interpreted as increases and decreases in the grouse population.

The grouse survey has been done in Minnesota since 1949. This long-running survey has shown that every 10 years or so, the ruffed grouse population tends to hit a high point. Exactly why does this cycle occur? No one knows for sure. In spring 2007, the ruffed grouse drumming index in Minnesota was 1.3 drums per stop, or about 13 grouse drumming for every 10 stops by the biologists. That 2007 index was higher than in 2006 and 2005, when the grouse population index was at the low point in its 10-year cycle.

Track the Sniffers

Another wildlife index is created by relying on an animal's sense of smell and its curiosity. If you drop a really stinky pellet on the ground, curious predators—raccoons, foxes, skunks, and coyotes—are likely to come sniffing around it. For predator surveys of these species in September, wildlife biologists first clear a small circle (about 1 meter across) about every half-mile along a country road. They sift soil on the circle and put a stinky pellet in the middle. Then overnight, when local predatory creatures stop by to check out the scent, they leave their tracks in the sifted soil. The next day, the wildlife counter returns to identify the tracks.

This counting method is called a *scent station survey.* What makes pellets stinky? Old smelly socks? Stinky cheese? Nope—fatty acids, just like the kind of fat that's in the food people eat. If you've ever been camping and had a raccoon sniffing around your food, you'll know that fatty acids attract animals.

The proportion of scent stations visited by a species makes up the population index for that species. For example, in 2006 the bobcat scent station index was 1.2, meaning that 1.2 percent of the scent stations were visited by bobcats. Back in the 1980s, less than 1 percent of the scent stations were visited by bobcats. Because the index is higher today, wildlife professionals think there are more bobcats in Minnesota now than there were 20 years ago.

START COUNTING CRITTERS

Every season, volunteers help count wildlife:

Bluebirds: Bluebird Recovery Program tracks about 9,000 pairs of nest boxes. See www.bbrp.org or call 507-332-7003.

Butterflies: North American Butterfly Association coordinates July 4th counts. See www.naba.org.

Frogs and toads: DNR needs volunteers who can drive and count in spring. See www.dnr.state.mn.us/volunteering/frogtoad_survey.

Winter birds: Audubon's annual Christmas Bird Count takes place in one day. See www.audubon.org/bird/cbc.

1. Wildlife managers prepare a spot for a scent station by clearing sod and rocks.

2. A smelly pellet is placed in the middle of the sifted soil to attract nearby predators.

3. The next day a wildlife manager returns to look for animal tracks.

4. In this case, a curious coyote left its tracks near the pellet.

How many deer do you see?

This answers the question from page 36.

A NOTE TO TEACHERS

Find teachers guides to this and other Young Naturalists stories online at www.dnr.state.mn.us/young_naturalists.