

Bear study teams DNR, Medtronic and University of Minnesota researchers

NEAR PLUMMER, Minn. -- An early spring might be a welcome turn of events for hibernating bears, but it's worrisome for researchers seeking to find the animals in their dens for close-up study.

Dave Garshelis and a crew accompanying him had already seen one bear bolt from a swampy nest Wednesday morning north of Bemidji.

They didn't want the same thing to happen with the female bear dened up in this thicket near the border of Pennington and Red Lake counties. A GPS collar on the sow's neck betrayed her whereabouts.

"I'm worried about the bears running with the warm weather," Garshelis said.

Bear biologist for the Department of Natural Resources in Grand Rapids, Minn., Garshe-
lis and a team of grad students and scientists were in the field as part of an ongoing black bear research project with Medtronic, the Twin Cities-based medical technology and research firm, and the University of Minnesota.

While the DNR is monitoring GPS-collared bears to learn more about their food and habitat preferences and where the animals spend their time throughout the year, partners from Medtronic and the University of Minnesota are seeking to gain insight into why hibernating bears can spend four to six months in a state of suspended animation and hit the ground running, so to speak, when spring arrives.

As part of a related study with the University of Michigan, they're also trying to learn more about why bears heal from injuries as fast as they do.

Turns out there's a lot more to understanding bears than knowing what they do in the woods.

"They're in this state of starvation -- no exercise, really nothing to drink, so you presume they're dehydrated as well -- yet they remain awake," said Tim Laske, vice president of research at Medtronic and an adjunct professor at the University of Minnesota. "We joke around you can't sneak up on a hibernating bear because they may be staying still in the den, but they're aware of your presence. It's pretty remarkable they're able to do that in

that condition. It's as if they're waiting for springtime; they're laying in this state of somewhat suspended animation, they're minimizing energy consumption, but they're remaining alert so they can defend themselves if need be."

Humans bedridden that long would suffer significant muscle loss.

According to Paul Iaizzo, professor of surgery at the University of Minnesota School of Medicine and Medtronic professor of visible heart research, heart monitors implanted under the skin in bears' chests have provided some striking data about bear physiology.

During hibernation, for example, their hearts routinely will stop for 25 to 30 seconds (the longest they've observed is 33.8 seconds). The bears will breathe, have three to four heartbeats to circulate oxygen, and then the heart will stop again.

Humans would faint within seconds.

"Their brain is telling them to really shut down almost all the way, and then there's a part of the brain that controls your respiration that's saying, 'OK, you need to breathe, so increase your heart rate,' " Iaizzo said. "Now we've got all the oxygen circulated, you're going to exhale, you don't need to have a heartbeat, so it drops down to nothing."

Medtronic donates equipment for the study, Laske said, and all three partners provide funding and research expertise. Beyond knowledge, there's no gain for Medtronic or the U of M, he said.

"It's all in the name of basic science," Laske said. "Hopefully, we can find cures to diseases and ways to treat patients that are bedridden or have cardiac conditions.

"The most substantial portion is related to the work the DNR is doing."

Winding down

Garshelis said the northwest Minnesota portion of the study -- underway since 2007 in an effort to learn more about bears on the western fringe of their home range -- will wind down in the next couple of years. Seven bears in northwest Minnesota currently have GPS collars, he said, adding the DNR is hoping to collar a bear recently spotted near Fisher, Minn., along with another yearling male.

Bears in the study generally were trapped in the summer and fitted with the tracking

collars.

"We've learned a lot," Garshelis said of the northwest Minnesota research. "Big bears here. They have big home ranges."

Garshelis had good reason to fear the bear near Plummer would flee Wednesday afternoon. The GPS collar on her neck told the researchers she already had moved from the den where they had found her in December.

At the time, a crew including Garshelis, Laske and Iaizzo, installed high-tech transmitting equipment at the den site.

The equipment, which had to be set up within a few feet of the bear, would transmit a signal every two hours from a tiny heart monitor implanted in the bear's chest to a website where the researchers could monitor her heart rate in the den.

Everything had gone as planned; they'd sedated the sow, buried an antenna below the floor of her den and set up a cell phone module atop a makeshift tripod outside the den to stream data to the website. A solar panel connected to two 12-volt batteries would ensure enough power to run the equipment throughout the winter.

The installation complete, the crew returned the groggy sow to her den for what they expected to be a long winter's nap.

Two days later, she vacated the den for a new site about 2 miles away, which is where Garshelis hoped to find her still hibernating Wednesday afternoon.

Mellow bear

To minimize disturbance, Garshelis and two assistants planned to sneak in and sedate the bear using a syringe attached to a dart stick.

Laske, Iaizzo and others in the crew would slog through mud and snow to retrieve the equipment from the old den site and haul it to the new den.

This time, everything worked as planned.

"The bear was really calm," Garshelis said. "I thought she was going to be active or sitting on a nest (instead of a den). We tried to be super quiet, not break any branches, and we got here, and she was in a hole."

"Still, if we'd come crashing over here, she could have just bolted."

By the time Iaizzo, Laske and the rest of the crew arrived, the bear was sedated with a drug that would last up to five hours. She was removed from her den, placed on a tarp and hooked up to portable EKG and ultrasound machines to look at her heart.

Iaizzo also implanted a new heart logger in her chest to replace an old one that was low on battery power, and Garshelis fitted the bear with a new GPS collar. Blood and tissue samples were collected, and the bear was poked and prodded to check her body condition.

A healthy female, the 6-year-old sow weighed about 260 pounds, down from 297 pounds when she was weighed in December at her first den.

The crew had expected to find cubs, but the sow was alone. Garshelis looked for remains of cubs in the den and found nothing. Because she'd changed dens, he suspected she'd eaten the cubs after giving birth.

A cruel reality, to be sure, but an occasional occurrence in nature.

Precise data

Wired up and fitted with the latest in springtime bear study accessories, the sow was returned to her den. The researchers will be able to receive precise heart rate data from the bear for the next three years.

At the same time, the new GPS collar, which cost about \$3,000, is programmed to transmit a daily email to the researchers showing where she's at and where she's been.

"What we're wanting to know is what the bears are doing essentially all day every day -- what their heart rate is doing so it can be correlated with the satellite collar," Laske said. "So if they're crossing a road, we know how their heart rate changed. If they're in someone's bird feeder or yard, we'll know what happened to the heart rate."

The DNR currently has 18 bears collared across the state, including the seven in northwest Minnesota. If he can secure funding, Garshelis said he hopes to launch a new study in the bears' core range of northeast Minnesota, in which case he said they'll start taking collars off the remaining northwest bears.

Besides the potential medical benefits, Laske said working with the bears has provided the researchers with a window into nature few people get to experience.

"We have interesting jobs back at our offices and in our labs, but this is something special," he said. "They're incredible animals."

Bear Facts

- Minnesota has an estimated population of 12,000 to 15,000 bears, down from a high of about 25,000 in the late 1990s.
- The bears in the northwest Minnesota study are located in the so-called "no-quota" zone, where bear permits can be purchased over the counter throughout the hunting season, which begins in early September and ends in mid-October. Hunters in traditional bear range apply for tags through a lottery.
- Dave Garshelis, bear research biologist for the Department of Natural Resources in Grand Rapids, Minn., said the DNR has cut back the number of bear licenses in recent years and is considering making the no-quota zone of northwest Minnesota a lottery area. A public input process would be conducted before that happened, he said, and no changes would occur before the 2016 season.
- For more information on Minnesota bears, check out the DNR website at mndnr.gov/bear/index.html.

-- Brad Dokken