SAVING BIG BIRD MONGOLIAN MARMOTS BIOFUEL GIANT SABLE SUN PARAKEETS

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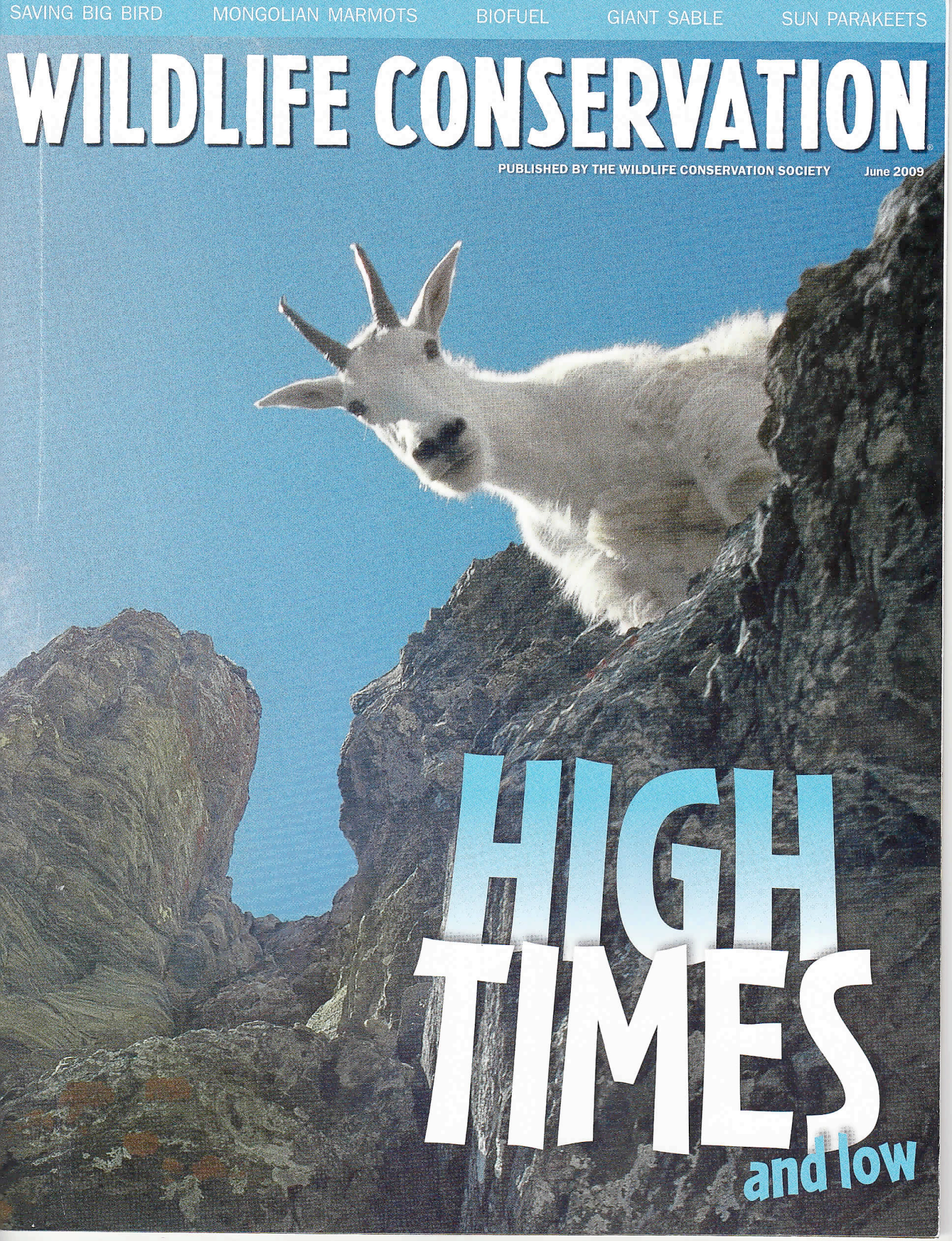

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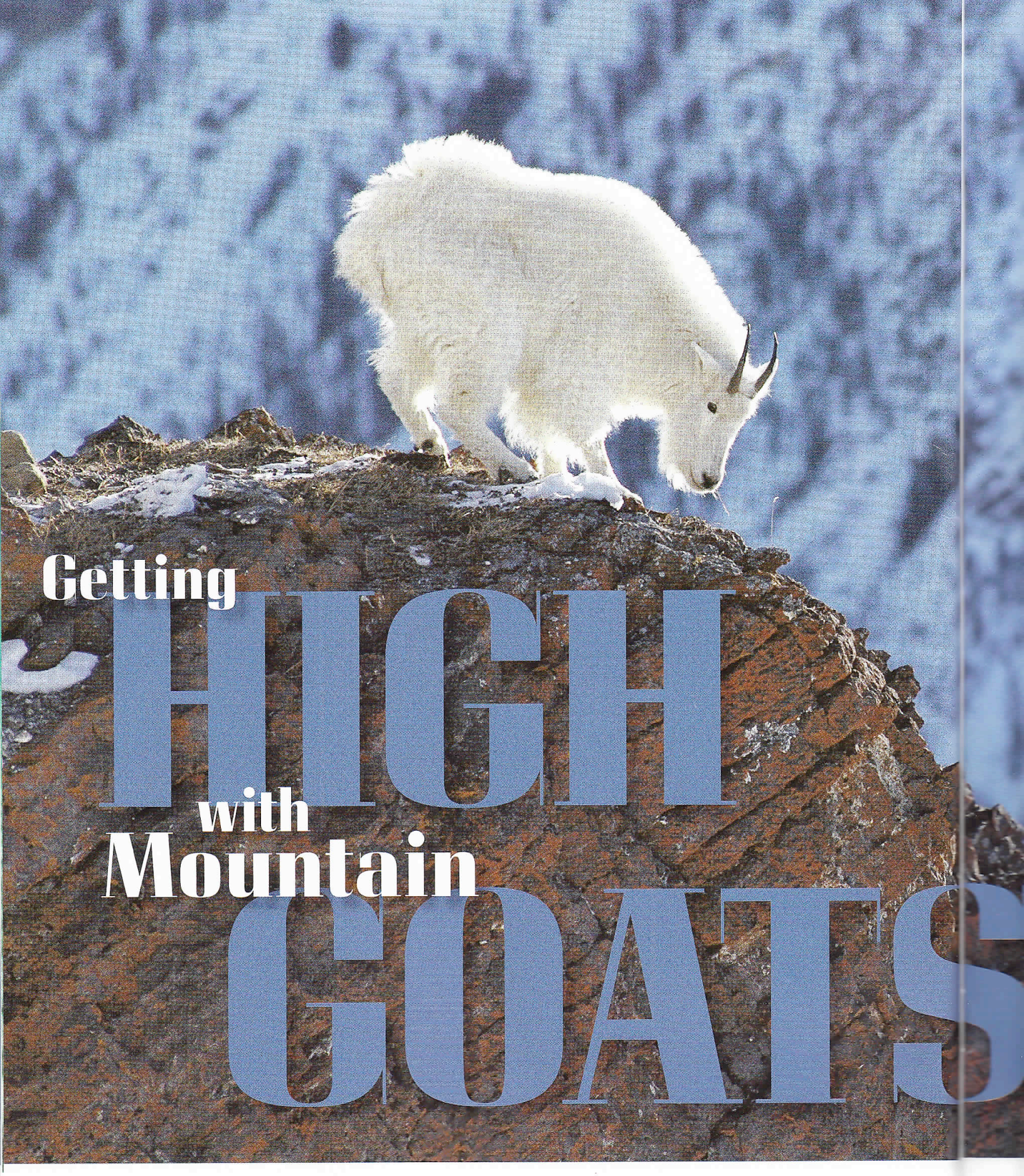

Getting HIGH with Mountain GOATS

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By Doreen Cubie

All I can see through the windshield of our single-engine Maule aircraft is the snow-topped summit of Mount Adams, a 12,276-foot dormant volcano in Washington's Cascade Mountains. As we continue to close in, a few translucent clouds float over the massive peak.

The air becomes turbulent, sending a slight shudder through the small plane. In the backseat, biologist Laurel James is listening for telltale beeps emanating from the high-tech satellite collars worn by four mountain goats somewhere below. She and her colleagues have been tracking these animals since autumn 2006 on the Yakama Nation reservation, which stretches from the floor of the Yakima Valley to the eastern summit of Mount Adams.

Below us lie several glaciers, with a dozen or so backcountry skiers enjoying a day of July snow. Not far from them, James spots a group of 18 mountain goats dozing in the sunshine on a flat outcropping aptly named Goat Butte. We circle overhead, but none of the tagged animals are there. We leave Mount Adams behind for Klickitat Canyon, a rugged gorge that also has a population of goats. James still doesn't hear anything. "They will tuck under a rock ledge," she says. "We can't always get a signal."

About 80 mountain goats live on the Yakama Nation's 1.3-million-acre reservation. When James worked for her tribe's Division of Wildlife, she received a Wildlife Conservation Society (WCS) research fellowship to study them. Now James is beginning a Master's program at the University of Washington in Seattle, and she returns home frequently to learn more about these elusive alpine animals. Her project is one of several underway in the Pacific Northwest, where mountain goat numbers have skidded downward in the past 50 years. Scientists are trying to figure out why.

Living as they do in high, inaccessible places, mountain goats are very difficult to study. Satellite telemetry, however, has made it easier. After we land, James explains that, in 2004, the tribe outfitted four other mountain goats with conventional radio transmitters. These produce a signal that can be picked up with an antenna, giving an animal's location at a precise moment. "With the WCS grant, we were able to purchase GPS (global positioning system) collars," says James. GPS collars use orbiting satellites to keep tabs on the goats, recording the time, ambient temperature, and latitude and longitude of each animal every three hours. A special receiver allows biologists to download the data stored in the collar. This new technology not only reveals exactly where an animal goes every day, it pinpoints its preferred habitat and migration routes and the size of its home range.

Much less is known about mountain goats than about deer, moose, or elk. Biologists do know they are not true goats. They are more properly known as goat-antelopes and are most closely related to chamois, high-alpine inhabitants of Europe and the Caucasus. Our North American mountain goat, *Oreamnos americanus*, ranges from Alaska south through the Yukon Territory, British Columbia, and Alberta into parts of Washington, Oregon, Idaho, and Montana.

Mountain goats have also been introduced into several other states, including Utah, Nevada, and South Dakota. Estimates put the population at 75,000 to 100,000 goats across their range, with about 50,000 of them concentrated in British Columbia.

These cliff-hanging goats sexually mature by two and a half years of age and can live ten years in the wild. Predators other than people are few, but mountain lions and wolves sometimes take them down. So do rock slides and avalanches. Golden eagles kill newborn kids, which are about the size of a snowshoe hare. As many as 50 percent of young goats die before they reach one year old, mostly from falls or starvation during their first winter.

With their shaggy, white coats and short, black horns, male and female mountain goats look a lot alike. During most of the year, nannies and their young live in family groups. The males, called billies, sometimes spend the summer together in small bachelor herds. When fall arrives, they

During the past 50 years, the numbers of mountain goats (below and pages 20–21) in the Pacific Northwest have declined, and researchers are trying to find out why. Possibilities include overhunting, a critical mineral deficiency related to acid rain, global climate change, and too many people visiting the backcountry. On Yakama Nation lands, which encompass a portion of Mount Adams in Washington State (right), human activities during winter, especially illegal snowmobiling, jeopardize the future of these sensitive goats.

LAUREL JAMES

THOMAS KOGUT

square off and compete for the nannies. Six months after mating, females give birth to one kid. Twins are rare. Not long after birth, the youngsters can stand, and in a matter of hours they can keep up with the adults. Within days, they are clambering over rocks and ridges. Both adults and kids have specially-adapted hooves with sharp outer edges that grip well and large, rubbery soles for traction on sheer slopes. "They can go in some incredibly steep areas," says James.

And scientists have discovered that goats can travel to unexpected places. Biologist Keith Kohl with the Oregon Department of Fish and Wildlife has placed radio and GPS collars on a number of mountain goats in his state. "We've had quite a few moving out into new territories," he says. One young male really surprised him. This goat left the Elkhorn Mountains in eastern Oregon and hoofed it more than 200 miles northwest into Washington. To get there, he had to cross major highways, including Interstate-84, several sets of railroad tracks, extensive agricultural fields, and even the Columbia River.

> Global climate change threatens the species. "They're alpine animals," Laurel James says. "There is nowhere for them to go."

A goat collared by Washington Department of Fish and Wildlife biologist Cliff Rice trekked 36 miles roundtrip just to reach a salt lick. "We didn't even know where mountain goats went in the winter," Rice says, commenting on what was known at the beginning of the project. Working with the U.S. Forest Service and the National Park Service, Rice tracked goats for six years, wrapping up his research in 2008. "We filled in some of the answers," he says, "but not all of them."

Most of the mountain goats he studied spent much of the winter outside of alpine areas, sometimes in old-growth forests. These never-logged areas have dense canopies that keep snow from accumulating underneath the trees. With less snow on the ground, the goats don't have to do as much pawing to reach food.

Old-growth forests also have many fallen branches and downed trees and abundant lichens, all of which provide forage. Rice discovered that mountain goats will forage in clearcut areas, too. If the snowpack is not too deep, the animals will move into these timbered sites seeking newly-sprouted vegetation.

THOMAS KOGUT

LAUREL JAMES

Within days of being born, a mountain goat kid can follow its mother over rugged terrain (opposite). Yakama Nation wildlife biologist Laurel James (left, with volunteer Michael Porter, center, and technician Terry Heemsah) outfitted eight mountain goats with radio collars to study seasonal habitat use and productivity and mortality in the two mountain goat populations living on the reservation.

When spring comes, the goats start moving up the mountains, following the greening grasses. By summer, they are above the timberline. There, a subtle threat may lurk: mineral deficiency.

Across the West, mountain goat and bighorn sheep researchers are trying to determine if these mammals are getting enough selenium. Ironically, the usual environmental problem is too much selenium due to the runoff of fertilizers from agricultural lands. But with too little of this micronutrient, youngsters seldom survive long enough to be weaned. Normally, plants take up selenium from the soil, and the goats and sheep assimilate the mineral from eating the vegetation. But scientists have determined that acid rain interferes with the ability of plants to absorb selenium.

To investigate this potential nutritional problem, Rice and his colleagues took blood samples from captured goats. None in his study area showed selenium deficiency. Instead, Rice believes that the main culprit for the decline of mountain goats is overhunting in the past. "We used to manage mountain goats like deer, but we've learned that they are different," he says. "For one thing, they have a low reproductive rate." Mountain goats do not mature as quickly, nor do they have as many young. "When hunting is reduced, they don't bounce back," Rice says. "They *climb* back."

Canadian ecologists Marco Festa-Bianchet and Steve D. Côté agree. Over a 16-year period, they studied more than 300 marked goats near Jasper National Park in Alberta, Canada. Their research convinced them that mountain goats can sustain a harvest rate of only one percent, although introduced populations seem to be able to sustain higher rates. In most places, hunting has been cut back. Rice thinks mountain goats in Washington are no longer declining. In fact, in some areas of the state, they may even be increasing slightly, he says.

But unanswered questions remain. For one, what will escalating numbers of hikers, skiers, climbers, and snowmobilers in the backcountry mean for them? When disturbed, mountain goats often abandon critical habitat. In a study in Washington's Mount Baker area, hikers didn't bother the goats if they stayed on established trails, but people that took off cross-country spooked them.

Global climate change also threatens the species. "They're alpine animals," Laurel James says. "There is nowhere for them to go."

The day after our flight over Mount Adams and Klickitat Canyon, James, several other tribal biologists, and I drive deep into the Yakama Nation reservation. We ascend from sagebrush desert through ponderosa pine and Douglas fir forests. When we finally reach the larches and spruces of sub-alpine habitat, streams rush with snowmelt. Fireweed, paintbrush, and lupine bloom. This landscape reminds me of Alaska, somewhere near Denali, especially with Mount Adams looming nearby and looking almost as close as it did from the plane.

As high as we are, the mountain goats are higher still. A flock of ravens chase each other overhead as the biologists set up their equipment. James swings the antenna around in a circle, listening for a signal. She locates a collared goat on the north side of Mount Adams, and soon she is downloading data. Somewhere in the distance, unseen except by satellites circling the Earth, a mountain goat is revealing the secrets of its world.

When she is not in the field with biologists tracking mountain goats, Burmese pythons, and assorted other wildlife species, freelance journalist Doreen Cubie writes from her home in South Carolina.