

NATURAL HISTORY

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**STEPPING
LIGHTLY**

Life on the Edge

Story and Photographs by Bruce L. Smith



Due in part to its remote habitat, the mountain goat, *Oreamnos americanus*, rarely gets championed.

Peaks protected fifty years ago by the Wilderness Act no longer keep mountain goats safe from human impact.

Many of the planet's species live—and go extinct—in obscurity. An untold number have yet to be “discovered” by inquisitive humans. They may roam the oceans’ dark depths or Papua New Guinea’s rainforest canopy, or wriggle through the soil beneath our very feet. Some surprisingly sizable animals have escaped the prying eyes of scientists. Only last August a new species of bamboo shark that “walks” on its fins was observed in Indonesia. A new primate, the Lavasoa dwarf lemur, was discovered in Madagascar last July. And in Brazil a second species of a spotted cat, the oncilla, and a new species of tapir—a 240-pound relative of horses and the rhinoceros—were recorded with camera traps for the first time.

Even cataloged life forms can dwell in near anonymity, a dim existence that can be both a blessing and a curse. Obscurity may spare such creatures from intentional exploitation but also leave them without a constituency to champion their defense. One such reclusive and seldom-seen species is *Oreamnos americanus*, a charismatic, shaggy, horned beast whose only extant relatives live half a world away. Inhabiting some of North America’s remotest wildlands, it might as well roam the Himalayas, like its relatives the gorals (*Nemorhaedus* spp.) and serows (*Capricornis* spp.), for how few Americans have seen a mountain goat in the wild. Although it is commonly called the Rocky Mountain goat, a more accurate moniker would be the American mountain goat (or just mountain goat), because its native distribution goes beyond the Rocky Mountains and includes the Cascade and Coast mountain ranges of western North America. In fact, these are not “true” goats of the genus *Capra*, but animals exhibiting char-

acteristics of both goats and antelopes, possessing fragile skulls, and short, dagger-like horns that look similar in males and females.

This year marks the fiftieth anniversary of the passage of the Wilderness Act, the law by which the United States

Congress created the National Wilderness Preservation System and set aside such pristine habitats as the Selway-Bitterroot and Bob Marshall Wilderness Areas in my home state of Montana. The following definition was made in 1964: “A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and community of life are untrammelled by man, where man himself is a visitor who does not remain . . . an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions . . .” No large animal better characterizes the high, rugged wildlands than the American mountain goat. Today the goats roam entirely on public lands, which include national parks in six states and three Canadian provinces,

though that doesn’t guarantee their protection.

Forty thousand years or more ago, ancestral mountain goats crossed the Bering Land Bridge from Asia to the New World, as did most of North America’s extant and extinct large mammal species. The Great Ice Age’s conditions shaped *O. americanus* to the cold, rugged environment it roams today, from southern Alaska to the western Northwest Territories and southward through Canada into Montana,



Male mountain goat in its winter coat



Idaho, and Washington. Equipping it with traits that permit it to seemingly defy gravity on the high peaks, the mountain goat's specialization starts with the feet. Oversize, flexible hooves with pliable hoof pads are the animal world's equivalent of studded tires. A stocky body provides a low center of gravity, contributing to its uncanny agility on narrow ledges. While the goat's distant cousins, bighorn sheep, bound crisply across slopes and rocky outcrops, the goat is a methodical plodder and inclined to stick to steeper terrain. (Once I watched a goat climb to the top of a dizzying pinnacle and stand with all four feet together on a summit measuring only eight inches square. Then he raised a hind foot, scratched behind an ear, and shook the dust from his white coat, as I looked on in wonder.)

The goat epitomizes the concept of layering for warmth. It has a flowing outer pelage that protects a cashmere-like mantle of under-fur. From May until August, goats progressively shed their shaggy winter coats and slowly adopt trim summer attire. For centuries native peoples along the Pacific coast have collected the shed hair to weave blankets and garments prized for their

beauty, insulation, and comfort. The white coat reflects solar radiation, enabling goats to graze on exposed terrain in summer, rather than retreating to the coolness of forests. Still, on August afternoons they may lounge on remnant snowfields to better thermoregulate, and to ease the aggravation of insect pests. And, from November through April, most goats favor cliffs and crags that face a southerly slanting sun. Like woolly veg-o-matics, they paw through snow for grasses and sedges, nibble mosses and lichens from rocks, strip twigs from shrubs, and sometimes dig the rhizomes of ground-hugging plants.

Their unforgiving habitat has no doubt shaped the social behavior of mountain goats. A rigid, matriarchal social structure limits group sizes to an average of just two or three animals. Competition for prime feeding sites in a vertical world—with mere snacks on precarious shelves—is fierce. Sparse spacing of animals across rugged real estate prevents a population from depleting its food supply and forestalls stress and disease that can accompany overcrowding. In some high-altitude environments, such as the Rocky Mountain ranges of Colorado and interior Canada, where wind sweeps the snow from

Montana's Selway-Bitterroot Wilderness provides prime summer habitat for the mountain goat (above), and Jones's columbine, Aquilegia jonesii, (right), is one of many alpine flowers that grace the mountain goat's summer range.

broad ridges and offers food in larger patches, goats may socialize in groups of ten or more animals. Conversely in Alaska and British Columbia's coastal ranges—where snow piles higher than a house—goats descend far down the mountains and strip lichens from ancient trees in the dark depths of winter.

Of all North America's large herbivores, the mountain goat (rivaled only by the musk ox) enjoys the greatest freedom from competition with other herbivores for food and space—a reward of sorts for its specialization and desolate domain. Likewise, most predators, with the exception of the mountain lion, lack the tenacity or the

mountaineering skills to hunt this sure-footed climber. Where they stray from steep terrain, bears and wolves more successfully prey on mountain goats. And on rare occasions, even wolverines and eagles have taken young goats. But starvation, climbing accidents, and deep winter snows claim more goats than do predators. Fluctuating temperatures in the spring precipitate avalanches that sometimes engulf the cliff dwellers. In U.S. and Canadian studies, the smallest and least experienced goats proved most vulnerable to the hazards of their life on the rocks. Half of all newborns may fail to survive their first year, with the mortality of yearlings not far behind.

O*americanus* escaped much of the nineteenth-century carnage experienced by other large North American mammals killed for profit, pleasure, and subsistence during the settlement of the West. Elk and pronghorn antelope were reduced from millions to a mere 50,000 and 13,000, respectively, and an estimated 25 to 50 million bison were wantonly slaughtered, leaving fewer than 1,000 in all of the United States by 1887.

We might as-

sume that the mountain goat and other mountaintop biota would remain buffered from human exploitation. But that immunity abruptly ended during the latter half of the twentieth century. Industrial and recreational development and mechanized travel increasingly penetrated remote areas. Logging, mining, and motorized recreation sometimes displaced goats from winter ranges, and the survival of young goats declined.



Hunting became easier; some hard-hit herds in Montana, Idaho, Washington, southern British Columbia, and Alberta were severely overharvested. Over the past fifty years, native goat populations may have declined by half in British Columbia and by two-thirds in Washington State, based on wildlife agency estimates.

Wildlife managers believe that 100,000 mountain goats remain on the continent today, with less than 15 percent of those living south of the Canadian border. Fewer goats now roam North America than mountain sheep, musk ox, moose, or any other large herbivore. The damage was certainly not intended; native populations shrank due to a general ignorance of the species' social behavior and population biology. Mountain goats



The carcass of a billy goat killed in an avalanche, found by the author early one May. It had been scavenged by a black bear and coyotes.

could not be managed as intensively as deer, elk, and pronghorn, for example, and wildlife and land managers were slow to limit goat harvests and curb motorized travel in goat ranges. In 1988, Alberta closed goat hunting province-wide. As herds slowly recovered, conservative hunting resumed there in 2001. Other jurisdictions have pared back recreational hunting, with most now restricting harvests to discrete breeding herds numbering fifty individuals or more.

An emerging threat to goat herds is the burgeoning volume of helicopter overflights for energy and mineral exploration and extraction, and for backcountry recreation, such as the budding heli-skiing industry. Mountain goats appear highly sensitive to whirlybirds roaring overhead. Studies in Alaska, Montana, Alberta, and British Columbia have shown that helicopter flights may induce stress, temporary range abandonment, and reduced recruitment of young due to diminished reproductive or survival rates. Local efforts are growing to regulate where and when these backcountry incursions may occur. One example is Idaho's Sawtooth National Recreation Area, where restrictions were established in the 1970s on helicopter travel in parts of mountain goat winter range, followed more recently by curbs on over-snow travel.

Other conservation efforts have met with varying success. For example, some failing herds were bolstered with goats transplanted from more resilient populations to expand numbers for both hunting and general recreation and enjoyment. In the latter half of the twentieth century goats were transplanted to entirely unoccupied mountains in Colorado, Nevada, Oregon, Utah, central Montana, the Olympic Peninsula of Washington, several Alaskan islands, and even beneath the granite gaze of four presidents in the Black Hills of South Dakota. Some of those introduced herds prospered beyond wildlife managers' expectations. Dispersal and range expansion (behavior atypical of native populations, which remain faithful to ranges over generations) have created concerns for National Park Service managers. At Olympic, Grand Teton, Yellowstone, and Rocky Mountain National Parks, where goats have traveled from introduced populations, the animals are considered an exotic (non-native) species. Removal of 400 animals from Olympic during the 1980s sparked heated public debate.

Even where drill rigs, helicopters, bulldozers, and snowmobiles are absent, alpine and subalpine life forms aren't exempt from broad-scale environmental impacts. To prevent genetic inbreeding, for instance, migratory corridors between potentially isolated "population islands" should be conserved. At the highest altitudes and latitudes, temperatures are warming two or three times faster than the global average. Impacts on species' physiology and habitats may be accelerating fastest there,

and the mountain goat may serve as a charismatic exemplar. As forests march up mountain slopes, alpine tundra shrinks, and permanent snowfields and glaciers melt, this cold-adapted rock climber has nowhere else to go. Idaho wildlife biologist Dale E. Towell expresses concern for the mountain goat's future "in a state where little alpine habitat currently exists."

In Alaska, biologist Kevin S. White found that summer temperatures indirectly influence survival of goats during the subsequent winter. Cool summers prolong the emergence of herbaceous plants at the edge of slowly receding snowlines. In early growth stages plants have less lignin, meaning they're more easily digested, and promote higher weight gains in animals. Research on the mountain goat's relative, the European chamois, found that their body growth was strongly related to growing-season temperatures; over sixteen years of study, the weights of yearlings declined as spring and summer temperatures increased. Just as cool summers prolong diet quality of Alaskan mountain goats—boosting weight gains and fat accumulation that enhance winter survival—slow-release meltwaters from the receding snowpack help to irrigate lush grazing land for the goat. And in a species whose young are already disadvantaged by small size in winter (at thirty-five to fifty pounds, they weigh less than young of other North American hoofed mammals), milk production and growth of kid goats demands good summer nutrition. Indeed, a warming environment may effectively confine optimum summer-fall habitat to shrinking islands in the sky. The good news is that given their generalist diet, mountain goats will likely fare better than feeding specialists (such as the hoary marmot) that share their warming environment.

Recently published reports by The Wildlife Society and the National Wildlife Federation, and a National Climate Assessment by a federal advisory committee, summarize the frightening pace and breadth at which our



Adult nanny with kid in Montana's Selway-Bitterroot Wilderness

planet's ecosystems are being stressed and transformed by climate change. The plights of pikas, meltwater stoneflies, and wolverines have gained attention through public efforts to list them as federally threatened species. Yet most alpine species, such as white-tailed ptarmigan, hoary marmots, and fritillary butterflies, have received little research and conservation attention.

It's unclear if the moderating climate may increase predation risk should mountain goats spend more time in forested habitat. Or will changes in parasite loads, life cycles, and transmission vectors plague the mountain goat? So much about the future is uncertain, completely uncharted biological territory.

Answers are elusive about how the warming will affect plants and animals, and indeed, we likely don't know all the relevant questions to ask. Ultimately, remedying climate change and other threats to alpine communities requires constraining human resource consumption, especially the burning of fossil fuels. Although our species is adaptable and we may well muddle through, if we fail to reverse the climate trend we will find the planet—impoverished of life forms like the mountain goat—a more demanding and less vibrant place to live.

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