Lack of predators harms wild lands

By Suzanne Bohan
San Mateo County Times
Article Created: 06/21/2008 10:21:48 PM PDT

YOSEMITE NATIONAL PARK — More fear of fangs is what's needed to revive hoof-worn Western lands.

That's the view of pioneering scientists certain that a scarcity of cougars and other large predators is devastating large stands of oak, aspen, cottonwood and even spectacular wildflower blooms in Western wild lands because deer and other foraging animals no longer fear predators and are overgrazing as a result.

"It's one of the most exciting new ideas in ecology within the last 25 years," said David Graber, chief scientist of the Pacific West Region for the National Park Service. "The whole notion of how important large predators are on the landscape is extraordinary."

Two Oregon State University scientists say their studies on the "ecology of fear" at national parks, beginning at Yellowstone and most recently concluding at Yosemite, show this phenomenon is under way on open lands across the West. It arose following a blitzkrieg by wildlife managers against large predators such as wolves and cougars in the early 20th century, as well as rising tourism at parks that drove away people-shy predators.

"We've lost many large predators," said Robert Beschta, one of the Oregon scientists. "And most of us didn't realize the effects that may have caused."

Here's how the hypothesis works: Lacking natural predators, expanding populations of herbivores freely wander into areas where their ancestors never lingered long because grasses, bushes or trees could conceal a prowling cougar, wolf or grizzly bear.
Lacking fear of these now scarce or absent carnivores, large herds of herbivores, such as mule deer in Yosemite and Zion, or elk in Yellowstone and Rocky Mountain national parks, lose their migratory ways and loiter in one area, devouring tender young plants until few — if any — survive to maturity.

"We began to realize an important part of what large predators do is instill fear into a prey population, thus altering their behavior," Beschta said. To keep their distance from potential predators, herbivores maintain greater vigilance, select safer foraging habitat and don't typically linger in one spot, he said.

"Without this fear of a large predator, elk and deer will often stand in a given location and forage continuously on specific plants, eventually browsing them to the ground," Beschta said.

In time, populations of birds, small mammals, frogs, butterflies and insects plummet as the plants that provide them shelter and food disappear, as do the fish dependent on

streamside plants for shade and sustenance. Streams have changed course as a result, the scientists say, as their banks, denuded from overforaging, dissolve with the flow.

Beschta and his Oregon State colleague, William Ripple, were the first scientists to report that the 1995 re-introduction of the gray wolf to Yellowstone had so altered the browsing behavior of now-skittish elk that cottonwood, willow and aspen in nearly denuded areas in the park have begun to rebound.

The plants' restoration, they say, has set the stage for the return of numerous species of smaller native mammals, reptiles and insects, which rely on shrubs and trees for food and shelter. Early signs show that beaver are now building dams from willow branches, creating ponds and wetlands that can attract waterfowl, river otters and other animals. Stream banks, now anchored with plant life, have stabilized in some areas, Ripple said.

After learning of this stunning connection between the gray wolf and the health of so many other species at Yellowstone, and even the terrain, "we all got terribly excited," recalled Graber, the park service scientist.

"I was schooled in Berkeley in the 1970s to think predators didn't play a huge role in the ecosystem," he said. "And that's been turned on its head."

The Oregon scientists then expanded their research into other areas.

"We wanted to know if what we were seeing in Yellowstone might be a universal phenomenon," Ripple said.

Indeed it was, according to their work at Wind Cave in South Dakota, Zion in Utah, and Jasper in Canada. In those parks, they found deer or elk wreaking comparable havoc when large predators were scarce or absent. Other researchers have studied the effect of a lack of predators at Banff National Park in Canada, Isle Royale in Michigan, and the Kaibab Plateau in Arizona and reported similar results.

In 2006, Beschta and Ripple then turned their attention to Yosemite Valley, seeking an association between cougar predation and the regeneration of stately groves of black oaks, a valued yet imperiled tree in the valley.

The graceful trees, named for their dark bark, support more than 40 species of animals, according to one study, such as bear, deer, squirrel, raccoon and many bird species, which favor the tree's nutritious, fat-rich acorns.

And when the first white men viewed Yosemite Valley in 1851, they surveyed a mixed landscape of forests and meadows dotted with numerous black oak stands. At the time, Native Americans used fire to keep meadows open and to promote black oak growth, as its acorns were a staple in their diet.

Ten percent of the black oak stands remain and the conifer forest has aggressively advanced into meadows and oak groves, according to a study by a National Park Service scientist. Future survival of the black oak in the valley is in question.

In the May issue of the journal Biological Conservation, Ripple and Beschta reported a direct connection between declining regeneration of black oaks in the valley and a loss of fear in mule deer no longer subject to cougar attacks.

In groves within 2½ miles of the Visitor Center — the main hub of human activity in the park — they found a scarcity of young oak and no cougar scat. That indicated the deer browsed freely on acorns and oak sprouts because cougars weren't frequenting the area.

But in oak groves from 2½ to 5 miles from the Visitor Center, 10 times as many oak trees had survived since the 1920s, when deer populations surged in the valley after a government campaign to eliminate predators such as cougars and coyotes.

"That still would be considered low," Ripple said, adding it's not a sufficient number to regenerate the groves.

Cougar droppings found in these areas explain why relatively more young oak survived, the scientists said. The presence of the big cats, although still infrequent, was enough to keep more deer closer to the Visitor Center.

This gravitation toward areas of human activity also underscored another finding: Mule deer, which once avoided humans in Yosemite when hunting was allowed long ago, now use admiring tourists as "shields" against predation because cougars typically avoid people, Ripple said.

But isolated parcels of land, which the scientists called "refugia," most dramatically showed the effect of reduced deer browsing. There, the oak forest was regenerating normally.

These small swaths of land were squeezed between the valley's main road and the Merced River, and flanked by steep embankments, which Ripple and Beschta say they believe discouraged deer visitation. In these strips of land, there was a sevenfold increase between the number of oaks surviving since the 1920s, compared with, on average, the other groves frequented by deer.

The scientists also tracked the whereabouts in Yosemite Valley of a yellow flower called evening primrose, which once grew profusely, and found only isolated patches of the plants.

"Deer love wildflowers," noted Ripple, who blames overgrazing by mule deer for the near demise of wildflowers in the 7-mile valley, which is flanked by soaring granite walls.

A 1929 report from Yosemite's park superintendent backed Ripple's assertion. "Flowers are becoming very scarce on the floor of the valley, due, no doubt, to the presence of great numbers of visitors and deer," wrote the then-superintendent in July of that year.

"Evening primrose, for instance, which once carpeted the valley floor," the superintendent wrote, "have almost entirely disappeared."

Graber, the park service scientist, needs no convincing that the work of Beschta, Ripple and other scientists is opening the door to a new view of predators' crucial roles in maintaining functioning ecosystems.

"I'm absolutely certain this is being replicated by other predators around North America," Graber said.

Nonetheless, he's withholding judgment as to whether this phenomenon explains the worrisome decline of Yosemite Valley's prized black oaks.

"I'm not entirely persuaded that what the authors saw (in Yosemite) is entirely valid," he said, explaining that other factors, such as decades of fire suppression under old Park Service policies, are also implicated in the black oaks' decline.

"But on the other hand, I'm not saying it's not true," said Graber, adding that he believes the assertions need more scientific backing.

But Ripple and Beschta defend their Yosemite research.

"We didn't study everything, no study ever does," Beschta said. But the findings in Yosemite fit with trends they've found elsewhere, he said. The two say they also factored in other possible causes for the poor rates of oak regeneration in Yosemite Valley, such as a lack of fire, drought and climate change.

"You could argue about all kinds of things, but we are seeing similar patterns across ecosystems," Beschta said.

No one is suggesting that cougars be reintroduced into Yosemite Valley, nor do they need it. Despite early 20th century efforts to eradicate cougars in the state, the agile, versatile and fecund cats have rebounded in the park's backcountry. Cougars also are spotted yearly in the valley, said Les Chow, a scientist with the U.S. Geological Survey who is the leading expert on cougars in Yosemite.

Chow said he doubts, however, that they stay for long — perhaps four to six weeks. And he said he believes the valley tends to attract females with offspring, nutritionally stressed from feeding the one or two cubs typically born in each litter.

At Zion, cougars left the main tourist area on their own, fleeing the encroachment of visitors in the national park's valley. But their population in the rest of the park is intact, Ripple said.

With the reintroduction of wolves, the story is more complicated. They once roamed across much of North America, but they were eradicated in most of the contiguous United States in the early 20th century. Reintroductions and some migration from Canada have restored the predators to a small fraction of their former territory, most famously in Yellowstone. But their absence throughout their historic range has affected lands even far from visitor hubs.

And reintroducing wolf packs to restore ecological balance is a deeply divisive proposal. The wolves were reintroduced to Yellowstone only after years of litigation, with ranching interests protesting the proposal because of expected predation on livestock. And a wolf reintroduction to Yosemite is not being discussed, as wildlife experts say they don't believe wolves ever populated the region.

Despite the powerful implications of their findings, Ripple and Beschta assiduously stay clear of recommending how land managers might implement solutions.

"Our job is to do the science," Beschta said.

But with this emerging knowledge about the astonishing role of top, or apex, predators in influencing survival of so many plants and animals lower on the food chain, it is science that's sorely needed to leaven the often bitter debates over proposals to reintroduce large predators to wild lands.

"When you start looking at issues of reintroduction, these are value-driven, not science," Beschta said. "But in the debate about large predators, we should include in there the ecological ramifications predators can have in large landscapes."

Reach Suzanne Bohan at sbohan@bayareanewsgroup.com or 650-348-4324.