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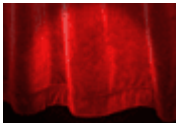
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August 28, 2001

California Maps Network of Open Space as Animal Lifeline

By JON CHRISTENSEN

MURRIETA, Calif. — The bobcat looked stunned, as if it had been caught in the glare of headlights. It had just been startled by a research camera's flash, triggered by an infrared sensor, as it traveled through the Tenaja corridor, one of the tenuous natural stretches connecting wildlife habitats in California.

Conservation biologists say bobcats have been figuratively caught in the headlights of suburban traffic, along with long-tailed weasels, mountain lions, badgers, coyotes and other animals photographed as they have traversed the Tenaja corridor.

The biologists predicted that if such corridors were overrun by freeways, subdivisions, streets and shopping malls, the fragmented islands of natural habitat that remained would lose species, with the biggest carnivores — mountain lions, bobcats and coyotes — the first to go.

If such keystone species are lost, biologists say, the rest of the ecosystem can begin to unravel.

So last November, 152 scientists, conservationists, and state and local officials met at the San Diego Zoo to map wildlife corridors that they



Jon Christensen for The New York Times
Dr. M.A. Sanjayan, Carole Bell and Graham Chisholm recently checked an automated camera that is used to track the movement of wildlife along the Tenaja corridor in Southern California.

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believed had to be protected to ensure biological diversity alongside the sprawling human diversity of California, the most populous state.

The Tenaja corridor was one of 232 critical habitat linkages noted in a report and atlas from the November conference published this summer by the California Department of Parks and Recreation, the United States Geological Survey, the San Diego Zoo, the Nature Conservancy and the California Wilderness Coalition. The corridor links the isolated Santa Rosa Plateau Ecological Preserve to the larger Cleveland National Forest in the Santa Ana Mountains southeast of Los Angeles.

For many years, conservation biologists have debated whether wildlife corridors are effective in linking habitats and protecting animals. While some scientists remain skeptical, the debate has steadily turned in recent years to how best to design wildlife corridors, according to the researchers who advocate their use. The California effort is the latest and most ambitious example.

"We want to show that we can have a 21st-century civilization in the midst of an 18th-century landscape," said Mary Nichols, director of the California Resources Agency, which oversees state parks, forests and rivers and has embraced wildlife corridors as a top priority. "We've learned as a result of advances in conservation biology that simply protecting chunks of land, even on a large scale, is not adequate to protect many species and the plants they depend on."

California officials are now using the detailed maps just published to identify corridors that ought to be protected from development and, in some cases, restored.

Ms. Nichols said the state had recently protected two of the corridors. In Coal Canyon, on the north end of the Santa Ana range, the state paid \$14.7 million for 680 acres of land zoned for development near a highway exit. The California Department of Parks and Recreation plans to remove the paved road under the highway, leaving the underpass, and restore natural vegetation along a narrow creek that connects the Santa Ana Mountains to the Chino Hills north of the highway.

The state also recently bought a 2,675-acre ranch in Southern California for \$5.6 million. The ranch is between two state parks, Anza-Borrego and Rancho Cuyamaca, and serves as a corridor for wildlife migrating between the mountains and desert east of San Diego.

The state spent \$221 million buying land for conservation purposes last year and that figure is likely to go up, Ms. Nichols said. Last year, voters approved two bond measures that provided \$4.1 billion for protecting parks and watersheds. A growing part of the money spent by the state on land is being used to acquire wildlife corridors, state officials said.

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"Linkage-type acquisitions are our most important acquisitions," said Richard Rayburn, chief of the Natural Resources Division of the California state parks department. "Linking preserves is the best way to make preserves bigger."

Dr. Paul Beier, a biologist at Northern Arizona University, said: "In Southern California, it's the only way." Dr. Beier's research on mountain lions in the Santa Ana Mountains has provided some of the strongest scientific support for the growing effort to protect wildlife corridors in California.

Dr. Beier and his students put radio collars on 32 cougars to study their movements from 1988 to 1992. They found that the animals used areas like Coal Canyon and the Tenaja corridor and tended to avoid urban areas.

When the animals did not, they often got into trouble. Twelve mountain lions were hit by cars. The police in Oceanside shot one mountain lion after it wandered into town.

Dr. Beier concluded that the Santa Ana Mountains, which include about 1,287 square miles of undeveloped land, were too small to support a viable population of mountain lions.

Young mountain lions will have to travel from other areas through corridors to keep the Santa Ana population from becoming extinct, Dr. Beier said. In conservation biology, that is called the rescue effect.

Whether corridors will encourage that kind of influx of wildlife is not known. "There's almost no science of corridors," said Dr. Daniel Simberloff, a biology professor at the University of Tennessee, who is skeptical about the value of wildlife corridors compared with core habitat. People advocating them "don't have real evidence of the viability of populations with or without corridors," Dr. Simberloff said.

Many corridors are designed to provide for movement instead of core habitat, he added, yet they can be very expensive. In his papers, Dr. Simberloff has warned that corridors can also serve as pathways for invasive species and diseases.

Dr. Beier found no evidence of these negative effects when he analyzed 32 studies of corridors, he reported in a 1998 paper in Conservation Biology. But he agreed that the scientific evidence in support of wildlife corridors was still weak, largely because appropriate studies were difficult to design and carry out. But time is running out, especially in Southern California, he said.

"In areas that are largely urbanizing," Dr. Beier said, "they are our only option. We have all the state parks and wilderness areas we're going to get. We can tweak the margins. But to make them viable over the long

term, we have to think about how we're going to link them."

Ms. Nichols, the state resource director, agreed that the debate was not settled. "I don't think we have all the answers, but every fragment is making it clear we have to be looking at the issue of corridors," she said. "All the information points in the direction and usefulness of corridors."

In an attempt to redefine the debate, the recent statewide report used the terms "linkages" and "connectivity" instead of corridors. The areas identified in the report ranged from narrow choke points, like the Coal Canyon underpass, to long stretches of rivers and broad swaths of redwood forest.

The picture is both daunting and surprisingly hopeful. Of the 232 linkages in the report, more than half were deemed to be high priorities because of development threats and good opportunities for conservation.

Many of the high-priority areas are already part of formal conservation plans. And agencies are working on buying land where there are willing sellers and local support for the corridors. But the science and practical details of wildlife corridors are still being worked out.

The Tenaja corridor illustrates how the debate about wildlife corridors has moved from large-scale theory to microdesign, said Dr. M. A. Sanjayan, director of conservation science for the Nature Conservancy in California.

The organization hoped to persuade area landowners to keep most of their property wild. But with more property owners building big houses and clearing their five-acre parcels for horse pastures, the conservancy decided that it would have to buy enough land to provide steppingstones for animals moving between the two areas.


The conservancy has spent about \$6 million assembling 1,250 acres in the corridor. It needs to buy 400 more acres to protect the corridor completely. The conservancy hopes to recoup some of the cost by selling parcels of 20 to 40 acres each to buyers who are willing to build on only 5 acres or less and keep the rest of their property wild. The placement of each house will present a new complication, Dr. Sanjayan said. "You have to think like a mountain lion or bobcat," he said.

Judy Kollar bought the first parcel in the corridor. Although she plans to build a small house, she does not want it to be in the way of wildlife, especially mountain lions. "I love that piece of land, but the thrilling part of it for me is the concept," she said. "Even though I have title to that property, I am the intruder."

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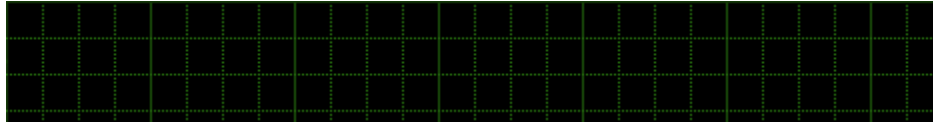
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