SPECIAL REPORT
The Sacramento Bee

MAJESTY AND TRAGEDY:

THE SIERRA IN PERIL

Even the summit of the Sierra may not be safe from the ravages of man. Mount Whitney is the sharp-ridged peak in the background.

Bee photos by Jay Mather

'We are wont to whittle away at our giants. I fear the Sierra awaits a similar fate.'

Intensive logging followed by a heavy thunderstorm turned a beautiful forest near Last Chance Creek, Plumas County, into an ecological moonscape.

State's citadel of stone, wind is under siege

Stories by Tom Knudson
Bee Sierra Bureau
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John Muir said it best.

The Sierra Nevada, the naturalist wrote a century ago, "seems to me above all others the Range of Light, the most divinely beautiful of all the mountain chains I have ever seen."

Remember those words. Savor them like old wine. Share them with young children.

For Muir's words no longer hold true.

Today, California's Sierra Nevada – one of the world's great mountain ranges – is suffering a slow death.

Almost everywhere there are problems: polluted air, dying forests, poisoned rivers, vanishing wildlife, eroding soil and rapid-fire development. Even Muir's holy ground, Yosemite National Park, is hurting: Much of its forest has been damaged by ozone.

Remarkably, the problems have drawn little attention, masked in part by the enormity of the range. The Sierra Nevada, after all, stretches for 430 sky-scraping miles along the eastern edge of California, spanning 18 counties, nine national forests, a half-dozen climatic zones and three national parks.

At first glance, these mountains seem invincible. Up close, it's another story. Just as Jonathan Swift's Lilliputians subdued Gulliver, so, too, are we bringing down a giant.

The vulnerability of this majestic mountain range was the central finding in an eight-month investigation by The Bee, involving more than 200 interviews, 10,000 miles of travel and the examination of a small mountain of government reports, scientific studies and other documents.

There are no official estimates of overall environmental damage to the Sierra Nevada for one simple reason: No government agency, university or environmental group has taken an exhaustive look at the entire range.

The Bee's investigation, though, uncovered plenty of reasons for concern. Across the range, one can find an assortment of unsettling scenes, including heavily logged forests, barren, eroding soil, silt-choked streams and scenic vistas fouled by air pollution.

The investigation also found that, in many cases, it is we Californians who are to blame.

Weary of our cities, we are spilling into the Sierra in record numbers. The mountains, already suffering from logging, mining, dam building and other activities, must

Continued on next page, 2

ABOUT THIS REPORT

The Sierra Nevada stands as California's eastern sentinel, a towering, 430-mile range that is as synonymous with the Golden State as Hollywood or the Golden Gate Bridge.

Although the mountains that naturalist John Muir called the Range of Light have survived for millions of years, they are suffering under an onslaught by man.

Problems are myriad: polluted air, dying forests, poisoned rivers, vanishing wildlife, eroding soil and rapid-fire development. Even Yosemite National Park is hurting: Much of its forest has been damaged by ozone.

The magnitude of the threat to the Sierra was revealed after an eight-month investigation by Bee Sierra Bureau chief Tom Knudson, who reported his findings in this five-part series.

Since the series appeared June 9-13, key federal and state officials have called for sweeping environmental reforms for the range. California Resources Secretary Douglas Wheeler plans to convene a "Sierra summit" this fall, and U.S. Rep. Mel Levine, D-Santa Monica, said he plans legislation to ensure greater protection for the southern Sierra Nevada, including its majestic giant sequoia forest.

Even the U.S. Forest Service, the largest landholder in the region and one that has come under intense scrutiny over its timber-harvest practices, had praise for the series.

"The Bee did a service in bringing the focus on the Sierra Nevada, which is badly needed and very hard to put into focus," said Chris Bowen, a U.S. Forest Service spokesman in San Francisco. "What matters is what happens to the Sierra."

Gregory Favre
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INSIDE

The Air

Throughout much of the Sierra Nevada, the "air the angels breathe" is fouled by a not-so-heavenly cloud of contaminants – ozone, sulfur dioxide, polycyclic aromatic hydrocarbons, carbon monoxide, nitrogen oxide, particulates and other chemicals. **PAGE 4**

The Forest

The Sierra Nevada forest is dying. Logging is the most visible and controversial agent at work in the Sierra. But air pollution, drought and insects are inflicting great damage, too. And there is one other problem – more subtle than the rest – causing enormous harm: fire suppression. **PAGE 8**

The Soil

Along the back roads of the Sierra Nevada is a battered and bleeding land, places where trees, grass and other vegetation have been peeled away and soil is washing into mountain streams at staggering rates. The problem draws little attention, though, partly because gullies – unlike spotted owls – are not very glamorous. **PAGE 10**

The Remedies

The Sierra Nevada, one of the world's great mountain ranges, is slowly dying – and no one seems able to help it. Today, though, things are starting to change. Concern is growing, rumbling like a summer thunderstorm along the Sierra crest. **PAGE 14**

'Invincible' range faces dire threat

Continued from page 1

now bear new burdens: shopping malls, traffic jams, ozone, wood smoke and resort hotels.

And government, with a few exceptions, is doing little to make things better. Lack of money and manpower is a familiar refrain. That's the good news. The bad news is that federal land-management policies – particularly for logging, livestock grazing and mining – are actually hastening the destruction.

Nor is science a panacea. Scientific research in the mountains is expensive, and funding is scarce. Science, by its nature, is often selective – singling out one problem, but overlooking the larger whole. The more that scientists study the Sierra, the more questions they have. Studies beget more studies. Meanwhile, the mountains suffer.

Solutions are elusive, roadblocks numerous. The Sierra's enormous distances, convoluted geography and jigsaw pattern of land ownership make conventional land management difficult, if not impossible. Many remedies have been discussed – such as setting aside more land for wildlife, building fewer houses, cutting back on logging, creating a Sierra Nevada commission or even a new "Range of Light" national park. But change in the mountains is an uphill struggle.

Today, the Sierra is dominated by controversy. From Camp Nelson to Quincy, Lone Pine to Nevada City, people are fighting over the future of this range. At the center of the controversy stands the largest landowner in the Sierra, one that has cut vast stands of forests, caused massive soil erosion and destroyed many sparkling streams. That landowner is the U.S. Forest Service.

At risk, ultimately, is more than a mountain range. At risk is one of the world's great outdoor meccas, a citadel of stone and wind, a storehouse of wonder. "A huge granite mountain cannot be denied," photographer Ansel Adams once said. "It speaks in silence to the very core of your being."

A land of many gifts

The Sierra has long been a land of superlatives – home of the largest living things on earth, giant sequoia trees; 95 of the 100 tallest mountains in California, including the tallest in the nation outside Alaska, Mount Whitney; and the 10th-deepest body of fresh water on the planet, Lake Tahoe.

Even the names of its places are fantastic: Sky Parlor Meadow, Pulpit Rock, Hell-for-Sure Pass, Siberian Outpost, Silver Spray Falls, Castle Rock Spire, Sawtooth Ridge, Cloud Canyon, Thousand Island Lake, Hawks Head Notch and so on.

Its enormity is daunting. Stretching from the Mojave Desert to Mount Lassen, the Sierra heaves and buckles across 15.5 million acres – enough real estate to cover more than half of Pennsylvania. But even more surprising is who owns all that territory: About 70 percent of it is public land, deeded to the citizens of the United States.

Only 10 percent of the range, though, is protected by Yosemite, Sequoia and Kings Canyon national parks. The remainder is divided up roughly along these lines: 52 percent U.S. Forest Service; 30 percent private; 7 percent U.S. Bureau of Land Management; and 1 percent state, county and municipal.

It is a land of many gifts – emerald forests, sapphire lakes, snow-clad peaks, satin sunsets and stars that swing like lanterns in the night. But its greatest gift is locked up in the dance of clouds and wind, the clash of winter storm and cold, unyielding stone – the miracle of mountain water.

Roughly six of every 10 gallons of fresh water used in California come from the Sierra Nevada. Without its cloud-stopping, moisture-wringing peaks, the most productive farmland in America – the Central Valley – would be desert. Without the Sierra, much of California would die of thirst.

The Sierra, too, is the birthplace of an idea, one put forth in 1892 to mark the formation of a small group of wilderness enthusiasts:

"To enlist the support and cooperation of the people and the government in preserving the forests and other natural features of the Sierra Nevada."

Nearly a century later, that group has become one of the most influential conservation groups in the world: the Sierra Club. But even the mighty Sierra Club has not stopped destruction of its namesake mountains. And there is controversy over that, too.

These days, the Sierra Nevada remains a magnet for accolades, a place where phrases like majestic, breathtaking and awe-inspiring are much in use, often for good reason.

But in recent years, another mountain dialect has begun to emerge, one marked not by lofty sounding adjectives, but by a tone of trouble and concern. Today, dark clouds are gathering over Muir's Range of Light – a paradise in peril.

As Douglas Bradley, editor of a recent collection of scientific articles about the Sierra, put it:

"We are wont to whittle away at our giants, such as buffalo or elephants or the seven seas, until they are depleted. I fear often that the Sierra awaits a similar fate."

Bee/Jay Mather

The spine of the Sierra – the "Range of Light" – looking south from the southeastern end of Yosemite National Park.

Clear cut, then disaster

Traveling in a car at 60 mph, the foothills of the northern Sierra are a kaleidoscope of green and brown and blue. One thing, though, is clear: The land is rich, thanks to good soil, generous rainfall and a forgiving altitude.

Trees grow large here, very large. Step out of the car north of New Bullards Bar Reservoir in Yuba County and you can find some real museum pieces – Douglas fir, ponderosa pine and sugar pine, straight as a ruler, wide as a horse.

Nearby, on a steep ridge above Mill Creek, a logging company went to work in 1990, toppling trees for a prominent landowner, the Tahoe National Forest.

The Tahoe National Forest, however, did not want just a few trees removed. It wanted the entire area leveled.

The agency knew the clear cut would be controversial, but it was confident. After all, it had assembled a thick document – known as an environmental assessment – analyzing the impact of logging on everything from water quality to wildlife habitat.

A clear cut, the national forest concluded, would be good for the economy and the land. According to national forest staff, logging would improve bald eagle habitat, promote "visual diversity," even enhance recreation.

Still, there were concerns: Slopes were steep, soil was prone to erosion and Mill Creek – a clear, cold trout stream – tumbled through the area. Nonetheless, then-forest supervisor Geri Bergen decided clear cutting would have "no significant impact."

"All practicable means to avoid or minimize environmental harm have been adopted," she wrote in a document obtained by The Bee through the U.S. Freedom of Information Act. "Soil and water resources will be protected."

That is not how things turned out. Today, the area is an open wound: a stump-scarred wasteland of barren slopes and eroding soil. Downhill, Mill Creek is clogged with mud and the trout are gone.

At the headquarters for the Tahoe National Forest, confidence has turned to embarrassment. "It has been painful for us," resource officer Jeanne Masquelier said. "There was a lot of blood shed over this.

"I'll stick my neck out – I think we were in too big of a hurry. We were in a hurry to meet our annual timber quota. We pushed too hard. There were too many risks."

Mill Creek is not an isolated incident. It is, in fact, a kind of mirror – a reflection of the damage taking place throughout the forests of the Sierra, on public and private land.

"These kinds of things happen all the time," said Robert Holland, a plant ecologist who recently left the California Department of Fish and Game to work on a book. "I'm appalled, but not at all surprised."

A forest under assault

The destruction of any forest is controversial. But the Sierra forest – known around the world for the diversity, size and grandeur of its trees – is much more than just another forest.

"I cannot pretend to account for the extreme magnificence of the Sierra forest," said Asa Gray, the distinguished 19th century botanist, in a lecture at Harvard University in 1878.

"Evidently, there is something wonderfully favorable to the development of trees, especially coniferous trees. And it is not easy to determine what it can be."

Today, this storybook forest is under assault. Consider:

- Throughout the range, a record 6 billion board-feet of timber, enough to build more than half a million homes, are dead or dying, and no one is sure why. Drought, bark beetles, air pollution and fire suppression are suspects, but the mystery is far from solved.
- While the forest suffers, the chain saws whine. Trees are being logged from some parts of the Sierra faster than nature can restore them – and in ways that are transforming the region's renowned mixed-conifer forest into a single-species tree farm.
- In the Sierra, unlike northwest California, most trees are falling on public land under the eye of the U.S. Forest Service. And the cut on public land is growing – up from 549 million board-feet in 1980 to more than 1 billion board-feet in 1988.

Concern is growing – inside the Forest Service and out – that this government-sanctioned logging may be stealing the glory from the Sierra forest once and for all.

"The biggest threat to the Sierra Nevada is the United States Forest Service," said David Brower, executive director of the Sierra Club from 1952 to 1969 and one of the nation's most well-known conservationists.

"The clear cuts we used to complain about were in the Pacific Northwest," said Brower, 78. "Now, if you fly over the Sierra, you see clear cuts all over."

But the Forest Service's top official in California said the agency is changing, from a timber-dominated institution to one that will care for the entire forest.

"We are really at a crossroads," said Ron Stewart, regional forester for Region 5, which includes California and Hawaii.

"We've got a history. And we see over the past couple of years, and in the next couple, rapid changes going on in the direction and aspects of our mission."

Last year, the agency issued a kind of manifesto – an "environmental agenda" it said would usher in a new Forest Service dedicated to safeguarding diversity, enhancing recreation and doing less clear cutting.

"There is some very good research that's coming out almost daily that says we need to look at the total ecosystem, that we ought to be more careful in the way we conduct our timber harvest activities," said David Jay, a deputy regional forester.

But even Forest Service employees wonder if the agency can really change.

"I hear a lot of good verbiage," said Ron Medel, a fisheries biologist with the Tahoe National Forest. "But is it translating to change down on the land? No."

"The Forest Service revolves around timber," said Steve Brougher, a wilderness supervisor for the Stanislaus National Forest. "I haven't seen anything that would indicate a change of substance – anything really visionary."

Most Americans associate the Forest Service with its cuddly mascot, Smokey the Bear. But over the past four decades, the Forest Service, the nation's largest fire-fighting agency, also has become one of the nation's biggest timber barons.

And for good reason: That's what Congress tells it to do. Today, pressure to meet annual timber targets set by Congress is an enormous driving force within the Forest Service – one that affects everything from who gets a good pay raise to which stand of Sierra forest will fall next.

"We have a whole generation of managers who were raised on getting the cut out," said resource officer Masquelier. "They get graded on it. When our forest supervisor gets his yearly review, it's a big-ticket item – 'Did you meet the timber targets?'

"I have wildlife targets, too, and fish targets. And nobody ever once reviews – when I get graded – whether I meet my fish and wildlife targets. I think that's indicative of the double standard."

There are even troubling suggestions that pressure to cut trees has corrupted the agency's own decision-making process, including the environmental assessments – or EAs – prepared before logging.

"A lot of the time our EAs have been written to support a decision that's already been made: to go ahead with a timber sale," said Dean Carrier, who recently retired from the Forest Service after 23 years as a biologist.

"And that prostitutes the whole process. And it makes me madder than hell."

For the Forest Service, these are times of trouble, torment and – maybe – transition. "It's going to be a difficult next couple of years," Masquelier said.

"We're saying we're going to manage for ecosystems, for many values. At the same time, we've got people who have worked here for 20 or 30 years who want to meet their targets.

"We still get questioned very heavily about meeting our timber targets."

But Ed Whitmore, chief of timber planning for the Forest Service in California, said that is changing.

"We've got to quit thinking of timber sales as timber sales," Whitmore said. "Rather than timber being the driving, primary force, let's do our planning so we encompass all the values on a piece of land.

"And then, what is surplus, we sell. The timber is the result, not the objective."

But don't expect change overnight.

"It's going to take time to get the old tapes changed in people's brains," Masquelier said. "And beyond that, it's got to come from the leaders – the line officers and forest supervisors. They have to walk what they talk."

But trees are only one part of the Sierra puzzle. When a forest falls, damage can ricochet through the mountains. Again, Muir said it best:

"When we try to pick out anything by itself," he wrote in "My First Summer in the Sierra," "we find that it is bound fast to everything else in the universe."

Sierra's eroding soil

One of the biggest concerns lies underfoot: the erosion of mountain soil.

Soil is a fundamental building block of all life, but logging and other activities are flushing it out of the Sierra at catastrophic rates.

In the Plumas National Forest, for example, a single storm last year washed nearly a quarter-million tons of soil from a heavily logged region near Last Chance Creek. Today, the area is more scar tissue than forest, a moonscape of gullies and barren ground that will take centuries to heal.

The rate of erosion was staggering – more than 3,000 times higher than normal, according to an internal Forest Service report obtained through the U.S. Freedom of Information Act.

"The consequences of the storm were very dramatic and, unfortunately, very damaging," the report said. "Further accelerated erosion can be expected from this area in the future. Chances for seedling survival and long-term site productivity have been adversely affected on several hundred acres."

"With that kind of soil loss, they're not harvesting trees – they're mining them," said Clyde Wahrhaftig, professor emeritus of geology at the University of California, Berkeley, and a former member of the California Board of Forestry.

Of special concern is what Sierra historian Francis Farquhar called "the crowning glory" of the Sierra Nevada: cold, clear mountain water. Across much of the range, incidents like the one along Last Chance Creek are turning clear-as-glass Sierra streams to sloppy brown gruel, causing serious damage to aquatic life and fouling reservoirs and hydroelectric facilities with mud and debris.

On the north fork of the Feather River, for example, Pacific Gas and Electric Co.'s Rock Creek hydroelectric facility is drowning in mud. Behind the dam, mud is stacked up underwater more than 70 feet deep, the result of 40 years of logging, livestock grazing and road building, much of it in the Plumas National Forest.

"There's definitely a problem everyplace we look," said Larry Harrison, a project manager for the utility's hydro-generation department.

"Every reservoir everyplace is filling up. It's just a matter of how much space there is – and how long it's going to take."

A mountain range left barren by soil erosion is no place for wildlife, either. Already, many species of wildlife are fading from the Sierra – for many reasons. But one common thread is mankind.

"The need to act is urgent," said a 1990 report by the California Policy Seminar, a joint group of state and University of California officials. "If we do not take remedial actions, it is likely that within decades – not centuries – the habitat destruction we are causing will lead to a massive wave of extinctions."

"We are at a crossroads," said Susan Sand-

Continued on facing page, 3

THE SERIES

TODAY: California's Sierra Nevada – one of the world's great mountain ranges – is suffering a slow death.

Almost everywhere you look there are problems: polluted air, dying forests, poisoned rivers, vanishing wildlife, eroding soil and rapid-fire development. Even naturalist John Muir's holy ground, Yosemite National Park, is hurting.

The vulnerability was documented in an eight-month investigation by The Bee, involving more than 200 interviews, 10,000 miles of travel and the examination of a small mountain of documents.

There are no official estimates of overall environmental damage to the Sierra Nevada for one simple reason: No government agency, university or environmental group has taken an exhaustive look at the entire range.

The Bee's investigation, though, uncovered plenty of reasons for concern. Across the range, one can find an assortment of unsettling scenes, including heavily logged forests, barren, eroding soil, silt-choked streams and scenic vistas fouled by air pollution.

MONDAY: Throughout much of the Sierra Nevada, the "air the angels breathe" is fouled by a not-so-heavenly cloud of contaminants – ozone, sulfur dioxide, polycyclic aromatic hydrocarbons, carbon monoxide, nitrogen oxide, particulates and other chemicals.

Few parts of the range have been spared. During the summer, west-facing foothills and canyons are immersed in great ashen clouds of pollution. In the winter, once sparkling skies are smudged with yellow, brown and gray – the signature of too many woodstoves, automobiles and people in the mountains.

TUESDAY: The Sierra Nevada forest is dying. Logging is the most visible and controversial agent at work in the Sierra. But air pollution, drought and insects are inflicting great damage, too. And there is one other problem – more subtle than the rest – causing enormous harm: fire suppression.

Like soldiers in a siege, Sierra trees are falling – and falling fast. The battlegrounds are many: North Mountain, Duncan Canyon, Black Mountain, Red Clover Creek. In its toughest hour, the Sierra Nevada forest can find little mercy.

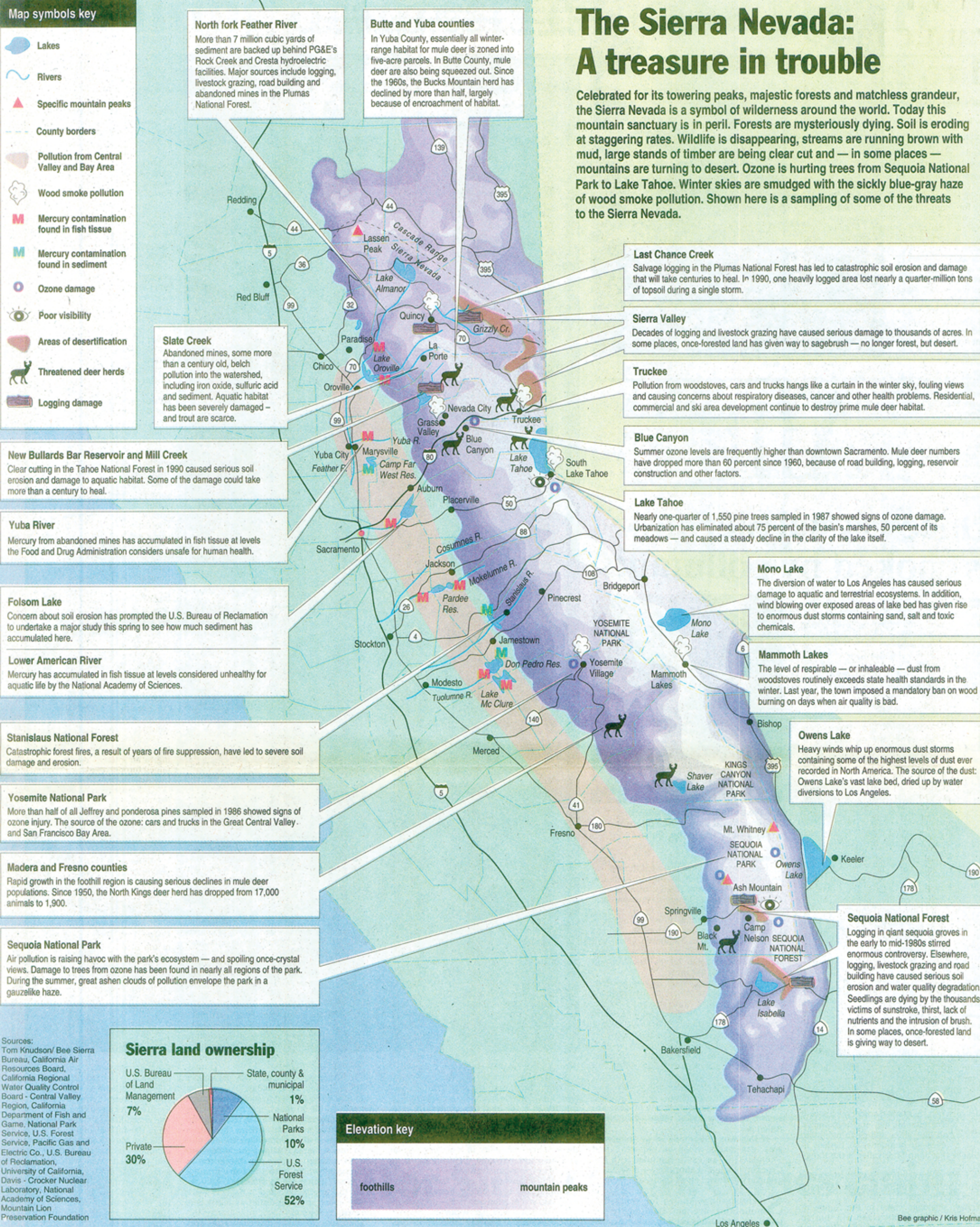
WEDNESDAY: Along the back roads of the Sierra Nevada is a battered and bleeding land, places where trees, grass and other vegetation have been peeled away and soil is washing into mountain streams at staggering rates.

The problem draws little attention, though, partly because gullies – unlike spotted owls – are not very glamorous. The Bee's investigation found that damage to soil and streams is perhaps the most serious and overlooked problem in the Sierra Nevada, one that threatens the essence of the range and the lifeblood of California – mountain watersheds.

THURSDAY: The Sierra Nevada, one of the world's great mountain ranges, is slowly dying – and no one seems able to help it.

Once majestic skies are filled with pollution. An emerald forest is sick and brown. Soil is washing away. Streams are lined with mud. People are moving in – and wildlife is moving out.

Today, though, things are starting to change. Concern is growing, rumbling like a summer thunderstorm along the Sierra crest. You can hear it in mountain towns from Quincy to Camp Nelson, over campfires along the John Muir Trail, even in some quarters of the U.S. Forest Service.



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ers, a wildlife biologist and leading authority on one of the mountain's most threatened birds, the willow flycatcher.

"The demands on the Sierra are more than the mountains can give."

Even the familiar mule deer is suffering heavy losses – its habitat picked apart by logging, road building and urban development. In fast-growing Fresno County, for example, mule deer numbers along the north fork of the Kings River have dropped from 17,000 in 1950 to around 1,900 today, due largely to habitat loss.

"When we lose land to a subdivision, we lose it forever," said Terry Mansfield, a wildlife manager for the California Department of Fish and Game.

"People complain about deer being in their back yard eating their roses, when, in fact, the people are in the deer's back yard, too."

While the problems in the Sierra grow, so, too, do the numbers of people. Years ago, most people came to the mountains to visit. Today, they are coming to live.

The numbers are startling: Six of the 10 fastest-growing counties in California are Sierra Nevada counties, according to the 1990 U.S. Census. Three of those counties – Nevada, Amador and Calaveras – grew by more than 50 percent.

"We've got to come up with an answer to growth, and I wish I had one," Brower said. "Ansel Adams came as close as anyone years ago when he said, 'When the theater is sold out, you don't sell lap space.'

"Well, this state is sold out – and we're selling lap space. And when that happens, the mountains are bound to suffer, too."

Smog invades the mountains

People also are bringing a problem that potentially is more serious than all the rest: air pollution.

Today, the Sierra Nevada – known widely for its brilliant blue skies and telescopic views – is fouled at times by some of the dirtiest air in California.

Consider this:

- In July 1989, Ash Mountain in Sequoia National Park recorded a higher monthly average ozone level than any air-quality monitoring station in the Los Angeles area. Ozone – born in the clash of smog and sunlight – is a major suspect in the massive tree die-off sweeping through the Sierra.

"You can go pretty much anywhere in the park and find trees with ozone injury," said Diane Ewell, an air-quality specialist at Sequoia.

- On winter days, pollution from wood smoke fills mountain skies in Truckee, Mammoth Lakes and elsewhere with a sickly blue-gray haze containing toxic compounds known to cause cancer.

"It's very striking," said Russell Roberts, air pollution control officer of the Northern Sierra Air Quality Management District. "You start with this brilliant white filter and at the end of 24 hours, it's black. And it smells like wood smoke. And everything on that filter you are breathing into your lungs."

- Fifty years ago, you could stand atop Moro Rock in Sequoia National Park and see 100 miles. Today, summer skies are so fouled by nitrogen oxide, sulfur dioxide, particulates and other chemicals that you are lucky to see five miles.

"If you were to put a pad of paper up there on Moro Rock and ask, How's the air today? the answer would be universal: It stinks," said Tom Nichols, an environmental specialist at Sequoia.

The Sierra's air quality woes, in fact, are more troublesome and more serious than the more widely known air pollution problems in Grand Canyon National Park.

"Grand Canyon actually has a little cleaner problem," Nichols said. "A lot of their particulate matter comes from power plants. So they have a chance to get some bags on those stacks and clean up the air.

"Here, there's no single thing – like a smokestack – we can point to. We're stuck with a regional problem almost entirely. And therefore, we've got a tougher road ahead of us."

In the face of such enormous problems, one might expect to find a flurry of government action – or at least strong words of concern. Instead, one finds mostly inaction.

"When you go to any agency, you get the litany of, 'Yeah, we know it's happening. But we don't have the time and we don't have the staff,' " said Michael Jackson, an attorney for Friends of Plumas Wilderness in Quincy.

"The frustrating thing about watching the Sierra die is that there is the knowledge and desire that it not happen. But the problem is there is no one responsible.

"When my grandchildren's grandchildren come before whoever's in charge at that time and ask where it went, they're going to say there was no one responsible. It disappeared because nobody was responsible."

This five-part series was written and reported by Tom Knudson of The Bee's Sierra Bureau in Truckee, with assistance from Sacramento-based staff writers Lorena Natt and Ricci Graham, and staff research librarian Pete Basofin.

FOR MORE INFORMATION

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- California Board of Forestry, (916) 445-2753.
- U.S. Bureau of Land Management, (916) 985-4474.
- Enviroline – An electronic index of journal articles, government documents and other material, available through the DIALOG Information Service, 3460 Hillview Ave., Palo Alto, CA 94304, 800-334-2564.