Forest rule *continued from page 3*

ment coordination, in an e-mail. Yet there's little in the rule to define those terms.

"How will you or I know that we've walked into a resilient ecosystem?" Nelson says. "There's no clear criteria set out in the draft to determine that." Nor does it require proof in numbers that such an ecosystem is, as the proposal assumes, beneficial to a variety of wildlife. "I'm afraid the Forest Service thinks monitoring at the species level is burdensome," Nelson says. "I think of it as a trust-building exercise." With ecosystem protection as with nuclear arms control, it's "trust, but verify."

In short, the new rule leaves a lot up to the discretion of local forest managers. That's not necessarily bad: Forest supervisors can observe changes at the local level that would elude bureaucrats in D.C. "It's hard at the regulation level to provide any one-size-fits-all standard," says Martin Nie, associate professor of natural resource policy at the University of Montana. "I can think of some forest supervisors who'll go to town with this thing in terms of meaningful standards and requirements."

Local supervisors under pressure from politics or industry, however, could theoretically veer in a less constructive direction. "The pushback is always economics," says Congressman Raúl Grijalva, D-Ariz., who has criticized the proposal for weakening wildlife protection. "But when you have habitat shrinking, species disappearing and wild places not being protected, your decision-making can't be subjected to biased outside pressure. You have to have strong federal oversight to make sure what you do is based on facts and science."

Timber and other industry interests have not yet commented on the rule, except to say they're watching it closely. Meanwhile, the Forest Service will take public comments through May 16.

Francis thinks everyone should consider contributing. For Westerners, "the planning rule affects everything from where you hike to the quality of your drinking water." After all, it's your plane the agency is piloting, he says, "and you need to have some way of knowing whether it's staying on course." □

BUREAU OF LAND MANAGEMENT

THE LATEST

Backstory

In 2008, the Bureau of Land Management's Vernal, Utah, office released a plan to manage 1.8 million federal acres, including the Uintah Basin, primarily as a natural gas field. The Environmental Protection Agency sharply criticized it for failing to account for the ozone emitted by 2,300 recent wells, and for not considering the air-quality impacts of another 6,300 planned wells. Rocky Mountain EPA official Larry Svoboda told *HCN*, "We think that's a disaster waiting to happen" (*HCN*, 12/28/08, "(Un) clearing the air").

Followup

It looks like Svoboda's concerns were justified: Fourteen violations of federal ozone standards were recorded during the first six weeks of 2011 in the Uintah Basin, which is pockmarked by more than 10,000 wells. In seven of those incidents, the ozone level was nearly 30 percent higher than the federal threshold – the level at which ozone can set off asthma attacks and worsen respiratory problems like bronchitis. The BLM is studying the problem, which is exacerbated by winter weather patterns; if high levels persist, the feds may tighten regulations on further natural gas development.

JODI PETERSON

FIELD NOTES

Forestry + genetics = a blister rust solution?

Gene sequencing could help save the West's whitebark pines

In 1926, the U.S. Forest Service first found blister rust, a deadly fungus, on high-elevation whitebark pines in Montana. Since then, the Asian invader has spread through several species of five-needled pines in the West; it was first discovered in Arizona in 2009. The U.S. Fish and Wildlife service is now considering whether whitebark pines, a key food source for grizzlies, birds and small mammals, should be listed as endangered.

There is hope, though. Some five-needled pines have a gene that makes them completely resistant to all but a supercharged version of the disease. Others possess a set of genes that, while not making them totally resistant, allows them to fight — and often stave off — even the deadliest blister rust infection.

So foresters are seeking out trees that appear resistant, collecting their seeds, and then growing resistant saplings to replant wherever they can — usually in disturbed areas that have lost their trees to fire or the disease. It's a "very laborious and expensive process" that can take decades, says Vicky Erickson, a Forest Service geneticist in Oregon who oversees breeding projects. And there's no guarantee that the saplings possess the most versatile form of genetic resistance.

That's where UC Davis geneticist David Neale comes in. He's sequencing the genome of three evergreens: the rust-susceptible sugar pine, Douglas fir and loblolly pine, an Eastern forest staple. After completing sequencing, Neale will use samples from thousands of trees to undertake a complex matching process that maps tree DNA to specific traits, such as disease resistance, drought tolerance and cold hardiness. He hopes to begin the process next year.

Whitebark pine cones are caged (top photo) to protect them from Clark's nutcrackers. At right, whitebark pine resistance trials at Dorena Genetic Resource Center in Cottage Grove, Oregon. USDA FOREST SERVICE

Once geneticists understand which sets of genes convey resistance, they can help foresters choose just the right trees to breed and replant. This will boost efforts to fight not only blister rust but other tree diseases. It will also help tree breeders ensure they're keeping enough genetic variation among the trees they plant in places like Mount Rainier and North Cascades national parks, and in Western national forests.

Mapping genetic adaptation also has implications for everything from post-fire restoration to climate change mitigation. Until now, managers hoping to restore fire-damaged slopes have been "groping in the dark for traits," says Forest Service researcher Connie Millar. They might harvest seed from Douglas firs on a hot, dry slope with the hope that they're genetically adapted to that environment. But there might be other reasons why the trees thrive on that slope — the presence of certain minerals in the soil, for example. With trait-mapping, "we can know where on the landscape these trees are adapted to," says Millar.

The information could also help the Forest Service designate areas to prioritize for conservation or seed banking, says Oregon's Erickson. But genetic research isn't cheap, and though costs have been going down, breeding and replanting is still labor- and time-intensive, she notes.

Public-lands managers will never have the time or money to manage every forest stand based on genetic information. For cases like the whitebark pine, though, where small, high-altitude stands are rapidly succumbing to disease, the new knowledge could help foresters do their work faster and smarter. That's good for the trees — and the animals that rely on them.

STEPHANIE PAIGE OGBURN