Yosemite: Protected but Not Preserved

The spectacular landscape of California’s Yosemite Valley looks natural and has been protected for more than a century. Yet ecologists know that today’s valley is not the one that enchanted naturalist John Muir when he promoted the formation of Yosemite National Park. One of the park’s emblematic species, the California black oak (Quercus kelloggii), is in decline, a problem usually attributed to a lack of fire and an invasion of conifers. Now, two researchers have traced the trees’ suffering through a complex chain of effects that starts with human influence and extends from cougars through mule deer to oaks and primroses. The result of that “trophic cascade” is that there are very few young oak trees to replace their elders, hurting other species from shrubs to birds and invertebrates and apparently reducing overall biodiversity, according to a report in the May issue of Biological Conservation.

“It’s not just Yosemite,” says ecologist Thomas Rooney of Wright State University in Dayton, Ohio, who was not involved in the study. He notes that other oak species are in decline across the United States. “It shows that habitat protection alone is not enough. You need the predators.”

In Yosemite, the paper says, the direct cause of oak mortality is the high density of mule deer, which have been munching the oaks’ basal sprouts and seedlings for nearly a century. Intriguingly, the mule deer’s abundance stems not from a lack of predators—as with elk in Yellowstone National Park (Science, 27 July 2007, p. 438)—but from shy ones: elusive cougars (Puma concolor). The mountain lions keep the deer in check elsewhere in the park but avoid areas like the valley, where people congregate.

“There are higher deer densities now than in the 1850s,” when American settlers first entered Yosemite Valley, says ecologist William Ripple of Oregon State University, Corvallis, who co-authored the study with OSU colleague Robert Beschta, a forest hydrologist.

After Yosemite became a national park in 1890, visitors swarmed into the valley, eager to see its parklike landscape of black oaks and famed wildflower-filled meadows. Officials began eliminating cougars, bobcats, and coyotes and protecting mule deer from hunting. By 1925, deer were numerous, and park observers noted a marked decline in the most popular wildflower, the evening primrose (Oenothera hookeri). Although not apparent at the time, that’s also when the black oak seedlings began to disappear, says Ripple and Beschta, who in 2006 measured the diameters of more than 3000 black oaks. They also took tree ring cores from 40 sites close to the valley’s visitor center and sites 4 to 8 kilometers away. Black oaks can live as long as 500 years, but a “healthy stand includes a mix of young and old trees,” says Beschta. Oaks close to the visitor center have almost no young trees or basal sprouts. The deer are using people as “protective shields,” says Ripple. Deer had also nipped off the flower buds of nearly every evening primrose the scientists saw.

Today, Yosemite managers burn prescribed areas to keep out conifers and clear the way for oaks. But fires can’t do what most needs to be done, says Ripple: “Get the baby oaks to grow.” That’s not likely to happen until there are fewer deer. “It wouldn’t be popular to have culling in a national park,” Rooney says, “but it may be necessary” if the valley’s biodiversity is to be preserved.

—VIRGINIA MORELL

Cancer Genome Goes Global

There’s an ambitious new sequencing project on the block: the International Cancer Genome Consortium (www.icgc.org). Leaders aim to raise $1 billion to sequence 50 human cancers over the next 10 years and share the data. This week, it joined a crowded field; similar efforts are under way at the U.K. Sanger Institute and the U.S. National Institutes of Health (Science, 8 September 2006, p. 1370). But a global organization makes sense because the prevalence and environmental causes of cancer differ around the world, says consortium leader Thomas Hudson of the Ontario Institute for Cancer Research in Toronto: “We’re trying to prepare ourselves for the next wave.” Organizations in nine countries, including in China, Singapore, and India, have signed on.

—JOCELYN KAISER

Stresses Grow in U.K. Science

U.K. parliamentarians attacked the Labour government this week for slighting science and mismanaging the current allocation of £2.8 billion. The science committee in the House of Commons also leveled harsh words at the agency that supports astronomy, particle physics, and government labs, saying it had axed fields and facilities without consulting the community and citing “particular weakness” in its peer-review systems and management. Neglect has “caused immense damage to fundamental science in this country,” says particle physicist Brian Cox of the University of Manchester. However, U.K. innovation secretary John Denham argued in a speech that “as a government, we have fought for, and won, record resources” for science.

—DANIEL CLERY

Wage Understanding, Not War

The social and behavioral sciences may get as much as 20% of a proposed $250 million boost to the U.S. Department of Defense’s basic research budget to counter terrorist threats without force. “We have given our troops many technologies to win conflicts, but we haven’t done enough to help them avoid conflict,” William Rees, the Pentagon’s chief of basic research, told Science last week. Rees was amplifying a message from other officials, including Defense Secretary Robert Gates, who credits a small team of anthropologists embedded with military units in Afghanistan for helping to reduce violence in the region.

—YUDHIJIT BHATTACHARJEE
The work is “an excellent contribution to both paleoecology and food-web theory, showing the relevance of the fossil record to understanding current ecosystem states,” says Peter Roopnarine, a paleontologist at the California Academy of Sciences in San Francisco.

On the menu. Ball-and-stick diagram shows who, such as the predatory Anomalocaris, eats whom in this 500-million-year-old food web.

But 15 million years made a difference. “The younger Burgess Shale web looks incredibly like the modern food webs,” Dunne points out.

The Chengjiang food web—15 million years older than Burgess—was more primitive. The researchers found more “loops” in the Chengjiang web, wherein the same species appears twice in a particular food chain. By contrast, the Burgess Shale and modern food webs tend to be more hierarchical, a trait considered important for stability, Dunne notes.

Another analysis revealed that the Chengjiang food web was more loosely connected than the rest. Today, any species in a web is so closely connected to others that a change in one tends to affect most of the web members. In China, that may have not been the case. Incredibly like the modern food webs, “The younger Burgess Shale web looks really coexisted, as the beds cover millions of years, and whether the sampling was comprehensive enough for this sort of analysis. Just because the structure of the food webs seems similar doesn’t mean they functioned the same way, cautions Roopnarine, who says that the paper “falls short on some of its claims.” Nonetheless, he thinks the work will have an impact: “The questions emerging from this paper should encourage paleontologists to think more seriously about the need to develop theoretical and modeling approaches to fossil ecologies.”

—ELIZABETH PENNISI

Business Boost Thwarted

A congressional Democrat with clout and a Republican with conviction have teamed up to block a plan to give small businesses a bigger slice of the federal research pie. Last week’s vote by the House of Representatives came on a bill to reauthorize two research programs that fund peer-reviewed proposals from start-up companies through a tax on 11 science agencies. Of greatest concern to science lobbyists was language raising the share going to the SBIR (Small Business Innovation Research) and STTR (technology transfer research) programs from a combined 2.8% to 3.6%, an increase that would have siphoned off an additional $650 million a year. But representatives David Obey (D–WI), chair of the powerful appropriations committee, and Vernon Ehlers (R–MI), a former physics professor who had failed to derail the increase during an earlier committee vote, argued successfully on the House floor that this was the wrong time to tap already stressed science budgets.

A larger SBIR program “does no harm for a large agency whose budget has been rising, such as the Department of Defense,” Obey said shortly before last week’s vote, “but it can do immeasurable harm to the crown jewel of our research agencies in this country, the National Institutes of Health.” The White House also opposed the increase. A proposal for an even larger boost has stalled in the Senate. Both programs are set to expire this fall unless Congress reauthorizes them.

—JEFFREY MERVIS

Campaign Bailout for Arecibo?

Senator Hillary Clinton (D–NY) has introduced legislation (S. 2862) to keep federal funds flowing to the Arecibo Observatory in Puerto Rico. Her support for the world’s largest single-dish radio telescope, which is slated to lose its $15 million-a-year slice of the federal research pie. Last week’s vote by the House of Representatives came on a bill to reauthorize two research programs that fund peer-reviewed proposals from start-up companies through a tax on 11 science agencies. Of greatest concern to science lobbyists was language raising the share going to the SBIR (Small Business Innovation Research) and STTR (technology transfer research) programs from a combined 2.8% to 3.6%, an increase that would have siphoned off an additional $650 million a year. But representatives David Obey (D–WI), chair of the powerful appropriations committee, and Vernon Ehlers (R–MI), a former physics professor who had failed to derail the increase during an earlier committee vote, argued successfully on the House floor that this was the wrong time to tap already stressed science budgets.

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