Deer are eating their way through too much ginseng (inset). Oh deer. Deer are eating their way through too much ginseng (inset).

**ECOLOGY**

**Ginseng Threatened by Bambi’s Appetite**

With few natural predators left, deer are running rampant across much of eastern North America and Europe. In addition to damaging crops, raising the risk of Lyme disease, and smashing into cars, white-tailed deer are eating their way through forests. “This is a widespread conservation problem,” says Lee Frelich of the University of Minnesota, Twin Cities. Indeed, on page 920, a detailed, 5-year forest survey of ginseng reveals that deer, if not checked, will almost certainly drive the economically valuable medicinal plant to extinction in the wild.

The survey was conducted by James McGraw, a plant ecologist at West Virginia University in Morgantown, and his graduate student Mary Ann Furedi. Ginseng is one of the most widely harvested medicinal plants in the United States; in 2003, 34,084 kilograms were exported, mainly to Asia, where wild ginseng root fetches a premium. Although the plant (*Panax quinquefolius*) ranges from Georgia to Quebec, it is slow-growing and scarce everywhere.

To determine the population trends of ginseng, McGraw and Furedi began a census in West Virginia forests. For 5 years, they checked seven populations of wild ginseng every 3 weeks during the spring and summer. They quickly noticed that plants were disappearing. In some places, all of the largest, most fertile plants were gone by mid-August. At first they suspected ginseng harvesters, but the valuable roots were left. Cameras confirmed that deer were at work. The nibbled plants are less likely to reproduce, and after repeated grazing, they die. Indeed, during the study, populations declined by 2.7% per year on average.

McGr aw and Furedi then ran a ginseng population viability analysis. By plugging in the sizes of plants in various populations, mortality rates, and other factors, they learned that current ginseng populations must contain at least 800 plants in order to have a 95% chance of surviving for 100 years.

That’s bad news. A broader survey they conducted of 36 ginseng populations across eight states revealed that the median size was just 93 plants and the largest was only 406 plants. At the current rate of grazing, all of these populations “are fluctuating toward extinction,” McGraw concludes. Even the biggest population has only a 57% chance of surviving this century.

“This paper has high significance because it’s one of the first demonstrations of the direct impact of deer browsing on understory plants,” says Daniel Gagnon of the University of Quebec, Montreal. And deer eat more than ginseng. “We could lose a lot of understory species in the next century if these browsing rates continue,” McGraw says. That in turn could affect birds, small mammals, and other wildlife that rely on these plants.

McGr aw and Furedi calculate that browsing rates must be cut in half to guarantee a 95% chance of survival for any of the 36 ginseng populations they surveyed. That has direct management implications, says Donald Waller of the University of Wisconsin, Madison. “We should be encouraging the recovery of large predators like wolves. It also suggests we should be increasing the effectiveness of human hunting” by emphasizing the killing of does rather than bucks, he adds. Such deer-control measures are controversial: Reintroduction of predators like wolves faces logistical as well as political hurdles, for example. Meanwhile, the deer keep munching.

—ERIK STOKSTAD

**Biosafety Lab Fallout in Boston**

New revelations about how Boston University handled an incident in which dangerous bacteria sickened three workers last year may hinder BU’s plans to build a biosafety level 4 (BSL-4) lab in the city’s South End neighborhood (*Science*, 28 January, p. 501).

When news of the infections broke last month, the university said that it had not suspected tularemia as the cause until October. But BU officials admitted last week that they had conducted tests on two workers in August that showed the presence of infectious bacteria. Because they were not convinced that the samples contained tularemia, they waited until a third worker fell ill in the fall before they closed the lab, ran further tests, and informed public health officials. Also last week, Peter Rice, the beleaguered head of the lab where the tularemia incident took place and chief of infectious diseases, resigned from his positions at BU. Opponents of the BSL-4 lab, meanwhile, are pushing a bill in the Massachusetts Senate which would ban such facilities from the state.

—ANDREW LAWLER

**Turning Bombs Into Semiconductors**

**ALMATY, KAZAKHSTAN**—Plans are afoot to create what may be the world’s first “nuclear technopark” at one of the enduring legacies of the Cold War. The government of Kazakhstan is reviewing an $80 million proposal to establish a technology incubator at the Semipalatinsk Test Site—a territory nearly as big as Israel—in northeastern Kazakhstan where the Soviet Union detonated its first atom and hydrogen bombs. Since the closure of the Central Asian facility in 1992, Kazakh authorities have been trying to secure risky materials such as plutonium-laced soil (*Science*, 23 May 2003, p. 1220).

Looking to convert a liability into a sustainable venture, the former test site’s physicist-caretakers have drafted plans to build an electron accelerator, a gamma irradiator, and other facilities for producing everything from medical radioisotopes to semiconductors. If the government approves the plan and kicks in the start-up money, the technopark would then use tax exemptions and other incentives to entice commercial partners from Kazakhstan and abroad. A decision is due by the end of the month.

—RICHARD STONE
fertent methodology. Observers have been slow to wade into such turbid statistical waters, citing instead the other half-dozen paleoclimate studies employing a variety of data analyzed using two different types of methodologies. McIntyre, however, sees far too much overlap among analysts and data sets and perceives far too many problems in analyses to be impressed.

Now comes a joint Swedish-Russian effort that clearly breaks away from the pack. Climate researcher Anders Moberg of the University of Stockholm, Sweden, and his colleagues have not participated in previous millennia analyses. Tree rings don’t preserve century-scale temperature variations very well, so they added 11 proxy records ranging from cave stalagmites in China to an ice core in northern Canada. They also used a wavelet transform technique for processing the data, a new approach in millennial studies.

Moberg and his colleagues found that temperatures around the hemisphere fell farther during the Little Ice Age of the 17th century than in Mann’s reconstruction and rose higher in medieval times. The medieval warmth equaled that of most of the 20th century, but it still did not equal the warmth of 1990 and later.

Moberg’s result is only the latest to suggest that the handle of “the hockey stick is not flat,” says paleoclimatologist Thomas Crowley of Duke University in Durham, North Carolina. “It’s more like a boomerang,” he notes. The near end still sticks up—albeit less dramatically—above all else of the past 1000 years.

---RICHARD A. KERR

TOXIC AIR POLLUTANTS

Inspector General Blasts EPA Mercury Analysis

Power plants buying and selling the right to spew mercury to their smokestacks—the mere prospect raises the hackles of environmentalists. But when the U.S. Environmental Protection Agency (EPA) proposed such a cap-and-trade system last year, it argued that it was the most effective way to cut back the 48 tons of mercury, a known neurotoxin, emitted nationwide each year. Last week, the agency came under fire anew—this time from its own Inspector General (IG), who accused EPA officials of deliberately skewing their analyses to burnish the cap-and-trade approach. EPA denies the charges, but environmentalists say the report “will give them a leg up in court if they sue over the final rule.

Coal-fired power plants are responsible for about 40% of all mercury emissions in the United States, making them the largest single source. Perhaps as much as half spreads considerable distances, while the rest is deposited locally, creating so-called hot spots. The primary route of human exposure is fish consumption, because mercury bioaccumulates in water. Nearly every state has fish consumption advisories, especially for pregnant women, as fetuses are considered most vulnerable.

No federal rules on mercury from power plants are in place yet, although EPA determined in 2000 that regulation was “appropriate and necessary.” Under existing law, there is only one way to regulate a hazardous air pollutant like mercury (as opposed to less dangerous pollutants). This so-called MACT (maximum achievable control technology) approach requires all polluters to meet an air standard based on the average emissions of the cleanest 12% of power plants.

While calculating the MACT, EPA became enamored of pollution-trading approaches, allowed by law for so-called criteria or conventional air pollutants. For instance, the “Clear Skies” legislation, introduced in Congress in June 2002, included a pollution-trading scheme to reduce emissions of sulfur dioxide (SO₂) and nitrogen oxides (NOₓ). That’s relevant to the mercury debate because the same scrubber technology that can clean up these pollutants can also reduce mercury in some situations, yielding what’s called a “cobenefit.”

After that bill stalled, EPA proposed a rule in January 2004 that would regulate mercury under a similar cap-and-trade system. The agency claimed that this trading approach would cut emissions by 70% to 15 tons by 2018—apparently a much better bottom line than the MACT approach, which EPA said would lower annual emissions to

---JOCELYN KAISER

Harvard Creates New Task Forces on Women in Science

A month after making controversial remarks about why men outnumber women in most scientific disciplines (Science, 28 January, p. 492), Harvard University president Lawrence Summers last week set up two task forces on campus to change the situation. The first, led by historian Evelyn Hammonds, will work to improve faculty searches and create a senior administrative position for improving gender diversity. The second group, chaired by computer scientist Barbara Grosz, will probe why women are underrepresented.

---YUHJJIT BHATTACHARJEE

Nascent Reform Bill Criticized

Paris—French scientists took to the streets last week to protest a government bill designed to boost research by reforming it (Science, 7 January, p. 27). The bill hasn’t been made public yet, but after reviewing a leaked draft, leading scientists have concluded that it focuses too heavily on applied research. The government has scheduled more meetings with unions and leaders this month, so the bill won’t be presented to Parliament until March at the earliest.

---BARBARA CASASSUS