

program started, Williams says.

The restoration project was also paying tuition, fees, and a stipend for Tawny Mata, an ecology graduate student at UC Davis. The funding freeze “has pretty much left me up in the air about how I’ll finish my Ph.D.,” Mata says. A teaching assistantship is paying her bills this quarter, but beyond that Mata isn’t sure how she’ll manage. “I’ve been contacting any professor I’ve ever worked with to see if they have any money lying around.” She’s not alone: A recent e-mail survey found that at least 24 out of about 160 students in her program had lost at least some funding.

Across UC Davis, 60 projects received stop-work orders, says Jan Hopmans, chair of the university’s Department of Land, Air and Water Resources—20 in his department alone. “Many of these grants are for a few

hundred thousand to a few million dollars,” Hopmans says. “We have 50 employees just in my department for whom we have in principle no funding at this time.” Researchers, students, and technicians have been reassigned to projects with other sources of funding where possible, Hopmans says, but so far 13 people have received layoff notices.

Nonprofit groups are also feeling the pain. “A lot of our grantees are relatively small organizations, and some of them will go out of business if this goes on too long,” says Samuel Schuchat, executive officer of the Coastal Conservancy, the state agency charged with administering bond-funded grants for coastal research and conservation. One such program, the Invasive *Spartina* Project, an effort to eradicate invasive *Spartina* cordgrass from the San Francisco Bay, would

be especially painful to lose, say Schuchat and others. The state has already invested nearly \$10 million in the project, which has reduced the area covered by the grass by 90% since 2006 and is on course to eradicate it by 2012, says Peggy Olofson, the project’s director. Olofson has cobbled together money to run a scaled-down operation this year, but beyond that the future is uncertain.

How long the bond funds will remain frozen is unclear, but all eyes are on Sacramento, where the governor and state legislators are wrangling over how to close the budget gap—a necessary first step toward restoring the state’s credit rating and restoring its ability to sell bonds. Only then will those affected by the freeze be able to start thinking of a thaw.

—GREG MILLER

## BIOSECURITY

# Life Scientists Cautious About Dual-Use Research, Study Finds

Some life scientists are changing the way they do business because of security concerns, according to a U.S. survey released this week.

Researchers and policymakers in the United States have been hotly debating the need for new government regulations to prevent the misuse of life sciences research by terrorists and other bad actors. Even without such regulations, according to the survey, a few scientists are avoiding “dual use” research projects with the potential for harm; some are shying away from international collaborations; others are excluding foreign graduate students and postdocs from certain lines of work and censoring themselves while talking about their research.

In all, 15% of the nearly 2000 life scientists who responded to the survey, conducted in late 2007 by the National Research Council and AAAS (publisher of *Science*), reported having changed their behavior in one or more of those ways. “It is a surprisingly high number,” says study chair Ronald Atlas, a microbiologist at the University of Louisville in Kentucky. He finds it worrisome that security concerns may be impinging on the traditional openness of research in the life sciences. “What’s not clear is whether the community is overreacting or if this is an appropriate response,” Atlas says.

The finding is also an implicit endorsement of the popular argument among academics for letting scientists police themselves on dual-use research rather than imposing government-mandated rules. The National Science Advisory Board for Biosecurity endorsed that self-governance approach in recommendations to



**Self-review.** Some researchers are avoiding certain projects because of security concerns.

the government in 2007, but federal officials have not yet decided what the policy should be.

Richard Ebright, a chemist at Rutgers University, New Brunswick, who has argued in favor of tougher regulations, says he finds the survey results “hard to believe,” given that previous studies have shown that most scientists in the community aren’t even aware of dual-use concerns. Ebright suspects that the survey, which was e-mailed to 10,000 life scientists who are members of AAAS, attracted an overwhelming proportion of responses from individuals who would “prefer not to see [government] regulations.” Atlas agrees that the survey may have captured “a biased group that had been thinking about this topic” and says that the findings “would require further verification from broader surveys.”

The study authors say the survey results point to the need for clearer guidelines on what kinds of research might have the potential for dual use. “It’s possible that some life scientists are being over-cautious because there is no good definition of dual-use research,” Atlas says. Panelist Robert Cook-Deegan, a biosecurity expert at Duke University in Durham, North Carolina, says biosafety committees at some institutions are already working with their scientists to help evaluate the dual-use potential of research projects and respond accordingly.

As an example, he cites a project led by Mark Denison of Vanderbilt University in Nashville, Tennessee, and Ralph Baric of the University of North Carolina, Chapel Hill, that set out to make a SARS-like virus using synthetic biology techniques. The researchers “thought about dual use with their biosafety committees all along, and we did a half-day workshop before their publication to talk about what should not be included in the final publication and why,” Cook-Deegan says. The paper was published in the 16 December 2008 issue of the *Proceedings of the National Academy of Sciences*, with minor modifications to the language and no data withheld. “It’s a really nice example of scientists taking dual use seriously,” he says.

—YUDHIJIT BHATTACHARJEE