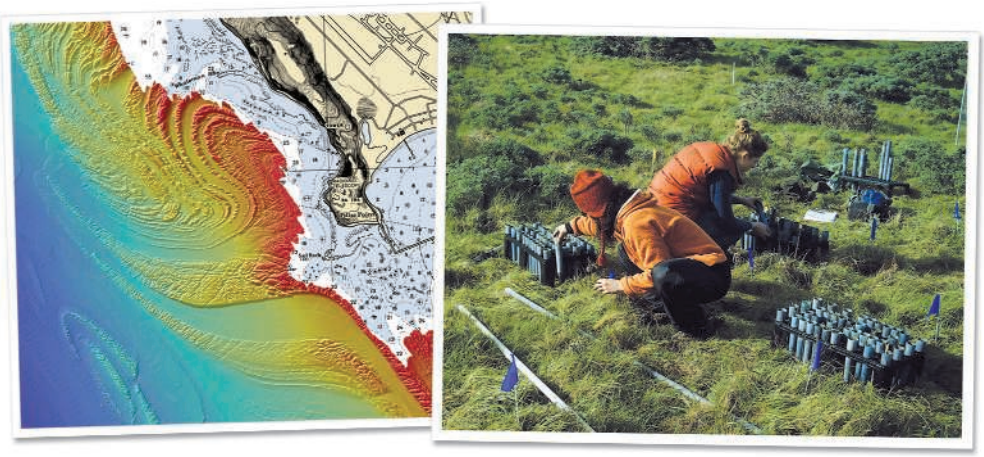


On hold. A sea floor–mapping study (*left*) and coastal prairie restoration project are among the victims of California's bond fund freeze.

FINANCIAL CRISIS

California Researchers Chilled by Sudden Freeze on Bond Funds

For many California researchers, the bad news came just before the holidays: As a result of the state's deteriorating financial situation, the department of finance was freezing billions of dollars in funding tied to the sale of state bonds. These funds had been slated for a vast variety of projects statewide, everything from supporting schools and public housing to building libraries and fixing freeways. But the freeze also pulled the plug—at least temporarily—on thousands of environmental research and conservation projects. In the ensuing weeks, scientists, graduate students, and nonprofit organizations have faced a mad scramble to replace what most had assumed was a secure source of funding.

When the decision was announced on 19 December, Rikk Kvitek, a marine ecologist at California State University, Monterey Bay, got the call right before heading to his lab holiday party. "I had to walk in and say 'Merry Christmas, and by the way, there's no work tomorrow because virtually all of our funding is tied up in this.'" Kvitek is a principal investigator on a $20 million state-funded seafloor–mapping project that was just hitting full stride. "For the last 8 years, I've been really pushing the state to map all the state waters because we knew that it would really transform coastal marine research and how resource management was done," he says. The high-resolution digital maps are being used, among other things, to help select sites for the state's network of marine protected areas. Because of its scale, the project has become the primary focus of Kvitek's work, and he says for the first time in 20 years he had all of his funding eggs in one basket.

Like others, Kvitek was instructed to stop all work immediately on bond-funded projects. The next day, a 180-foot ship surveying the northern California coast pulled into port and has been out of commission ever since. Kvitek has managed to find temporary funding from a foundation to keep his 15 students and staff members working on data analysis, but he says that money will last only 2 or 3 months.

California's governor and legislature are at loggerheads about how to narrow a projected $40 billion budget deficit, and the state's credit rating has tanked, scuttling its ability to sell bonds to raise capital. In more typical times, the state loans money to approved projects and subsequently recoups the money by selling bonds. But now that the bonds aren't selling, the state decided that the loans had to stop. Environmental projects are feeling the pinch in part because of the public support they've received in recent years as California voters have passed propositions authorizing the state to sell bonds to fund projects to study and manage the state's natural resources. (The state's bond-funded stem cell institute has not yet felt the pain as acutely but is girding itself; see sidebar.)

"This came totally out of the blue," says Susan Williams, the director of the Bodega Marine Laboratory in Bodega Bay, administered by the University of California (UC), Davis. Many of the frozen projects were intended to help support California's coastal economy, Williams says. "These are not pie-in-the-sky projects," she says, citing ocean-monitoring projects used by fisheries managers and the U.S. Coast Guard, efforts to combat invasive species, and research on the impact of climate change.

Some projects have been put on hold at a critical juncture. One example, Williams says, is a coastal prairie-restoration project run by the Bodega marine lab. This postcard-pretty habitat along the Sonoma County coast is being taken over by invasive grasses. The eradication plan called for a series of mowing and herbicide treatments followed by plantings of native species. The first treatment was completed last fall, but the funds are now frozen for the second round of grass removal, which should be happening now. "Unless the funding is restored and we can do the second removal, the seed bank of these weeds will germinate," causing "an even bigger problem" than existed before the ▸

Stem Cell Institute Looks for New Ways to Raise Cash

In 2004, California voters authorized the state to raise $3 billion for stem cell research through the sale of bonds. Now, the state's finances are in disarray and its bonds aren't selling, forcing the California Institute for Regenerative Medicine (CIRM) to look for new ways to raise cash. At a meeting last week in Burlingame, California, the institute's leaders discussed alternatives and provisionally approved funding for $58 million in new training grants.

Although the state's recent decision to freeze funding on projects tied to bond sales has had a chilling impact on many researchers in the state (see main text), the freeze has not had a big immediate impact on CIRM, says Vice President for Operations John Robson. As of 1 January, the institute had $158 million on hand, thanks to proceeds from bond sales that took place before the recent economic nosedive. That should be enough to maintain operations and honor previous funding commitments for several months, Robson says: "We feel like we have enough money to carry us to about November."

But then what? CIRM estimates it would need to raise close to $136 million just to continue funding ongoing commitments through the end of 2010; it would need a total of $377 million to also fund projects that have already been given preliminary approval from its board and anticipated new programs. At the meeting, CIRM Chairman Robert Klein proposed raising money by selling private placement bonds to wealthy investors interested in the potential societal benefits of stem cell research. **–G.M.**

CREDITS (LEFT TO RIGHT): CALIFORNIA STATE UNIVERSITY, MONTEREY BAY; PETER ALPERT

Published by AAAS

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

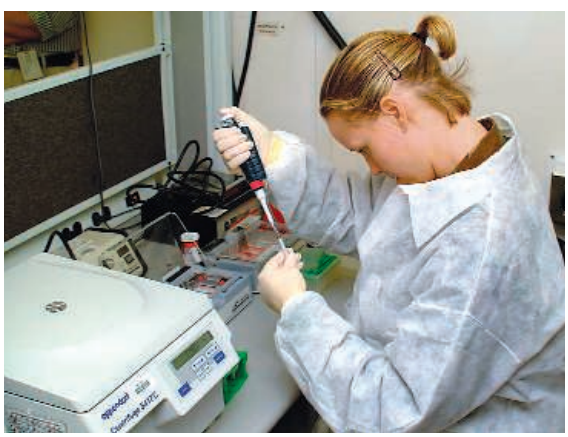
Life Scientists Cautious About Dual-Use Research, Study Finds

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



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

CREDIT: STEVE FERENDO/AMERICAN FORCES PRESS SERVICE/DOD

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 overcautious 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