Space Systems in Ithaca, New York, for re-inspection. Changes were made, including replacing the ball bearings, which had already shown signs of pitting, says Charles Sobeck, Kepler's deputy project manager at Ames. Troeltzsch says, "The assessment was that the changes would prevent the recurrence of the types of problems that had happened before." Through a spokesman, Ithaco owner UTC Aerospace Systems declined to respond to questions about how the company had tried to fix the wheels, referring the questions back to NASA.

Borucki notes that, at the time, potential problems with the reaction wheels seemed less of an issue because the mission was supposed to last for only 3.5 years. That was how long it was expected to take for Kepler to achieve its main goal: surveying a group of about 150,000 Sun-like stars up to 920 parsecs (3,000 light years) away to determine how common Earth-sized planets in Earth-like orbits are in the Galaxy.

After launch, however, scientists discovered that most stars are more variable than the Sun (see *Nature* **477,** 142–143; 2011). The mission would need more time to distinguish a random fluctuation in a star's brightness from a dip in starlight due to a passing planet, so last year, NASA extended the mission until 2016. But around the time of that decision, the first reaction wheel went bad. With the loss of the second wheel, says Troeltzsch, "the science we were doing with Kepler, as we were doing it, is over".

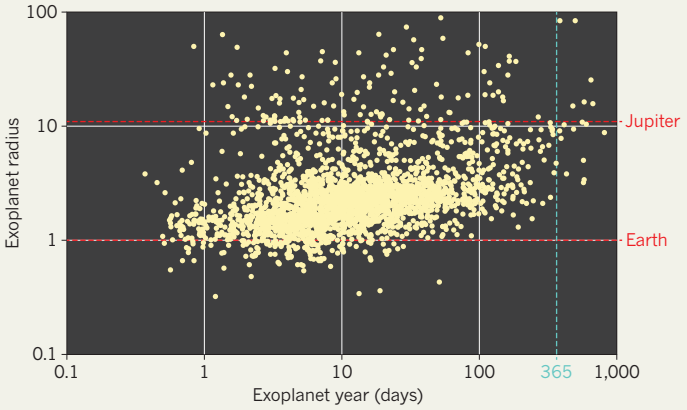
Although engineers will try to reactivate the failed wheels in the next couple months, Troeltzsch is not hopeful. "It's very unlikely that it can be restored to any kind of usefulness," he says. Thrusters on board the craft may be able to serve as a crude stand-in, but they were not designed to provide the precision orientation needed. Efforts to bring the mission back to life will probably continue until the end of autumn, says Sobeck.

In the meantime, Borucki's team is analysing the two most recent years of Kepler data, which seem likely to add hundreds of candidate planets to the mission's current tally of more than 2,700 (see 'Kepler's bounty'). Because the most recent data contain information on planets with orbits of similar length to Earth's, Borucki is optimistic that they will reveal a reasonable estimate of the frequency of Earth analogues in the Galaxy.

Sara Seager, an exoplanet theorist at the Massachusetts Institute of Technology in Cambridge, is not so sanguine. She says that the data may yield decent statistics about Earth-sized planets in orbits up to about 200 days, but not all the way up to orbits in the 'habitable zone' of a Sun-like star, which are around 365 days. She is hopeful, however, that a few such planets are buried in the remaining data. "It's possible, and even likely." ■

KEPLER'S BOUNTY

NASA's Kepler spacecraft has discovered more than 2,700 candidate extrasolar planets. But the mission may have ended just as it was becoming sensitive to Earth-sized planets in Earth-like orbits around their stars.



SOURCE: NASA EXOPLANET ARCHIVE

POLICY

Log-jam in agency confirmations

Political squabbles leave US science agencies without heads.

BY LAUREN MORELLO

US Senate Republicans have lots of questions for Gina McCarthy, President Barack Obama's nominee to head the Environmental Protection Agency (EPA) — 1,038 of them, to be exact. Many target alleged lapses in the EPA's policies regarding transparency and information access, but they also reflect a more general distrust of the agency that regulates greenhouse-gas emissions, sets water-pollution standards and monitors air quality.

McCarthy, currently the EPA's assistant administrator in charge of air and radiation, has had plenty of time to ponder the lawmakers' queries since her nomination on 7 March. She has already waited weeks longer for confirmation by the Senate than any would-be chief in the EPA's 43-year history (see 'Stalling tactics'). Obama's new energy department secretary, physicist Ernest Moniz, didn't fare much better. He was confirmed last week, but only after a key senator withdrew an objection that had held up the confirmation for more than two months.

In his first term, Obama was able to install a science 'dream team', with much fanfare and little opposition (see *Nature* **489,** 488–492; 2012). But at the start of his second term, Obama is facing a number of key science-policy decisions without agency heads. The delays are not all due to Congress. Partly because of the increasingly complex background checks needed to prepare for congressional scrutiny, the Obama administration has not yet even nominated new heads for the National Oceanic and Atmospheric Administration, the US Geological Survey, and the National Science Foundation (NSF), whose previous directors have all stepped down.

Ross Baker, a political scientist at Rutgers University in New Brunswick, New Jersey, says the McCarthy delays are a prime example of 'slow-walking' — stalling a nomination in the hopes that a nominee will withdraw his or her name. Simple tactics can be enough: Republicans boycotted a 9 May committee meeting that would have allowed McCarthy's nomination to advance to the full Senate. Even answering senators' questions can end up adding days to the process. "It's basically death

STALLING TACTICS

Gina McCarthy has waited longer than any other nominee for US Senate confirmation as head of the US Environmental Protection Agency (EPA).

EPA nominee	Presidency	Days to confirmation
Gina McCarthy, 2013	Barack Obama	77 and counting
Lisa Jackson, 2009	Barack Obama	2
Stephen Johnson, 2005	George W. Bush	46
Michael Leavitt, 2003	George W. Bush	55
Christine Todd Whitman, 2001	George W. Bush	11
Carol Browner, 1993	Bill Clinton	1
William Reilly, 1989	George H. W. Bush	13

by a thousand cuts," Baker says. McCarthy's nomination finally seems to be on course to a vote by the full Senate. But as *Nature* went to press, there is no word on when that vote might come.

To Calvin Mackenzie, a political scientist at Colby College in Waterville, Maine, who studies the presidential appointment process, the current stalemate is the culmination of a trend that began decades ago. Over the years, both major US political parties have taken advantage of Senate rules and customs to hinder nominations. During the presidency of George W. Bush, for example, Senate Democrats stalled the nomination of EPA chief Michael Leavitt for several weeks. "There is blood on the hands of both parties here," Mackenzie says. "The trouble with a scorched-earth policy is it keeps getting worse."

Some observers fear that the political manoeuvring will start to have an impact on US research. Like the rest of the federal government, US science agencies are grappling with the impact of automatic budget cuts known as sequestration, which has chopped roughly 5% from their funding to 30 September and is set to continue until 2021 (see page 419). Neal Lane, a former NSF director and science adviser to President Bill Clinton, says that having only an acting director can make budget negotiations problematic for agencies.

The EPA is finalizing a new rule to limit carbon dioxide emissions from power plants, and it is also advising the Department of State over whether to permit the construction of the Keystone XL pipeline to carry oil from the Canadian tar sands to the Gulf of Mexico. Those efforts are likely to be delayed until the EPA and other science agencies are again run by permanent leaders, says Lane, now at Rice University in Houston, Texas.

That's not to say interim heads aren't experienced. "They know how the agency works and they can keep the trains moving," says Lane. "But it's a serious problem if that acting arrangement lasts very long, because large policy decisions are generally on hold during that period."

Jeffrey Holmstead, who headed the EPA's Office of Air and Radiation during the George W. Bush administration, disagrees. "A lot depends on the reputation and stature" of an agency's interim chief, says Holmstead, head of the environmental-strategies group at the law firm Bracewell & Giuliani in Washington DC. He notes that the EPA eased clean-air regulations for older coal-fired power plants during a four-month period in 2003 when the agency was run by an acting administrator.

In the meantime, those watching the McCarthy nomination say they are cautiously optimistic that her long wait will end in confirmation. "I wouldn't be surprised if some day she will be confirmed," Mackenzie says. But he adds, "With these things, who knows?" ■

The flooded Red River isolated houses in North Dakota in 2011. Budget cuts now endanger monitoring.

SCOTT OLSON/GETTY IMAGES

POLICY

US budget cuts hit Earth monitoring

Sequestration threatens records of snow and stream levels in western United States.

BY ALEXANDRA WITZE

Two kilometres south of the US–Canadian border, in Pembina, North Dakota, a stream gauge measures the height of the water surging down the Red River. The instrument, one of about 8,000 maintained by the US Geological Survey (USGS), is a sentinel for communities along the river that experienced devastating floods in 2009, 2010 and 2011. Yet this spring, the USGS announced plans to shut down the Pembina stream gauge — a casualty of the sweeping federal budget cuts known as sequestration.

Implemented on 1 March, sequestration slashes about 5% from the budget of every federal agency and programme until the end of the fiscal year on 30 September, with further cuts expected until the end of 2021 unless Congress intervenes. Scientists in fields from biology to astronomy are bracing themselves for an era of smaller and fewer research grants, which will begin within months (see *Nature* **494,** 158–159; 2013). But the cuts are already hampering Earth-monitoring projects, including stream gauges and snowpack measurements, which require a constant influx of funds to keep data flowing.

Monitoring equipment frequently breaks and must be repaired or replaced, usually during the short period of summer fieldwork. That often requires expensive journeys to remote sites by helicopter or other means.

Such is the case for surveys of the United States' western snowpack, a crucial source of water in summer for many states. Continuing a tradition that began in 1906, when a University of Nevada researcher measured snow depth along a transect in the Sierra Nevada mountains, the US Department of Agriculture's Natural Resources Conservation Service conducts more than 1,100 manual 'snow courses' once a month throughout winter and spring. In 1980 it also began operating automated snow telemetry (SNOTEL) sites, and it now has around 860 spread over 13 western states. Survey data are used to produce water-supply forecasts and to analyse changes in the snowpack over time.

But in January, the snow survey announced that it would eliminate 39 snow courses in Montana. The programme was already suffering from reduced funding: it received US$9.3 million in fiscal year 2012, about 15% less than the year before. Congress has not yet finalized the 2013 budget, but the survey is probably facing another 7.5% cut this year when sequestration is taken into account, says Michael Strobel, director of the National Water and Climate Center in Portland, Oregon.

More snow courses may be at risk. "We're trying to prioritize sites that have ▶