Some Dam – Hydro News™
And Other Stuff

Quote of Note: “Rhetoric is no substitute for reality.” Thomas Sowell

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“Good wine is a necessity of life.” -- Thomas Jefferson
Ron’s wine pick of the week: 2013 Josh Cellars US Red Blend “Legacy”
“No nation was ever drunk when wine was cheap.” -- Thomas Jefferson

NO APRIL FOOL’S JOKES

Dams:
(New book article on embankment dams uses Hoover dam photo. Maybe the article title is wrong.
Mmmm.)
Dam Inspection: New book by USU professor takes a closer look at world’s embankments
By Katie Peikes staff writer, Mar 17, 2016, news.hjnews.com

In his second book, “Dam,” Utah State University professor of photography, Carsten Meier, hones in on the human relationship to wilderness, taking his readers on a picturesque journey through every dam he has ever visited. Meier, 44, honed his interest in on dams during graduate school while reading Roderick Nash’s “The Wilderness and the American Mind,” which looked at the history of the American preservationist movement. Meier began to contemplate the dam as the perfect symbol for utilitarian architecture representative of humans’ relationship to nature. “There’s something iconographic, almost a symbol for that particular relationship,” Meier said.

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For his graduate thesis, he created a living dam out of natural materials on a small creek in Ohio. Meier was aware of the controversy surrounding dams and their ecological impacts, and he wanted to do something referencing the notion that a dam creates a degree of interruption within a landscape. What he found, from creating his own dam, was it created a small reservoir in the landscape. Water filled the dam in the springtime and Meier noticed that a few species, including turtles and copperheads, had made the dam their home. “It seemed to provide more biodiversity,” Meier said.

In 2010, Meier decided he wanted to channel his interest in dams through a book using photography to tell their stories instead of words. As his second book following “Public Parking,” which featured the aesthetic of photographed parking garages, Meier began visiting dams considered controversial across the United States and Europe, and utilized a photographic typology style, placing similar objects in photographs next to each other in a sequence. Meier, however, goes a step further and extracts the dams from the photos to show the dams without valleys and the valleys without dams. “It shows the sort of desire to have them removed and not knowing really what it will look like,” Meier said. “It sort of places this anticipation of these dams being removed from the landscape. At the same time it shows more in detail what the dam without the landscape looks like.” Working with an 8x10 camera on a tripod, Meier would visit and photograph dams, providing his viewers with an on-the-scene view of the landscape and transporting them to the dam’s site. The first dam he photographed was the Ecker Dam, which used to straddle the border between East and West Germany. “What photography does as the principle function is to allow us to virtually travel, especially in architectural landscape photography which kind of comes together here,” Meier said. “We’re brought to these places simultaneously.” “Dam,” he said, gives viewers the idea of what the purpose and the meaning of the dam is today. Meier contradicts this work with landscape photographs that provide notions of romanticism. Through color photography and typology, Meier’s book, which is scheduled to be published on March 22, brings to life each dam that Meier has visited over the last five years. "The dams are so extremely brutal in terms of their architecture and what they look like." Meier said. "I’m using it (the book) not just to show collections of my photographs but rather to give the viewer an idea of what the purpose and what the meaning of the dam is today in our perception." Among his influences are Ansel Adams, Stephen Shore, Bernd and Hilla Becher, with the Bechers inspiring him the most through their photographic typology to delineate water towers. As a USU assistant professor of photography, Meier said passion is key in shaping the minds of aspiring photographers. Professionalism and balance between the conceptual approach and technical realization are among the many facets that help shape photography, he said. “You’ve got to have a passion for it,” Meier said. “You really need to be completely into it, and you’ll find a niche for which you become a professor conceptually and technically.”

(The benefits of dams.)

Researchers Estimate Dams Would Give Tulsa $122M Economic Boost Annually
By MATT TROTTER • 3/18/16, publicradiotulsa.org

Vision Tulsa’s low-water dam projects could be worth at least $122 million a year. OU’s Center for Economic and Management Research studied the potential impact of river development by looking at eight other cities with successful riverfront development. City Councilor G.T. Bynum has led the "water in the river" charge the past few years. "When you consider that the total cost

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of building the two lakes is right around $130 million, that's a substantial annual return on investment,” Bynum said.

Researchers also think Arkansas River development could generate nearly 1,900 jobs. The estimates are based on Oklahoma City’s outcomes from economic development efforts. The study also notes community amenities, referred to as "quality of place" are integral to economic development because they attract young workers and new businesses. PSO President and past Tulsa’s Future Chair Stuart Solomon agrees. "Young professionals feel very strongly about quality of place. In fact, a lot of young professionals choose where they want to live even before they get a job," Solomon said. "So, the types of amenities that communities provide are critically important." The researchers said based on economic comparisons to other cities, Tulsa is behind the curve in offering local amenities.

Bynum said the numbers confirm the river task force's work over the past few years. He said for the last few decades, Tulsa has been among the cities watching its suburbs grow rapidly because they have cheap land. He said the low-water dam projects open up a lot of possibilities for private investment in the river corridor. "These are the types of things that you see cities throughout the country that are reversing that trend of migration out to the suburbs are doing to prevent that," Bynum said. The study was prepared for the Tulsa Regional Chamber.

(This isn't a laughing matter.)

**America accuses Iran of hacking the dam, cyber-squirrels rejoice**

While America is worrying about nation states, our infrastructure is being terrorized by rodents.

By Violet Blue, 03.18.16, engadget.com

As cyber-geddon stories go, Middle Eastern countries hacking into US dams or power grids and making stuff go haywire sounds like the plot for a not-so-subtly racist Hollywood scare flick. But that's the story we got when news outlets, citing unnamed sources, recently reported the Obama administration would be calling out Iranian hackers as the culprits behind a malicious 2013 breach at a New York dam.

Outlets reported at the time of the disclosure that hackers were "unable to get into the full dam system, but could take control of the flood gates." The news drama here hinges on reports that hackers accessed the dam's floodgate controls. The Bowman Avenue Dam near Rye Brook, New York, whose only purpose is to mitigate flooding, does have a computer-operated sluice gate ... er, it does now, anyway.

After the Department of Homeland Security approached the city of Rye about investigating the dam in 2013, Marcus Serrano, Rye city manager, told local press something that's not making it into this week's resurgence of stories about Iranian hackers. In local news outlet My Rye, Mr. Serrano said: "In or about June 2013, a sluice gate was added to the Dam, in order to help control the flow of water and assist with flood mitigation during storm events. The gate was designed to be opened and closed via computer; however, despite a ribbon cutting ceremony, the gate was..."
never fully operational, and remained non-functioning through the DHS investigation. In any event, based on information provided to us, at no time was the sluice gate ever manipulated by unauthorized users outside of the city. Subsequent to and after taking certain security measures consistent with the DHS report, the City did implement the sluice gate for the first time during a storm event on or about April 30 to May 1, 2014. So the damn dam, which in this case was really more like an artist's rendering of a dam, was operating at less than a minimum. The Iranian "cyberspies" who "had access to [the dam's] control system" had it only in theory. It seems like someone’s trying really hard to make Iranian hackers seem more dangerous than bird poop.

(The important things in life. The domino effect got them.)

MARCH 20, 2016 9:30 PM
Lexington golf course bouncing back from flood after dam broke
Water flowed across five holes after Old Mill Pond dam broke
Town leaders put in rock to stop erosion around sewer line
Concern persists that heavy rain may cause new damage

LEXINGTON COUNTY, SC - Play is getting back to normal at the Golden Hills Golf Course in Lexington after repairs due to an unexpected flood. Five of 18 holes at the 28-year-old course were inundated after the Old Mill Pond dam a half-mile upstream broke during record rain Oct. 4. "It was a sorry sight," said Julian Hayes, a golfer who lives in the neighborhood around the course. "It was halfway up to your knees in mud." Tee boxes have been rebuilt, cart paths replaced, fairways resodded after drying out and rock added along sections of 12 Mile Creek on the edge of the course to prevent erosion. The unexpected flood was "a nightmare, devastating," said Dian Berry, general manager for the 300-acre development. Play was suspended for several days after the flood to remove debris and create temporary greens and tees, she said. The flood swept away improvements in the 6,600-yard course finished two months before it happened. Town leaders chipped in on some repairs to protect sewer lines being installed across the course near the winding creek. "We paid for stuff that is associated with our project," Town Administrator Britt Poole said. No total for what Town Hall paid was available. Storms may create more challenges indefinitely at the course, officials say.

"It was a creek tsunami," said former mayor Randy Halfacre, a golfer who lives in the neighborhood. "Until the dam is back up, any heavy rain will be problematic out here." Repairs of the earthen dam in the center of the community’s downtown probably won’t be complete for a few years. First, an assessment of what improvements are needed must be finished. Then a plan to pay for restoration must be developed. "At this point, we don’t know what will be required," Poole said. The same review is under way for two other dams that couldn’t contain the rain. Their failure sent water pouring into Old Mill Pond, contributing to the collapse of its dam as repairs to strengthen it were starting, town officials say. One dam is at town-owned Gibson Pond Park, with a preliminary estimate of up to $3 million in improvements needed. Town officials are seeking federal disaster aid to pay for strengthening the three dams, all built at least 70 years ago, before current standards were in place. It’s unclear yet how much dam improvements might cost taxpayers. Commercial developers who own the Old Mill Pond and Barr Lake are responsible for improvements on their dams but could ask Town Hall for assistance.
Meanwhile, the focus at Golden Hills is on breaking par as a few finishing touches remain on flood fixes. “We had the breath knocked out of us,” Berry said. “Now the grass is growing – we’re excited.”

(Dam removal. There are so many articles on this dam removal, guess I’ll use one.)

**West Milford Dam demolition process underway**
By Melissa Toothman STAFF WRITER, 3/21/16, theet.com

WEST MILFORD, WV — Officials kicked off the first day of a three-month undertaking Monday to remove three dams along the West Fork River in Harrison County. The West Milford Dam is the first set to be removed, and that phase of the project is underway, according to the U.S. Fish and Wildlife Service. The Clarksburg Water Board is working with Fish and Wildlife and Canaan Valley Institute, among other partners, to remove the dams.

“Today we got the construction access ramp down to the water’s edge complete, and we have created the block pads upstream of the dam for the heavy equipment to walk out on,” said Callie McMunigal, the Appalachian partnership coordinator for the U.S. Fish and Wildlife Service. McMunigal said the first 2-foot notch made to the dam in a three-day phase of its removal also was completed Monday. “It’s been a good day. We've made a lot of progress, and things are looking good,” she said. “Each day, we’ll continue notching the dam an additional 2 feet and letting it dewater. That cycle will continue for the next two to three days. Hopefully, by the end of the week, we'll be done with all the notching and dewatering, and we'll focus solely on just removing the entire structure of the dam from the stream and continuing trash cleanup.”

As the water level descends, McMunigal said there will be salvage efforts for stranded mussels along the river and cleanup efforts for trash debris. Following the removal of the first dam, the process will be repeated at Two Lick Dam and then at Highland Dam. “We’re relieved that we finally secured all the necessary permits and the project is moving forward,” Clarksburg Water Board General Manager Dick Welch said. “We certainly put a lot of time and effort into getting to this point. We’re excited about what we feel will be the finished product.” Welch said most citizens of Harrison County are in favor of the dam removal, but there has been some opposition. Security was hired for the removal project after threats were made to sabotage equipment or block roads to deter the project. McMunigal said there were no issues as the crews worked Monday morning. Welch said he does not anticipate any issues with security in place for protection. During the demolition, residents should use caution when on the river and avoid the construction area around each of the dams.

(Too close for comfort.)

**Citing Dam Safety Risk, Army Corps to Approach Grand Prairie Tuesday**
By Ben Russell, Mar 22, 2016, nbcdfw.com

Representatives from the U.S. Army Corps of Engineers are set to make the first public comments Tuesday after a report released last week indicated safety concerns over oil and gas drilling in the area around the Joe Pool Lake dam. (Published Tuesday, March 22, 2016)

The U.S. Army Corps of Engineers will make its case to Grand Prairie city council members Tuesday afternoon that oil and gas drillers need to be moved farther away from the Joe Pool Lake dam for safety reasons. The Corps, which maintains Joe Pool Lake and 23 other lakes and reservoirs in the Fort Worth District, released a report last week indicating its expansion of the exclusion zone around the dam from 3,000 to 4,000 feet.

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The Corps released a statement accompanying the report. USACE has concluded the 3,000-foot exclusion zone at Joe Pool Dam does not sufficiently meet our minimal tolerable risk guidelines and therefore, poses a risk to the dam, the lake, and the public. As a result of this finding, USACE has adopted a 4,000-foot exclusion zone at Joe Pool Dam. Within that zone no drilling will be allowed, regardless of depth. USACE is also working to protect the project from the effects of induced seismicity by limiting injection wells within five miles of Joe Pool Dam.

The study was the result of a process that began in late 2010 when a group of concerned citizens, the Westchester-Grand Prairie Community Alliance, wrote a letter to alert the Corps that Chesapeake Energy had begun gas exploration drilling at a site approximately 850 feet from the Joe Pool Lake Dam. In a 2011 response to the neighborhood group, the USACE indicated it was unaware that drilling was proposed "in such close proximity to our project." In a separate 2011 letter, this one to the City of Grand Prairie Deputy City Manager, the Corps noted its concern with the possible implication of drilling near the Joe Pool dam. "Our engineers believe that drilling and fracturing activities at Chesapeake Energy's Corn Valley drill site may increase the risk to the project, and possibly contribute to a catastrophic dam failure," wrote Col. Richard Muraski, Jr. "Due to the potential for grave and irreparable harm to the dam and, as a consequence, the public, it is necessary for our engineers to conduct studies to verify that drilling and fracking activities will not affect the integrity of the project, increase the hazard rating currently assigned to the dam, or cause the Corps to incur substantial costs to mitigate any increased risks to Joe Pool Dam." In that same 2011 letter, the Corps requested the City of Grand Prairie to impose a moratorium on any drilling or hydro fracturing activities within 3,000 feet of Joe Pool Dam. In its subsequent report, the Corps indicated that the "3,000 feet exclusion zone seems reasonable," but still recommended extending the buffer by 1,000 feet. "I'm surprised they extended it beyond the 3,000," said Susan Read, a member of the citizens group that pushed the Corps to do the study. "We just wanted them to enforce, maybe, what they had in place already." Read told NBCDFW she and other members of her group are happy with the release of the study, something they feared would not be made public. "We believed the study might never be released since it would likely criticize the industry's practices in Texas," Read noted.

In addition, Read said the study was concluded in 2013, prior to significant earthquake activity in North Texas, particularly in the area surrounding the former Texas Stadium site along the Irving/Dallas line. "We wonder if the larger Exclusion Zone might have been extended further if the study had taken the earthquake activity since 2013 into account," Read said.

A spokesperson for the Texas Railroad Commission, which regulates the oil and gas industry in the state, indicated that the agency has not yet had any direct contact with the Army Corps of Engineers about its report. "The Railroad Commission’s highest priority is protection of public safety and our natural resources," wrote Ramona Nye in a statement to NBCDFW. "The U.S. Army Corps of Engineers (USACE) has not contacted the Commission regarding its recent study of safety issues related to Joe Pool Dam. Railroad Commission staff are currently reaching out to USACE to discuss the findings of the study and determine what, if any further action might be warranted." A seismologist for the Railroad Commission has expressed skepticism on the connection between earthquakes and the natural gas industry. To that point, an industry insider familiar with the USACE study said Monday that the Corps is being inconsistent in its findings and its actions. "It's bizarre that the Army Corps decided to expand its buffer while citing its new study, considering the study itself recommended the buffer that's currently in place," said Steve Everley.

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a Senior Advisor with Energy in Depth, an advocacy group started by the Independent Petroleum Association of America. “The Corps’ study indicates that fracking has not contaminated groundwater, that any risk of seismicity is exceedingly low, and the existing buffer is not only adequate, but actually what the experts recommend,” Everley said. “It’s really unclear why the Corps chose to reject all of these findings, especially since they were part of a study for which the Corps itself had asked.” On Tuesday, representatives from the USACE will present the agency’s findings to members of Grand Prairie city council. Council members are not expected to take any action at this point. “USACE welcomes environmentally sound oil and gas exploration and other mineral extraction activities; but we must always ensure that those activities pose no threat to our critical facilities and life safety,” said Col. Calvin C. Hudson II, commander, Fort Worth District.

(It will be interesting to see if there’s a counterpoint. Dreamer. It only took Mother Nature 10,000 years to fill the Ogallala Aquifer.)

5 Reasons Dam Removal Still Makes Sense Despite the Drought

By Chris Clarke

Chris Clarke is a natural history writer and environmental journalist currently at work on a book about the Joshua tree. He lives in Joshua Tree. Check out his Facebook page.

March 22, 2016, kcet.org

When Interior Secretary Donald Hodel suggested in 1987 that California might tear down O'Shaughnessy Dam in Yosemite National Park, few took him seriously. The powers that be in San Francisco were outraged: the Hetch Hetchy Reservoir supplies San Francisco with its drinking water. Even the radical environmentalists who sometimes talked about removing dams like Glen Canyon mistrusted Hodel, saying that he was likely trying to manipulate greens into supporting the controversial Auburn Dam as an alternative to Hetch Hetchy. The era of building big dams was just ending, and the thought of removing them was so far off the radar that Hodel just wasn't taken seriously.

Flash forward 30 years, and dams are starting to fall across the west. Two huge dams on the Elwha River in Washington State came down in 2011. The San Clemente Dam in Monterey County is coming down from the Carmel River. Four dams on the Klamath River are so ripe for removal that their owner intends to take them out even if the state and federal governments aren't on board. In Southern California, the handwriting is on the wall for the Rindge Dam on Malibu Creek and the Matilija Dam on the Ventura River. It may seem counterintuitive. California and the rest of the west are held in a crippling drought that this current El Niño season is doing little to alleviate. And from the 1850s through the 1980s, dams went up in California in part to ensure a secure supply of water for homes, farms, and factories. But dam removal is still often a good idea even as the state looks at yet another year of drought. Here are five reasons why.

1: Safety

Eighty-eight years ago this month, the poorly engineered St. Francis Dam failed just a few years after it was completed near Santa Clarita. It sent a wall of water down San Francisquito Canyon and the Santa Clara River to the sea, killing at least 431 people; perhaps more than 600 actually died in the flood, some swept all the way out to the ocean. The St. Francis Dam failed mainly because its construction was unequal to California's geology. Unbeknownst to engineers of the day, the dam site sat on ancient, unstable landslides. We know a lot more about California's geology these days, and what we've learned about the locations of many existing dams is unsettling. One example of many: when the Anderson Dam was built near the Northern California

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city of Morgan Hill in 1950, geologists thought the nearby Calaveras Fault was inactive. We've since learned the Calaveras Fault is anything but. A sizable quake on the Calaveras could cause the 240-foot earthen dam to fail, devastating Morgan Hill and dumping eight feet of water into downtown San Jose. (The Santa Clara Valley Water District is in the process of retrofitting the dam to be more seismically sound.)

One of the state's most prominent dam removal projects stemmed in part from new awareness of earthquake risks. The San Clemente Dam, removed from the Carmel River in 2015, was identified as seismically unsafe as early as 1991. The 106-foot concrete arch dam, built in 1921, was also determined to be at risk of failure in a large flood, in part due to its reservoir having silted up almost entirely — more than 95 percent of the reservoir had been filled with sediment by the time it was removed. If the San Clemente Dam had failed, a wall of mud would have devastated communities downstream. All dams fail eventually, Flowing water is one of the most inexorable forces on the planet. One of the biggest dams ever "built" in western North America, the 2,300-foot-tall lava flow in the Grand Canyon that geologists call Prospect Dam, was worn away to almost nothing over just a few millennia by nothing more than the flow of water and river-borne silt. Come back to visit planet Earth in 500 years, and it's unlikely any of our present-day dams will be both unmodified and in working order.

That's especially true in earthquake-prone California, where many of the best sites for dams — deep river canyons cut into rising mountain ranges — are found near earthquake faults. A 5.7 quake near Oroville Dam in 1975 surprised engineers, who reexamined the site of the then-proposed Auburn Dam on the North Fork of the American River and found a major fault system beneath the site capable of unleashing a 7.0-magnitude quake. That's much of the reason Auburn is yet unbuilt. But before the advent of modern seismology, we did build a whole lot of dams, large and small, in earthquake hazard zones. And even if a quake never damages those dams, watersheds in seismically active California carry a lot of eroded sediment. That sediment silted up reservoirs, reducing dam operators' ability to manage seasonal flood. Sediment can also speed erosion of dams, as we saw when the silty Colorado River nearly took out Glen Canyon Dam in 1983. Sometimes, a dam just isn't a safe answer for water management in California's unstable watersheds. And dams built before we knew what we were doing, such as the completely silted-up Rindge Dam on Malibu Creek, just need to come out for public safety.

2: Dams are bad for fish
It's no secret that dams hurt fish populations. Some of California's once-thriving salmon runs have been wiped out, or nearly so, by huge 20th Century dams. Take the Shasta Dam, for instance. When that 600-foot dam closed its gates in 1943, it closed off access to almost all of the Sacramento River winter-run chinook salmon's historic spawning habitat. Before 1943 there had been hundreds of miles of winter-run habitat on the Upper Sacramento, the Pit, and McCloud rivers, which flowed together to form the Sacramento River just above the site of Shasta Dam. After 1943, there was 16 miles of winter-run habitat left, and the winter run chinook found itself listed as an endangered species. That's just one example, albeit a big one: few dams are as big as the Shasta, and few devastated an entire population of fish in the same way. But most California rivers held historic populations of anadromous fish such as salmon and steelhead, and

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all but two major California rivers — the Cosumnes and the Smith — now have dams on their main stems.

"Dams have blocked access to most historic spawning habitat in California," says John McManus, Executive Director of the Golden Gate Salmon Association. It's not just that fish find their way upstream blocked by dams, points out McManus. Dams can drastically reshape rivers' downstream reaches as well. There's the above-mentioned issue of reservoirs trapping silt, for instance. It's not just silt that gets trapped: it's sand and gravel as well. "Salmon need gravel beds to spawn in," says McManus; "dams disrupt the natural flow of that gravel, meaning that they degrade spawning habitat downstream as well as upstream. As if that wasn't enough of an injury to fish, dams also allow their operators to change the seasonal water flow patterns. Before the dams, California streams ran highest in late winter and early spring as cold snowmelt ran out of the mountains. California's fish evolved to expect that. Now, flows below the dams are pretty much as dam operators make them — and unless dam operators keep fish in mind, those flows can become too weak, and their water too warm, to benefit the fish. "Baby salmon rely on that runoff to hitch a ride down to the estuary," says McManus. "Cutting off that runoff is like cutting a conveyor belt that carries our future salmon." It's no wonder that the health of fish is a key reason offered for taking out aging dams, in California and elsewhere. Of 67 California dams removed from the late 1940s through 2009, improving passage for fish was cited as a reason for the removal of 19, and habitat restoration other than restoring access to upstream habitat for another four. The most recent big dam removal in California, of the San Clemente Dam above Carmel, opens up about two dozen miles of spawning habitat for steelhead. The October 2015 removal of San Mateo County's Memorial Park Dam on Pescadero Creek has freed up 62 miles of coho salmon habitat. And an agreement reached in February that will remove four large Klamath River dams by 2020 — the largest dam removal project in U.S. history, if it's carried out — is being undertaken primarily to boost the health of the Klamath's salmon runs.

3: Dams can make us more vulnerable to sea level rise.
You might be asking yourself where all the silt, sand and gravel trapped by dams would have ended up if those dams hadn't been built. The answer: your local beach. At least some of the sediment now cooling its heels at the bottom of California's reservoirs, especially soil particles of that particular size we know as sand, gets washed down free-flowing rivers to the sea. There it gets dropped on the seabed to join the great sand conveyor belts that — left to their own devices — replenish and rebuild beaches. The vast majority of sand on California beaches flowed down a river, much of it in times of flood when the energetic rivers could carry more sediment. Current thinking is that California's coastline is made up of a number of so-called "littoral cells" — segments of coastline where local rivers and streams deposit sand that is then distributed along beaches by wave action. Sand eventually flows out of each littoral cell; some of it may be washed into adjoining littoral cells, but a lot of it ends up on the deep ocean floor. Damming the waterways that feed into those littoral cells, whether with gigantic mega-dams of with six-foot debris dams, cuts down the amount of sand flowing into the system, which means narrower beaches.

It's thought that the many dams on California rivers and streams has cut the amount of sand reaching California beaches by about one-quarter. That's a problem. Sandy beaches provide a
natural buffer between the ocean’s pounding surf and the terra firma where we live. A long, gently sloping, sandy beach allows waves to discharge their energy relatively harmlessly. Where waves are able to pound against the land behind the beach, catastrophic erosion can result, as recently documented in this bit of drone footage of crumbling cliffs beneath apartment houses in Pacifica. With less sand on our beaches, our coasts are more vulnerable to damage from rising seas. But dams don’t just interfere with our ability to withstand rising seas by hurting our beaches. Sand grains are relatively big, and it takes energy for a river to carry them. When river water slows when it meets the ocean, it loses energy and can no longer carry sand. That sand falls out of suspension and onto the beach. Smaller soil particles such as silt and clay, which take a lot less energy to keep in suspension, are usually flushed out past the beaches into the open ocean, where they fall to the seafloor.

But there are places where even those lighter soil particles settle out on land, or close to it, and end up helping provide a buffer for floods and rising oceans. Tidal estuaries, where the advancing ocean slows rivers to a halt twice a day, are places where those smaller grains of soil can build up, providing a substrate for marshes and other wetlands. Farther upstream, occasional floods dump silt and clay onto floodplains, lowlands that provide an ecologically rich buffer zone between rivers prone to flood and the uplands where we tend to live. By sticking a cork in the source of all that helpful sediment, dams interfere with the natural processes that help protect us against flooding from sea level rise and extreme weather. And when we remove those dams, that stored-up sediment comes out of storage. On the Elwha River in Washington State, where the Glines Canyon and Elwha Dams came down a few years ago, that withheld sediment is rebuilding an estuary along the south shore of the Strait of Juan de Fuca. Releasing sediment from removed dams has to be done carefully, as too much sand and silt and clay can obliterate what’s left of the habitat downstream. But with some care, dam removals can put those sediment transport processes back the way they were supposed to be in the first place, to our benefit.

4: Removing dams makes solid financial sense

In February, when a pact among agencies, tribes, and the utility Pacificorp to remove four dams on the Klamath River seemed like it had fallen apart, Pacificorp stunned some observers by saying it wanted to remove the dams anyway. The Iron Gate and Copco 1 and Copco 2 dams near Horngate, CA, along with the John C. Boyle Dam upriver in Oregon, had been the subjects of decades of controversy. Downstream tribes and environmental groups pinned a decline in the Klamath’s legendary salmon runs on the four dams. Upstream farmers said that if the dams were removed, they’d no longer be able to ensure they could grow crops. It was diversions from these same dams’ reservoirs that caused the catastrophic salmon die-off in the lower Klamath in 2001, amid allegations that the Bush administration had interfered with agency scientists and ordered water deliveries to continue to farms. Too-warm water in the reservoirs bred toxic algal blooms that killed more fish, with an especially bad year in 2006.

So it was a little bit of a surprise to some when Pacificorp suggested, after talks fell apart, that it wanted to scrap the dams. And part of the reason: the dams required extensive — and expensive — upgrades. Removing the dams would cost several million dollars more, but it would also allow Pacificorp to avoid paying ongoing maintenance costs for the dams. No dams? No maintenance.
All four dams were mainly designed as sources of hydroelectric power, and no fish passage was designed into them when they were built in the late 1950s and early 1960s. Laws have changed since then, and if PacifiCorp intended to keep the dams operating the Federal energy Regulatory Commission would have required the utility add fish ladders to the dams. It became easier to take the dams out, which is slated to happen by 2020. The four dams will collectively become the largest dam removal project in history. As PacifiCorp’s Bob Gravely told the North Coast Journal in January, the removal just makes good business sense:

*Dam removal for a lot of people means a lot of things, and for us, we just need an outcome for an expired federal license that’s a good outcome for our customers in the eyes of our regulators. With the protections provided by the Klamath Hydroelectric Settlement Agreement, removing the dams and replacing the power was going to be a better way forward for our customers than re-licensing with the new requirements that it would [include].*

To be sure, there were other factors behind PacifiCorp’s decision, including a decades-long campaign by North Coast Native people and their allies that affected the company’s stock price. But the bottom line is the bottom line. PacifiCorp won’t actually be going it alone in removing the dams; the above-mentioned Klamath Hydroelectric Settlement Agreement, crafted in 2010 but seemingly moribund as Congress refused to provide funding for the removal, got a new lease on life in February with an agreement under which PacifiCorp ratepayers and the State of California would split the $450 million tab for removing the dams. It’s a lot of money, but those ratepayers and the state would have been on the hook for the retrofitting and maintenance costs, which could easily have outstripped removal costs not long after 2020.

The Klamath dams are a huge example, but there are plenty of cases where it was cheaper to remove dams than to bring them into compliance with existing laws. Removal of the Waterworks Dam on Wisconsin’s Baraboo River cost $213,770, while retrofitting would have cost between $694,600 and $1,091,500. The Edwards Dam on the Kennebec River in Maine would have cost so much to bring into compliance with environmental laws that FERC gave the dam’s owner only a pro forma choice whether to retrofitting it: that dam came down in 1999.

5: There Are Better Ways to Supply Water

We build dams for several reasons — flood control, power generation, even to create recreational lakes — but in California, the main purpose of dams that comes up when the topic of dam removal is being discussed is water storage. And indeed, on the face of it, dam removal in dry years seems counterintuitive. Why take down dams — and by extension, the reservoirs behind them — when California’s going thirstier than ever? But there’s such a thing as too much storage capacity. In some California watersheds there’s more storage capacity than there is water in the river in an average year. Reservoirs in the San Joaquin River watershed can hold 8.7 million acre-feet. The San Joaquin, in an average year, delivers only 6 million acre-feet of water. In a watershed with surplus storage capacity, you can find yourself actually losing more water to evaporation from the surfaces of reservoirs than you would if you decommissioned a dam or two, and concentrated the storage in fewer reservoirs — thus making less surface area for the water to evaporate from.

Copy obtained from the National Performance of Dams Program: [http://npdp.stanford.edu](http://npdp.stanford.edu)
California has enough large reservoirs, Lake Shasta and Lake Oroville at the top of the list, that some studies have shown smaller dams with smaller reservoirs could be decommissioned without substantially affecting the state’s water supply. A 2014 study, for instance, indicated that a number of large California dams — the Whiskeytown, Pine Flat, Pardee, Camanche, and Englebright dams — could conceivably come down without mattering to California's water consumption. The study showed that even if the dams stayed up, climate change is likely to reduce Californians' water supply by more than we'd lose taking them down.

As the drought continues, Californians are looking toward finding other sources of water to supplement reservoirs, and those sources of water could replace some reservoirs. Some of those new water sources are cost-competitive with storage provided by new dams, and they might well be cost-competitive as an alternative to maintaining existing dams. Two new controversial dam projects, the proposed Sites Reservoir near Colusa and the proposed Temperance Flat Dam on the San Joaquin River, would cost $340 to more than $1,000 per acre-foot of storage, respectively. According to the California Department of Water Resources, recycling urban wastewater would cost about the same amount, while other measures such as groundwater storage and increasing water efficiency are far more economical than building the new dams would be. And that alternative — just plain using less water — is the real issue. At its root, the dam removal question forces a value judgment. What do we value more? Wild, free-flowing rivers with healthy fish populations, thriving estuaries and beaches, and opportunity for recreation and enjoyment? Or watered lawns in highway medians that never feel the touch of an unshod human foot?

Hydro:
(This issue has been brewing a long time.)
Riverbank erosion a factor in TransCanada dam relicensing
MAR. 18, 2016, BY VALLEY NEWS, vtdigger.org

Editor’s note: This article is by Nora Doyle-Burr, of the Valley News, in which it was first published March 18, 2016.

WILDER, VT — Some Upper Valley residents are hopeful that the relicensing of three TransCanada dams on the Connecticut River, including one in Wilder, will require changes in the dams’ operation to reduce erosion along the river’s banks. As part of the Federal Energy Regulatory Commission’s relicensing process, a TransCanada consultant presented an update on three studies of erosion along the river on Thursday at TransCanada’s river control center in Wilder. Discussions of other studies took place later in the day and more are scheduled for today.

TransCanada’s current licenses for the Wilder, Bellows Falls and Vernon dams are set to expire in April 2019, according to the company’s website. FERC issued the current licenses for a 40-year term in 1979. The relicensing process began in 2012 and is expected to take five years.
Consultant John Field, president of Farmington, Maine-based Field Geology Services, said it will be difficult to determine when erosion is caused by the dams’ operations and when it is caused by natural factors.

After outlining the information he has gathered — including aerial photos from 1958 and 1978, more recent maps and photos and a two-year survey of 21 sites along the river — Field said, “Now what do we do with the data? (We’re) trying to understand where it’s occurring; why it’s occurring.” In future studies, Field said he would try to “tease” apart the causes of erosion. In addition to the dams’ operations, possible contributors to erosion along the river include tributaries and the sediment they carry, the height of the riverbanks and soil types. Of the 21 sites Field has been monitoring since 2013, just three are receding from the top of their banks, he said. Several others have shown losses farther down the bank. But, Field noted, just because erosion hasn’t been apparent at these sites over the past two years, does not mean that they are not eroding. Instead, it may mean that it takes more than two years for a stable bank to become destabilized, he said. During a break in Thursday’s meeting, Lyme resident John Mudge, who has owned property along the river since 1962, said he has no doubt the dam is the cause of the erosion on his land. He has previously said he has lost several acres to erosion over the years. Having watched the river level rise and sink over the course of more than 50 years, Mudge said, the fluctuations are contributing to “one of the largest environmental problems facing the Upper Valley today.” As soil from his property — and others — falls into the river, the sediment is deposited elsewhere, affecting the river’s flow and wildlife habitat. The soil loss is also gradually reducing the valley’s inventory of agricultural land, he said. “Give it long enough, there won’t be any farmland along the river,” he said. The recent closing of River Road in Lyme has drawn the community’s attention to the problems caused by erosion along the river. The Selectboard chose to close a 500-foot portion of the road south of the East Thetford Bridge last fall on the advice of three engineers and the town’s attorney. At Town Meeting earlier this month, voters approved taking $145,000 from the unreserved fund balance and raising $100,000 in taxes for relocating or reopening the portion of the road that now is closed.

Lyme residents are not alone in their erosion worries. John Bruno, of Charlestown, also attended Thursday’s meeting and said his primary concern in the dams’ relicensing is erosion. Charlestown is less than 10 miles north of TransCanada’s Bellows Falls dam. “I think there certainly is a component of the erosion that is related to the fluctuation in water levels,” said Bruno, who lives along the river and sits on the Mt. Ascutney subcommittee of the Connecticut River Joint Commissions. Bruno said the river is undermining a large tree on his property. Though the bank hasn’t yet collapsed, Bruno said, “it’s a matter of time.” He did not think it would be feasible for him to reinforce the bank on his own due to a prohibitive cost of tens of thousands of dollars and a complex permitting process, he said. There are natural reasons for riverbank erosion that can be difficult to separate from the water level fluctuations from the dams’ operations, said Andrea Donlon of the Connecticut River Watershed Council. Though repeatedly wetting and drying the banks as dams do is known to cause erosion, rivers also naturally change their shape over time. “It’s really difficult to suss out the causes,” she said. Unlike other scientific studies, in the case of the dams’ effects on the river there is no control group, she said. There is no way to know what the river would be without the dams. FERC will be accepting comments from April 1 through May 2 on the first erosion study and other studies filed on March 1. The studies can be found on TransCanada’s website at bit.ly/TransCanadaDams. More studies are expected in May and August, including the final two erosion studies.

(Gonna be tough water skiing.)

**Brazil launches revolutionary plan to float solar panels at hydroelectric dam**

By Manuel Rueda | March 18, 2016, fusion.net

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Copy obtained from the National Performance of Dams Program: [http://npdp.stanford.edu](http://npdp.stanford.edu)
Brazil has decided to place thousands of floating solar panels on a reservoir that was created by one of the country’s most notorious dams. The renewable power project, which is located deep in the Amazon rainforest, could eventually generate enough electricity to power hundreds of thousands of homes. It’s technology could be replicated in other parts of the world with hydroelectric projects that are under-utilized. “What happened here, was one of the worst environmental crimes that engineers committed in this country,” Brazil’s Energy Minister, Eduardo Braga, said during a visit to the reservoir and new solar power site. “How are we going to mitigate the cost of this crime? By improving the benefits of this dam.”

The Balbina Dam is located near the city of Manaus, in the middle of the Amazon. When the dam was built in the 1980s it flooded an area of pristine rainforest that is three times the size of New York City, forcing hundreds of indigenous people to leave their homes. Despite having such a huge environmental impact, the hydroelectric plant currently produces just 50 megawatts of power, or about enough electricity to power 90,000 homes. Brazilian officials are hoping that their floating solar panels will boost the dam’s capabilities and help to provide enough electricity for half a million homes. The solar panels, the first ever to be floated on a hydroelectric reservoir, will use the dam’s current infrastructure to connect with Brazil’s national power grid.

The first phase of the floating solar panel project will cover an area the size of five football fields. “We are going to transform hydroelectric plants that have been limited by [dry] weather, in plants without limitations, because they will also produce solar power,” Orestes Goncalvez, the president of energy company Sunlution, told AFP. Hydroelectric projects in Brazil’s Amazon have met tough resistance from indigenous communities and environmental activists who argue that the construction of huge dams threatens rainforests and brings more settlers into these sparsely inhabited areas. But the Brazilian government has pushed ahead with some of these initiatives, arguing that the country needs to find stable sources of energy. Currently the Brazilian government is planning to build a hydroelectric power plant in the eastern Amazon, known as the Belo Monte dam. The project would flood 400 square kilometers, or an area that is about one-fifth of the size of the Balbina reservoir. Belomonte would be the world’s fourth-largest dam though, producing at least eighty times more power than Balbina. “There is a big difference there in cost benefit ratio,” the Energy Minister said during his visit to the new solar panel site.

(Love old mills. Hydro’s roots.)

Run of the mill: Historical society pays tribute to picturesque landmark
By Adam Smith, 3/20/16, enewscourier.com

The rural landscape of western Limestone County is known for its rolling pastures, acres of untouched forests and a more relaxed pace not found in Athens or East Limestone. Those who enjoy picturesque landscapes and slow Sunday drives down Alabama 99 are certainly aware of those pleasures more than most, and they’re likely aware of “the old mill,” as it’s known to many. Its
proper name, however, is the Sim Corder/Harrison Mill, and it's been a West Limestone fixture for over a century.

The historical significance of the mill was marked by a monument placed at the site on March 9 by the Limestone County Historical Society and Athens-Limestone Tourism Council. The text of the monument reads: “Simeon Corder is said to have contracted with George Hamilton to build the mill and operate it for him in 1909. The contract was sealed with no more than a handshake. After Corder's death in 1923, his widow sold the mill to Aubrey Todd, who sold it to George Harrison in 1927. Harrison's descendants have owned it since that time. The waterwheel was sold and moved to Anderson, AL., in 1939 where it remained until 1996. After many years of deterioration and after major repairs it was returned to its original position. With a new millrace, the mill was returned to its original appearance. This mill is but one of many that once existed along the waterways of the county, but is the only one restored to its historic appearance thanks to the dedication of its owners.”

The monument not only informs the community about the mill, but it also signifies a new push by the historical society to highlight several locations of historical importance by the group. Historical society member Richard Martin said the group planned to erect five more monuments by year's end.

Member Donald Frost said the society wanted to recognize the mill because although there were a lot of mill sites in the county, the Sim Corder/Harrison mill is the only one restored to its original appearance. “None of the others appear to be in functioning condition,” he said. “It's picturesque, and people go there to take graduation and wedding photos.” Frost said a future monument being considered is one recognizing the history of Athens-Limestone Hospital, while another could be erected at the historic Pettusville Cemetery. Frost said there are also talks to place a monument on Morris Road near Elkmont, recognizing the area as the home of the Delmore Brothers, the influential country duo. For more on the Limestone County Historical Society, visit www.limestonecountyhistoricalsociety.org.

(More hydro in Alaska.)

Committee approves funding for Sweetheart Lake dam
March 24, 2016 - JUNEAU EMPIRE, juneauempire.com

The Alaska House Finance Committee has approved a bill allowing the Alaska Industrial Development and Export Authority to fund the Sweetheart Lake Hydroelectric Project southeast of Juneau. House Bill 143 allows AIDEA to provide up to $120 million in low-interest loans to the project.

The Sweetheart Lake Hydroelectric Project envisions an 111-foot-tall concrete dam at the natural outlet of Lower Sweetheart Lake, which would become a reservoir. A two-mile underground tunnel would convey water from the lake to a powerhouse near sea level at the mouth of Sweetheart Creek. Overland and undersea cables would connect the powerhouse to existing transmission lines that link Juneau and the Snettisham Hydroelectric Project. The dam would generate 19.8 megawatts of electricity. The group backing the dam envisions the project's power will be used at Kensington Mine and to heat downtown Juneau from a central plant. HB 143 now goes to a vote of the entire House. Assuming its passage in the House, it will go to the Senate, where a companion bill, Senate Bill 192, has been referred to the Senate's special committee on energy and is awaiting a hearing.

(There’s a lot of energy there, but doing it efficiently and economically is elusive.)

The scientists trying to harness the power of waves

[Copy obtained from the National Performance of Dams Program: http://npdp.stanford.edu]
For four decades, the problem of how to create an economically viable business producing power from waves has fascinated a specialized group of engineers, many of whom are concentrated around the sea-beaten coast of Scotland. Inventors have created all sorts of strange and wonderful devices to coax energy out of the water; investors have poured millions of pounds into the effort. — Quartz
"The problem is arguably one of the most perplexing in energy production. And maybe, just maybe, the answer is getting closer."

**Water:**
(Fresh water is only a very small part of the total water on the planet. Two percent is in polar ice caps and glaciers and less than 1 % is in rivers and streams.)

The world’s energy supply relies on water. Guess what we’re running low on?

By Suzanne Jacobs, 18 Mar 2016, grist.org

Not to make you do math on a Friday or anything, but here’s a simple word problem: If 98 percent of global power generation requires water, the U.N. predicts a 40 percent shortfall in global water supply by 2030, and the world’s population is expected to reach 9 billion by 2050, then approximately how screwed are we? Please present your answer in units of Stacey Dash accidentally driving on the freeway:

Now, before you grab a pencil and paper, some context: A new report from the World Energy Council says that we’re heading for a global water crisis, and we need to improve the resiliency of our energy infrastructure by, among other things: better understanding the water footprints of coal, gas, nuclear, hydropower, and other renewable energy sources and thus better understanding the risks of investing in certain types of future energy infrastructure. The report points to a recent warning from the U.N. that dwindling water reserves might only be able to meet 60 percent of global water demand by 2030 — meaning that by the time today’s infants grow into pimply bags of hormones, the world could be a serious water crisis. And since power generation is second only to agriculture in global water consumption, that could translate into a serious energy crisis.

Copy obtained from the National Performance of Dams Program: http://npdp.stanford.edu
Just how serious became clear when researchers reported in a recent study published in Nature Climate Change that hydropower and thermoelectric power provide about 98 percent of the world’s electricity, and both rely heavily on water. That means, the researchers report, that more than 60 percent of the 24,515 hydropower plants they studied and more than 80 percent of the 1,427 thermoelectric power plants they studied could show reduced capacity between 2040 and 2069. Still, some experts say that couching this as a global issue might not make sense. Kate Brauman, lead scientist for the Global Water Initiative at the University of Minnesota’s Institute on the Environment, for example, told Scientific American that she didn’t think we were facing a worldwide crisis: “There are places where we’re using all or nearly all of our available water, but those are localized places on the globe,” she said. “So by the end of the day, to say something like, on a global scale, we’re using more water than we have or we’re running out of water” doesn’t paint the situation correctly. Indeed, plenty of people are already mired in pretty serious water crises. Venezuela, for example, is about to enter a mandatory one-week vacation because a water shortage is making it hard for the country to meet energy demands. So for them and others around the world, this dire warning from the World Energy Council might elicit nothing more than a “So what else is new?” And besides, Brauman pointed out, as cities grow and “densify” — which they are — they tend to improve their water efficiency by updating leaky infrastructure and lowering overall per capita water use.

What’s more, Scientific American reports, we don’t actually have a firm grasp on how much water we’re consuming, because a lot of what we think we’re consuming actually just goes right back into the water cycle: For example, a power plant that uses water to cool its condensers might pull water from a river, run it through the plant and release that same water back into the river. The water leaving the plant is warmer, but it still re-enters the river. Power plants account for almost 80 percent of withdrawals in the United States, but in terms of consumption, their impact is much smaller, said Jerad Bales, the chief scientist for water at the U.S. Geological Survey. Currently, we don’t have good information on consumptive use, said Bales. “That’s a hard number to get,” he said. So the World Energy Council is probably right — we should get a firmer grasp on the water footprints of our energy sources and plan accordingly. But as for how screwed we are? Maybe not even one Stacey Dash — at least not as a globe.

(Oroville Dam releasing water over spillway for first time in five years)

Lake Oroville, the second largest reservoir in California, is now releasing water from its spillway for the first time in five years.

"We were 250 feet below the crest in December, and just three months later we're now within 38 feet of the crest," said California Department of Water Resources engineer Kevin Dossey, as he looked up at a huge ribbon of water flowing down the dam's spillway on Thursday.

At 84 percent full, the releases are required by the Army Corps of Engineers to keep room available in the reservoir in case of a major flood event.

The releases began at 10 a.m. Thursday and escalated through the day. Hundreds drove up from Oroville and places beyond to watch water rush down the spillway, and over the concrete dragon’s teeth, called "energy attenuators" by engineers.

Lake Oroville, California’s second-largest reservoir, is now 84 percent full. ABC10's Dave Marquis shows us why they are releasing water over its spillway for the first time in five years. ABC10 news at 11 3/24/16.

Copy obtained from the National Performance of Dams Program: http://npdp.stanford.edu
"I think it's just a treasure coming back to life here in our town of Oroville," said local historian Peggie Anderson. "You see an excitement in the community today, more than I've seen for a long, long time, knowing that our reservoir is full." Chad Her brought his kids up to fish on green banks along the lake for the first time in years. "Look at him," the Oroville native said, pointing to his two-year-old son. "He's enjoying it...really a blessing to get the water back up again."

Locals walked across the top of the dam and out onto docks that are now floating again. Boat ramps are again busy. "I've been coming up here all of my life and the last four to five years it's been dismal and now it's incredible," said Kevin Moore of Yuba City as he docked his boat. The water is swelling the Feather River, which went from 1,000 feet per second up to 6,000 cubic feet per second. The releases will raise the river's water level anywhere from two to four feet.

"People are living on islands in the river and we had to do some warning and let people know we were going to raise the river," Dossey said. The sudden rise was noted by river-goers. "You don't get close because it can take you under in no time," said Juanita Crosby, as she walked her kids along the shore. "People need to know not to get to close." Fishermen along the river are delighted at the higher water. "Really low flow to tremendous now. Going to be a great year for salmon fishing-fishing in general," said Ryan Tripp, as he tending a fishing pole along the river. Some thought it might take years to restore the reservoir to its current level. "All of this happened in just four months," Dossey said. "Everybody is talking about having the lake back again."

Other Stuff:
(I like math too, but this is a bit much. Don’t know what makes someone like this tick, but $700,000 is not bad.)

Prof Solves 300-Year-Old Math Mystery, Wins $700K

Oxford professor had been trying to crack Fermat’s Last Theorem since he was a boy

By Jenn Gidman, Newser Staff, Mar 20, 2016, newser.com

(NEWSER) – An Oxford professor is now $700,000 richer for solving a 300-year-old math mystery, the Telegraph reports. In 1994, Andrew Wiles, 62, cracked Fermat's Last Theorem, which was put forth by 17th-century mathematician Pierre de Fermat. Wiles will be traveling to Oslo, Norway, in May to collect the 2016 Abel Prize (including the honors and the cash) for his proof, which the Norwegian Academy of Science and Letters calls an "epochal moment" in the mathematics field. "Wiles is one of very few mathematicians—if not the only one—whose proof of a theorem has made international headline news," the academy said in an announcement of his numerical feat.

The puzzle had haunted Wiles for years. Times Higher Education notes he had been intrigued by it since he was a boy, leading to seven years of intense study at Princeton before he stumbled upon his eureka moment.

He found the proof he was looking for using a method involving three disparate fields that mean nothing to the layman but everything to braniacs trying to solve this problem: modular forms, elliptical curves, and Galois representations. "Fermat's equation was my passion from an early age, and solving it gave me an overwhelming sense of fulfillment," he tells the Telegraph. (For the record, the theorem states that there are no whole number solutions to the equation xn + yn = zn when n is greater than 2.) Wiles says he hopes his work will serve as inspiration for up-and-coming numbers aces "to take up mathematics and to work on the many challenges of this beautiful and fascinating subject." (Prime numbers just got a little weirder.)
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