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3. WATER: Calif. gauges the health of its river, levee systems (12/13/2007)

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WEST SACRAMENTO, Calif. – On a brisk December morning, crews from the California Department of Water Resources are preparing for another day on this stretch of the Sacramento River, measuring the depth of these narrow channels. As the small research vessel "Julie Ann" pulls out from the dock, the crew is less focused on the serene late-autumn scene than on the data being collected from the river floor below.

During the course of the day, the ship may "sweep" this section of the river five or six times over, using multi-beam sonar imagery, a highly sensitive technology that provides graphic images of underwater surfaces across the entire width of the channel.



The California Department of Water Resources is conducting surveys along the Sacramento River to look for possible erosion beneath levees that protect homes and farms from flooding. Photo by Arthur O'Donnell.

They are looking for areas of erosion or fissures that could undermine the levees that protect farms and thousands of recently built homes from flooding.

Scott Woodland, a supervising engineer in DWR's flood management division, explained that this topographic tool will be able to capture and illustrate data in a far more comprehensive and useful way than prior depth studies using single-point sonar along the center and edges of the stream. "This puts out a continuous wide beam, like we're sweeping the entire river," he explained. "It captures a continuous cross-section of elevations across each level until it gets to the channel bottom."

Translated into a computer-generated graph, the data will detect not only the slope of the banks but also exposed areas of the river bed and places where sand and sediment have built up or spread. "Where we have sand and gravel, we possibly have a seepage path," Woodland said. "If we find an area that demonstrates that the vertical slope of the levee is broadening, we'll ID that area and give it to the critical repairs group to see if it needs to be fixed."

Gilberto Suarez is a surveyor and hydrographer with Fugro Offshore Survey, which has a contract with DWR to conduct the river surveys. He showed *Land Letter* how the software program translates the data into a picture of the river's floor. While averaging 5 to 6 meters deep, this stretch of the Sacramento River also shows a distinct variability of depths in different locations.

"The channel is not flat," he said, pointing to the deep blue portions of the stream, the yellow-tinted ripples and splotches that reflect how the river's current deposits sand.

Each day's data – possibly covering 3 to 5 miles at a time – will be compiled with the results from other locations to provide a larger map of the river's potential hot spots. During the course of the month, DWR expects to survey about 111 miles of the river.

Next spring, the work may be expanded into the San Joaquin River and Port of Stockton, two other areas of major concern.

The effort is part of California's multibillion dollar campaign to examine and repair problem sites along the 1,600 miles of levees that flank the Sacramento and other rivers feeding into San Francisco Bay. Last year, voters approved two ballot measures – propositions 84 and 1E – providing for \$5 billion in general obligation bonds for levee evaluation and restoration

work. That money comes on top of another \$4.5 billion approved by the Legislature in May 2006.

And yet, those amounts do not even come close to completing the task, as voters next year may consider another \$11.7 billion water bond package currently being proposed that includes at least \$2.4 billion more for levee improvements ([Greenwire](#), Dec. 12).

Just outside of Sacramento, south of where the depth surveys were being conducted, more than 50 islands sit in an estuary protected by earthen levees. The levees hold off spring waters from the surrounding mountain ranges. Over the course of 100 years, the islands have sunk to about 25 feet below the water surrounding them.

Any breach of these levees could flood highly populated areas and farms, and compromise up to two-thirds of California's fresh water supply.

Levee repair status

In a recent report to the State Reclamation Board, Mike Inamine, manager of levee repairs for DWR, said that the state and the U.S. Army Corps of Engineers have been making good progress on scores of levee sites that have been deemed candidates for critical repairs before the winter rains commence. Crews have completed work on the 33 most critical areas that were identified in a 2005 Army Corps study, Inamine said, with the state fixing 22 of the sites and the Army Corps completing work on 11 others.

Of the additional 71 critical sites identified in 2006, work has been completed at all but two locations where the state is still in negotiation with landowners to build setback levees for added protection, he said.

And while the Army Corps earlier this year committed to fixing another 133 sites over two years, the work has slowed somewhat. "Originally the plan was to do 62 sites before this flood season," he said. "For a variety of reasons, that's been scaled back to about seven sites that are going to be performed through flood season." The remaining 124 sites will have to wait until next year, Inamine said.

So far this season, which began Oct. 1, California has experienced only minor rainfall. Even if rain clouds appear over the Sacramento River, however, the crew of the Julie Ann will be spending their days trolling for data that could help identify the next set of critical repair sites before they turn into levee breaches.