

# S.F. Bay's slide in mud worries scientists

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**(10-04) 20:45 PDT** -- Millions of tons of sand and clay that Gold Rush miners scoured from the Sierra Nevada have finally flushed out to sea after more than a century in San Francisco Bay, according to the San Francisco Estuary Institute.

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## IMAGES



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While that has led to a remarkably clearer bay in the past decade, scientists are worried about the implications for fish and wetlands, which require a certain amount of free-floating silt for survival.

"This sediment was introduced during hydraulic mining, and the ecosystem adapted," said Dave Schoellhamer, who leads the program to monitor bay water sediment levels for the U.S. Geological Survey.

"Now that extra pile of mud has been washed out and the ecosystem is adapting to a lower sediment regime."

San Francisco Bay faces increasing pressure on several fronts, including rising sea levels, pollution and invasive fish and vegetation.

Steep reductions in the amount of so-called "suspended sediment," or the tiny, solid particles that drift in the water column, may only compound some of those problems, according to researchers who compiled an annual report on bay water quality to be released today.

## Clear not always better

Less sediment means that more sunlight can permeate the bay's waters. That, in turn, spurs growth of phytoplankton, the microscopic plant matter that makes up the base of the food chain.

An overabundance of phytoplankton can result in a massive die-off with plant life sinking to the bottom of the bay to decompose. That process eats up valuable dissolved oxygen necessary for fish.

Free-flowing sediment serves another purpose - namely as a camouflage for certain fish, according to Peter Moyle, a UC Davis zoologist who has studied California estuaries for 35 years.

For instance, the beleaguered delta smelt, a thumb-size fish that resides mainly in Suisun Bay and farther east, depends on all those minuscule particles to hide it from prey.

"Smelt don't like water to be too clear or too cloudy," Moyle said. "They don't school and they're semitransparent, so if the water is more turbid, predators seldom get them."

Sediment loads from the Sierra Nevada peaked in the late 1800s and early 1900s as gold mining operations grew more sophisticated.

## **Water cannons**

Miners employed high-pressure water cannons to break down rocks and hillsides in search of gold. Much of that runoff bled into Central Valley rivers, through the delta and out to San Francisco Bay, where it built up along the bay floor and drifted in the water for generations.

By the late 1990s, however, that sediment had washed out of the system and water clarity dramatically increased. A particularly wet 1998, in fact, created a tipping point by pushing much of the remaining, erodible material into the Pacific, Schoellhamer said.

"That caused this sudden decrease in sediment concentration in the bay," he said.

The 20th century proliferation of levees throughout the delta and dams on California's rivers means that little sediment naturally flows into the bay; instead, it collects near dam bases.

## **Future in question**

Looking forward, Schoellhamer and others are concerned that less sediment may hamper the ecosystem's ability to adjust to climate change. As sea levels rise, sediments will be necessary to maintain and grow wetlands, which offer important buffer zones between water and land and provide key habitats for shorebirds.

Moyle said it may become necessary to replenish sediment and soil in ecologically significant wetlands. Yet to do so perpetually on a large scale "would be too expensive."

The flushing of Gold Rush-era silt from the bay has had at least one bright spot: Levels of mercury contamination have declined as well. Mercury, a toxic metal that can build up in fish tissue, was once used to separate gold from rock.

"Despite some progress in reducing contamination, we're seeing continuing declines in several important fish species," said Jay Davis, lead scientist for the institute's regional water quality monitoring program. "That is a sign that some serious problems in the system remain."

**Learn more:** To read the full report by the San Francisco Estuary Institute on sediment in the bay, go to [www.sfei.org](http://www.sfei.org).

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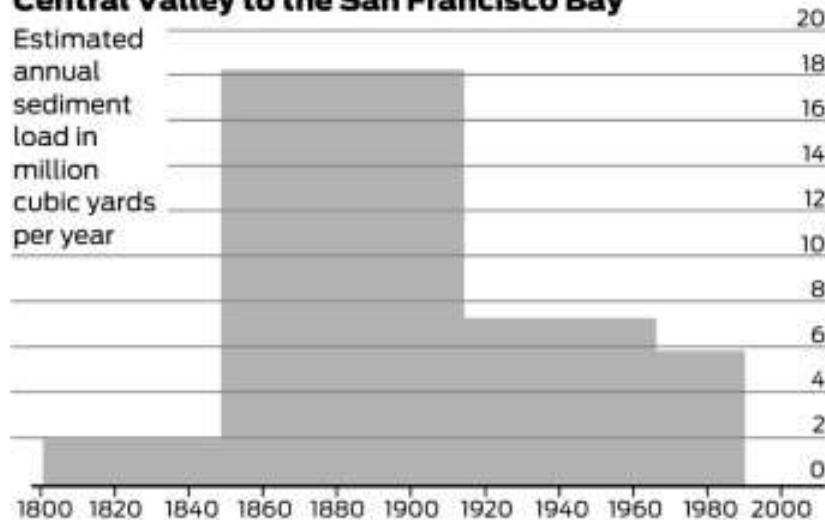
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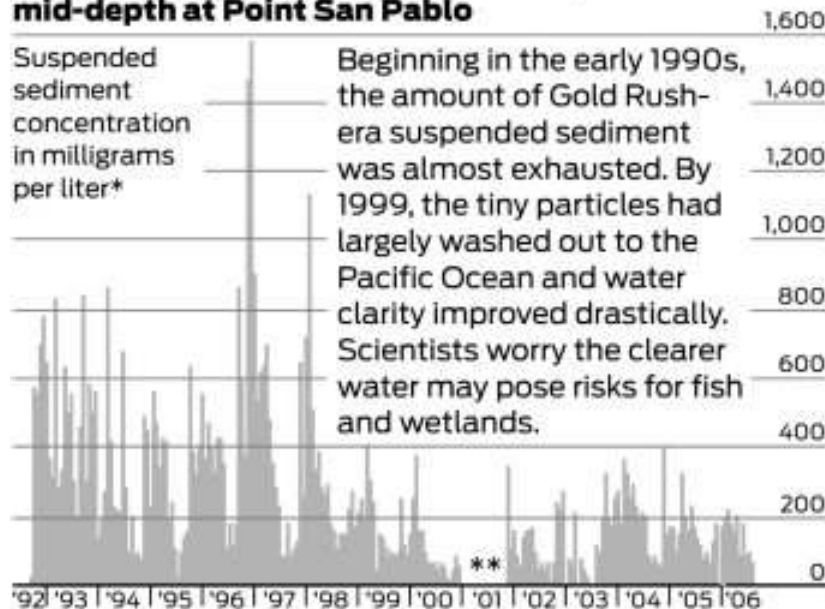
## The changing bay

Gold mining operations in the Sierra Nevada resulted in huge amounts of sand and clay washing down Central Valley rivers, through the delta and into San Francisco Bay. Sediment loads peaked around the turn of the 20th century.

### Historical sediment loads from the Central Valley to the San Francisco Bay



### Suspended sediment concentration, mid-depth at Point San Pablo



Beginning in the early 1990s, the amount of Gold Rush-era suspended sediment was almost exhausted. By 1999, the tiny particles had largely washed out to the Pacific Ocean and water clarity improved drastically. Scientists worry the clearer water may pose risks for fish and wetlands.

\* Measurements, taken about once a month, can be affected by tidal cycles, winds and river supply.

\*\* Recording station was temporarily closed while the pier supporting the instruments was repaired.