

Bay, delta habitats suffer big declines **Most of 39 species studied have lost half of original populations**

- [David Perlman, Chronicle Science Editor](#)

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For more than a thousand years the waters of San Francisco Bay and the rivers that feed the delta have been losing critical species of fish, wildlife and plants, and the loss rate is steadily increasing today, say marine biologists.

Records from the bay's history, combined with findings by archaeologists, reveal a "disturbing trend of species depletion and collapse, and a decline in habitats," said Heike Lotze, a specialist in historical ecology at Dalhousie University in Halifax, Nova Scotia.

Lotze and her colleagues studied long-term trends in 39 species of marine mammals, birds, fish, shellfish, plankton and plants around the bay, the Sacramento-San Joaquin River Delta and the rivers that feed the delta, tracing their population trends back for 1,000 years.

They found that more than 90 percent of the original water-dwelling species in those waters have lost at least half their populations, and a third of those populations collapsed close to extinction before their numbers partially recovered in more recent times.

"This has been going on for centuries," Lotze said in a telephone interview, "and the problem has become increasingly critical in the past 150 years -- since the Gold Rush sent huge quantities of silt down the rivers and into the delta."

Lotze is a member of an international team of scientists reporting today in the journal *Science* on global threats to the biodiversity of the world's oceans. The report contained the results of a study by the Lotze group of a dozen endangered bays, estuaries and coastal areas around the world, including San Francisco Bay.

San Francisco's waters, she said, are top contenders for historic damage with only a little recent relief from conservation efforts around the bay's shorelines to restore salt ponds and revive vegetation that serves as habitat for fish and shorebirds.

Of the 12 bays and estuaries Lotze and her colleagues studied, the biodiversity of San Francisco Bay's waters has fared worse than similar areas in Canada and Australia, she said, but is about the same as the Chesapeake Bay and the Bay of Fundy on the Atlantic coast.

Her team recorded 145 alien plants and animals that have invaded San Francisco Bay since historic times, a number that far exceeds the count of invasive species recorded in several European coastal estuaries, she said.

The bay's water quality, however, "is a bit of an outsider," she said, compared to the other bay and river systems she studied.

It shows no signs of oxygen depletion that could threaten fish, she said, and the reason is a bit ironic:

The native oysters, clams and mussels that once filtered organic matter from water and prevented

algae from blooming in the bay disappeared, but varied species of alien invading clams from Japan, the Philippines and the Atlantic coast have replaced them and taken on the filtering role.

Dangerous blooms of algae no longer threaten the bay's ecology, Lotze said.

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