

'It took 10,000 years to develop it,
and we've lost it in just the past few years'



Harbor seals sun themselves on the banks of Elkhorn Slough, which show the effects of tidal scouring action. Shmuel Thaler/Sentinel

Changing tide at Elkhorn Slough

Wetlands

Scouring action is slowly turning a critical salt marsh into a broad bay

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By TRACY L. BARNETT
Sentinel staff writer

MOSS LANDING — As a youngster growing up in this bustling fishing village in the 1940s, Louie Calcagno could jump across Elkhorn Slough — even walk across some spots during low tide.

Vast stretches of red-tinged pickleweed filled the valley. "This was one of the most beautiful wetlands in the country," he says.

He remembers flocks of ducks so huge they blackened the sky.

"This was a duck hunter's heaven, back when it was the way God meant it to be," says Calcagno. "You would see massive flock after flock after flock covering the sky when the morning sun came up."

Born on the shores of Elkhorn

Slough, Calcagno grows nostalgic as he recalls the old days. From the broad windows of his home at the edge of his Moonglow Dairy Farm overlooking the slough, he has seen the cycles of nature come and go.

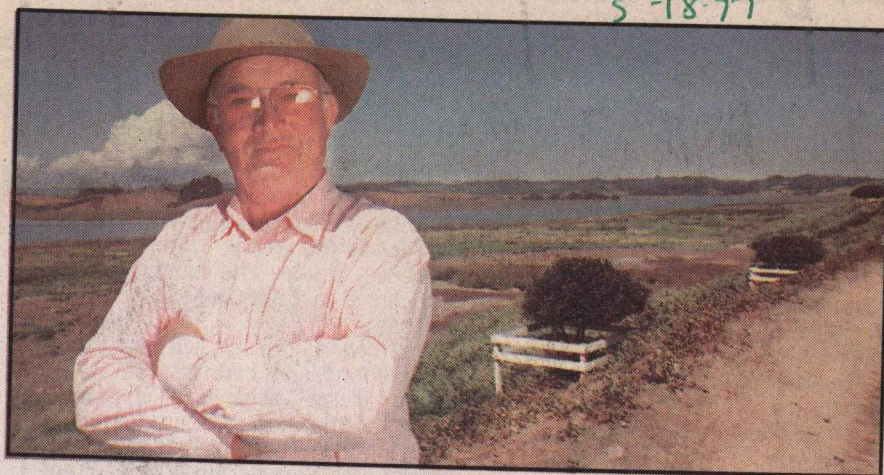
These days, he is seeing a much different slough.

Acres of salt marsh have now given way to sharp drop-offs at the slough's edges.

Human tinkering and geologic evolution have worked together to turn the mouth of the slough into a wider and deeper channel. It has become a playground for otters and seals; a place where pelicans and cormorants swoop and dive for fish.

This spring, scientists gathered at the slough to debate whether they

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Bill Lovejoy/Sentinel

Louie Calcagno has spent his entire life in Moss Landing, where Elkhorn Slough meets the Pacific Ocean.

Elkhorn Slough

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should do something to reverse the historical tide and save what marsh remains. It's a debate that is likely to continue for some time. While some believe there's an immediate need to intervene, others want to proceed with caution. Scientists came away with the agreement to conduct another round of studies.

Meanwhile, the slough is on its way to becoming a bay.

A changing tide

The slough remained much the way Calcagno remembered it until 1946.

City fathers and industrialists had big dreams for the future of the area, and hoped to turn it into one of the major harbors of the Pacific Coast. During the war, the U.S. Army Corps of Engineers dredged out a channel, giving the tides free rein in the shallow marsh and surrounding mud flats. The corps requested that the harbor district install culverts and gates to minimize erosion. But in the crush of postwar activities, those plans fell by the wayside, leaving the floodgates open for a changed landscape.

"All in all, I think we've done more harm than good," reflects Calcagno, former chairman of the state Coastal Commission.

The loss of wetlands across the country, not just at Elkhorn Slough, has taken a toll on the species that depend on them. Elkhorn Slough's situation is unique, however; while other remaining marine estuaries around the country are filling in with sediments, Elkhorn Slough is moving in the opposite direction.

"We have an estuary that's being scoured out at a rate faster than any other wetlands in the nation," says John Oliver, the Moss Landing Marine Laboratory researcher whose 1988 study first revealed just how bad the problem had become.

Oliver compared aerial photographs of the pre-dredging slough with recent photographs and found dramatic losses of habitat. His measurements revealed that what was once a 4- to 5-foot deep main channel had eroded to as deep as 30 feet, and that the historic average 20-foot width had stretched to several hundred feet. Sixty percent of the vegetated marsh is gone.

"It took 10,000 years to develop it," Oliver said, "and we've lost it in just the past few years."

A flood of trouble

Over the years levees were built around the slough, turning acres of wetlands into grazing lands for local farmers. Then in the 1980s, a series of events — natural as well as human-driven — conspired to exacerbate the problem. In the early 1980s, El Nino-driven storms



The slough is now losing its banks at a rate of more than three feet a year.

A sea gull swoops low to eye a wary sea otter's dinner in the slough, where tidal scouring has given the frisky marine mammals room to swim.

Shmuel Thaler/Sentinel

flow eating away at the existing wetlands.

Then, in 1989, the Loma Prieta earthquake wreaked further destruction on the historical marshes, causing a two-foot drop in the sandy floor of the slough.

The slough is now losing its banks at a rate of more than three feet a year. Calcagno estimates that the sea has claimed up to 40 feet on each side of the slough.

Oliver proposed in 1989 that a sill, or underwater dam, be built across the mouth of the harbor to slow the tide. But funding for the estimated \$700,000 project was a serious impediment, and not everyone was convinced it was needed. So the idea was put on a back burner while researchers explored the implications.

Earlier this spring, Elkhorn Slough's research coordinator, Jane Caffrey, brought together a summit of some of the best minds in the state on the subject in an attempt to jump-start the discussion. Scientists from all over the Monterey Bay area brainstormed about what — if anything — should be done to address the problem.

Some argue that the structural changes to the slough offer a unique opportunity to observe a changing ecosystem. The marine habitat that has emerged is great for certain species — seals, sharks, otters and rays, for example — at the expense of other species such as tubeworms.

Some researchers, such as Andrew De Vogelaere of the Monterey Bay National Marine Sanctuary, worry that tampering with the current system might have unfore-

seen, and potentially damaging, consequences — similar to those encountered when the levees were allowed to break.

On a sunny spring day recently, otters splashed in the cool, deep waters as a marine sanctuary motorboat cruised past a stretch of mud flats. Dozens of seals lay sunning themselves on the flats, and one raised a lazy head and fixed its round, black eyes on the intruders.

"There are 700 harbor seals who now make their home in Elkhorn Slough," De Vogelaere noted. "They're pupping now, and they're giving birth here."

"We're afraid a barrier would affect these guys traveling in and out," De Vogelaere said, gesturing toward a playful sea otter during a recent excursion. "The sharks and the rays would have a hard time, too."

Plotting a strategy

Some scientists aren't even sure that the erosion will continue; some speculate the erosion will reach an equilibrium and stop on its own, without any interference from human engineers.

What emerged from the March meeting was a plan to do computer modeling of the slough system, plugging in data for different scenarios to see what would emerge if

a sill were installed or if other actions were taken — or if nature were allowed to take its present course.

Jeff Koseff and Steve Monismith, civil engineering professors at Stanford University, will launch a pilot project this summer and try to get funding for a full-blown model.

She was known in the No. 38 the roller derby.

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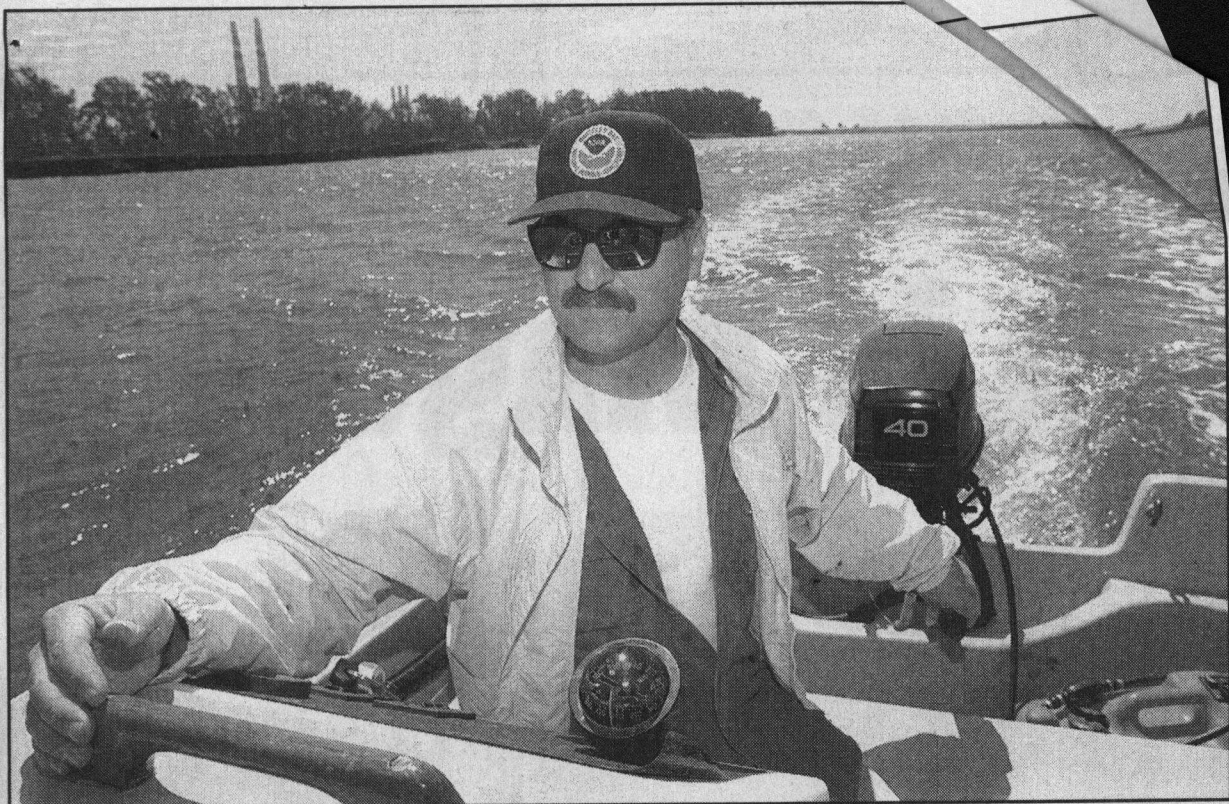
Over the years levees were built around the slough, turning acres of wetlands into grazing lands for local farmers. Then in the 1980s, a series of events — natural as well as human-driven — conspired to exacerbate the problem. In the early 1980s, El Niño-driven storms swept through the coastal area, the biggest storms in recent history. The pounding waves caused the outer levee to fail, letting even more tidal waters into the slough.

Since the state Department of Fish and Game had decided to let the grazing lands revert to wetlands, it didn't repair the levee and let the other ones succumb to erosion. But the plan backfired, with a 30 percent increase in high-tide

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Shmuel Thaler/Sentinel

Monterey Bay sanctuary research coordinator Andrew DeVogelaere guides his boat through the wider, deeper channel of Elkhorn Slough.

Elkhorn Slough

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eling study of the complicated process.

But Oliver and Calcagno argue the situation has been studied enough; scientists already knew what to do in 1989, and there just has not been the political will to do it.

"That's just fine and dandy; it's just unnecessary," Oliver says of the modeling project. "We know what the problem is; we know exactly where the arrow points."

Wanted: fresh water

Returning the slough to its natural state has implications that go far beyond the value of the area to marine animals and tourists, Oliver says — implications for the region's severely depleted watershed.

"We're sending marine water inland, when what we need more than anything in the world right now is fresh water," says Oliver. "We're turning valley into desert; the springs are dried up, and we're seeing the intrusion of salt water into aquifers. The loss of fresh water is the most significant environmental problem in the Monterey Bay area."

It's not that the tidal scouring causes seawater intrusion, or even worsens it. But historically, coastal wetlands exert pressure against

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the incoming pressure of seawater. With the loss of those freshwater sources, that barrier has decreased, leaving fresh groundwater along the coast vulnerable to intrusion.

Allowing seawater to make further inland headway just makes a bad situation worse, Oliver says. Returning Elkhorn Slough to its original, less saline state would be a small step, but a step in the right direction, according to Oliver and Calcagno.

But others, like Mark Silberstein, director of the Elkhorn Slough Foundation, remain unconvinced that a public works project reversing the tidal trend is the way to go. In fact, he noted, the slough has fluctuated over the millennia from a more marine environment back to a more freshwater one.

American Indian middens, or garbage heaps, on the shores of the slough show evidence that the en-

vironment was frequently more salty, as the outgoing water pressure broke through sandbar barriers during some particularly rainy springs.

Oliver sighs in skeptical resignation as he contemplates the future of the slough.

"Yes, it will reach equilibrium," he says. "It will stabilize when the whole thing is scoured out, when the mud flats and the marsh are all gone."

"The truth is, nothing will be done because people like it the way it is; it's a neat habitat," Oliver adds. "It's just a lot easier to leave it the way it is and have meetings and make measurements."

But Silberstein says that's an oversimplification. A former student and great admirer of Oliver, he nonetheless takes his mentor to task on the issue.

"One of the things we want to find out is whether the slough will come to an equilibrium at some point soon so that it would be inappropriate to spend a lot of public money on the project," said Silberstein. "That's a critical question that we must resolve. And what makes it a particularly vexing problem is that we don't want any solution that is going to end up making the situation worse."