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Restored Delta tidal marsh fights climate change and attracts wildlife, native species

Dutch Slough tidal freshwater marsh providing safe home for juvenile salmon and other fish

Daphne Szutu a biometeorology researcher with the UC Berkeley Department of Environmental Science uses a conductivity probe to collect data from tidal water in the Gilbert Tract of the Dutch Slough Restoration Project on Tuesday, Aug. 8, 2023, in Oakley, Calif. (Aric Crabb/Bay Area News Group)

By JUDITH PRIEVE | jprieve@bayareanewsgroup.com | Bay Area News Group

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Once eyed for thousands of homes, the recently restored Dutch Slough tidal marsh in east Contra Costa County is already flourishing as a new habitat for fish and wildlife, a living laboratory for scientists and one of the world's strongest sinks for absorbing and storing carbon long-term.

Source: California Department of Water Resources
BAY AREA NEWS GROUP

Led by the state Department of Water Resources, the ambitious $73 million project to restore 1,187 acres of freshwater Delta tidal wetlands near Oakley – one of the largest such projects in the state – is a little more than half finished. When it is completed, the scientists are hoping it will become a model for future restoration projects, climate change defenses and scientific research.

"It's taking in carbon at a rate compared to the top 1 percentile (of all ecosystems) in the world (annually)," said Katie Bandy, the department's Dutch Slough Tidal Marsh Restoration project manager. "It's taking in a lot more carbon than other land is producing."

That's important, because many scientists believe that capturing and storing carbon dioxide is one of the more cost-effective ways to combat global warming. Simply put, too much carbon in the atmosphere causes temperatures to rise and acts like a blanket keeping in solar heat.

Daphne Szutu a biometeorology researcher with the UC Berkeley Department of Environmental Science uses a conductivity probe to collect data from tidal water in the Gilbert Tract of the Dutch Slough Restoration Project on Tuesday, Aug. 8, 2023, in Oakley, Calif. (Aric Crabb/Bay Area News Group)

Dennis Baldocchi, professor at UC Berkeley's Department of Environmental Science, Policy and Management, has studied the Oakley tidal marsh's carbon-capture potential, along with its prospects for flooding prevention, for the past two years. He calls the restored tidal marsh "a living laboratory," "a big, fancy petri dish."

Coincidentally, the scientist grew up in Oakley across the street from what was then the Emerson Dairy and nearby farmland that would eventually be transformed into the Dutch Slough freshwater tidal marsh.

The reason these tidal wetlands are so productive, in part, is because of their long growing season, he said.

"We have plenty of water, plenty of sunshine, so really tall, dense vegetation can grow, and so that's really good at capturing light for photosynthesis," he said.

Since the wetlands are flooded, it's hard for oxygen to get into the subsoils, so organic materials build up rather than decay and there's less carbon emitting back out into the atmosphere, he explained.

Baldocchi is one of several scientists – including some at the U.S. Geological Survey – studying carbon capture at the site.

Some ways to store carbon, however, are only good up to a point, Baldocchi said, noting, for example, when forests burn, they release carbon dioxide back into the atmosphere.

Biometeorology researchers Daphne Szutu, left, and Robert Shortt, right, with the UC Berkeley Department of Environmental Science work on a flux tower in the Gilbert Tract of the Dutch Slough Restoration Project on Tuesday, Aug. 8, 2023, in Oakley, Calif. (Aric Crabb/Bay Area News Group)

"Wetlands can be very effective, large carbon sinks, but we don't have a lot of area, there's limited lines along the river," he said. "On the other hand, grasslands and forests are much slower (at storing carbon), but we have hundreds of millions of acres that are available, so we have to almost use both. … We have taken advantage of the best ecosystem that's appropriate for that landscape."

Scientists estimate that more than 350,000 acres of tule marsh once blanketed the area from Sacramento to Stockton, yet only 2% to 5% of those are left. European settlers moved here in the Gold Rush days and many hired Chinese immigrants to divert the waters and build levees for farming.

Because many of those "farming islands" have now sunk some 20 to 25 feet below sea level – too low for plants when the tides come in – there are fewer opportunities now to build tidal marshes, according to John Cain of River Partners, a nonprofit that works on large-scale habitat restoration projects.

Considered the project's visionary, Cain got involved in promoting the wetland project in the late 1990s while working for the Natural Heritage Institute. Knowing Dutch Slough land was at the mouth of Marsh Creek, filled with mineral soils and clay, the restoration ecologist understood it had not sunk as low as some other areas and could be transformed into a tidal marsh.

Cain wrote a proposal for the tidal marsh restoration in 2001 and persuaded three landowners – the Emerson, Burroughs and Gilbert families – to sell their property for tidal wetlands rather than a 4,500-home development.

"They knew there were challenges with developing the property when I came along and said the property was ideally situated to do something that was a state priority for the Delta – restoring tidal marsh," Cain said.

A drone view of a new pedestrian and bicycle bridge over Marsh Creek as it meets Dutch Slough in Oakley, Calif., on Tuesday, August 1, 2023. (Jane Tyska/Bay Area News Group)

In 2003, the state acquired the land and the Department of Water Resources and State Coastal Conservancy began planning an environment that would encourage native wildlife and plants. Construction began in 2018, followed by planting vegetation – 25,000 tule plugs and 45,000 shrubs, trees and grasses – in 2020-21. The site was breached in late 2021 in five locations to create the tidal marsh. Another breach will happen in Little Dutch Slough some five years from now, according to Bandy.

"What makes this project really ambitious is not only is it a really big investment for the state, it's a heavily engineered project," Bandy said, noting some areas had to be filled to bring the elevation up so the plants wouldn't be underwater during high tides.

"We did extensive grading, meaning we made this site."

Also unusual was the fact that project planners let plants establish themselves before breaching the levees, she said.

"That allowed for a more rapid response for wildlife and fish and just the establishment of the site to happen more expeditiously than if it was just left up to nature," Bandy said.

A drone view of Marsh Creek in Oakley, Calif., on Tuesday, August 1, 2023. (Jane Tyska/Bay Area News Group)

With Dutch Slough wetland now open to Marsh Creek, which is part of the Chinook salmon migration route between the Sacramento and San Joaquin rivers and the Pacific Ocean, the juvenile fish will have a safe place to grow, she said.

"We've built the marsh for the native fish and now we're seeing the native fish," Bandy added. "Our scientists are finding that Dutch Slough has very high diversity already – which is amazing for a site that's so young."

Lynnette Williams, a UC Davis researcher who is doing near-shore fish sampling at the site, can attest to that. She has found 22 species of fish so far. "Seeing a high diversity of fish is really exciting … in the fish world, more aquatic habitat is just better."

The deeper open water in the project has also proved valuable for research.

"Having differences in habitat creates really interesting differences in fish communities," Williams said. "And I think it is a really good lesson that we can learn from Dutch Slough."

The project ended up pretty much the way Cain had envisioned it, he said. His team had three goals: to improve public access to the Delta shoreline; to restore habitat, especially for Delta species; and to use adaptive management techniques, or learn as you go, to contribute to the understanding of ecological restoration in the Delta.

"The project is an incredible success," Cain said, noting it exceeded his expectations except for providing public access.

Robert Shortt a biometeorology researcher with the UC Berkeley Department of Environmental Science changes a carbon sensor atop a flux tower in the Gilbert Tract of the Dutch Slough Restoration Project on Tuesday, Aug. 8, 2023, in Oakley, Calif. (Aric Crabb/Bay Area News Group)

The project includes land for Oakley to build a 55-acre regional park with public access to the shoreline, which has yet to happen. Though the city is making plans for the park, the project is not yet funded, according to city officials.

Also, the Department of Water Resources, the city and East Bay Regional Park District still need to work together to develop/build the trails and secure long-term funding, Bandy said.

"After the completion of the master planning for this site, the city will explore all grant funding opportunities to secure funding for the construction of this project, which includes the trail that goes around the Emerson parcel; the project will span several years," she said.

Once completed five or six years from now, the Dutch Slough tidal marsh also should provide flood protection for surrounding neighborhoods, officials said.

That's something that piqued Baldocchi's interest early on.

"That's one of the reasons I got motivated," he said. "If you've been out there, you see these islands 30 feet below sea level. They have a high risk of collapse, and we just can't keep doing that."

A drone view of an old vineyard and wetlands near Dutch Slough in Oakley, Calif., on Tuesday, August 1, 2023. (Jane Tyska/Bay Area News Group)

Baldocchi said once an island has flooded – like Frank's Tract near Bethel Island did decades ago – "it's almost impossible to restore because it would be very expensive to redo the levees."

"There's no more vegetation there. It's flooded and it's just open water and that's what would happen with the whole Delta if this whole thing started breaking down and so it would be pretty catastrophic. … We don't want the whole Delta to become Frank's Tract."

Baldocchi, whose wetland research is funded through grants, hopes that it will continue so they get sufficient data over a number of years to understand varying factors.

"We're trying to stop the soil subsidence and reverse that, and by doing that, that helps us take carbon dioxide out of the atmosphere, which helps offset global warming and the fossil fuel addition," Baldocchi said. "And, it helps protect the habitat for salmon. It's really complicated. It's multifaceted."

"Ultimately, we're trying to protect the water transport system of California," he said.

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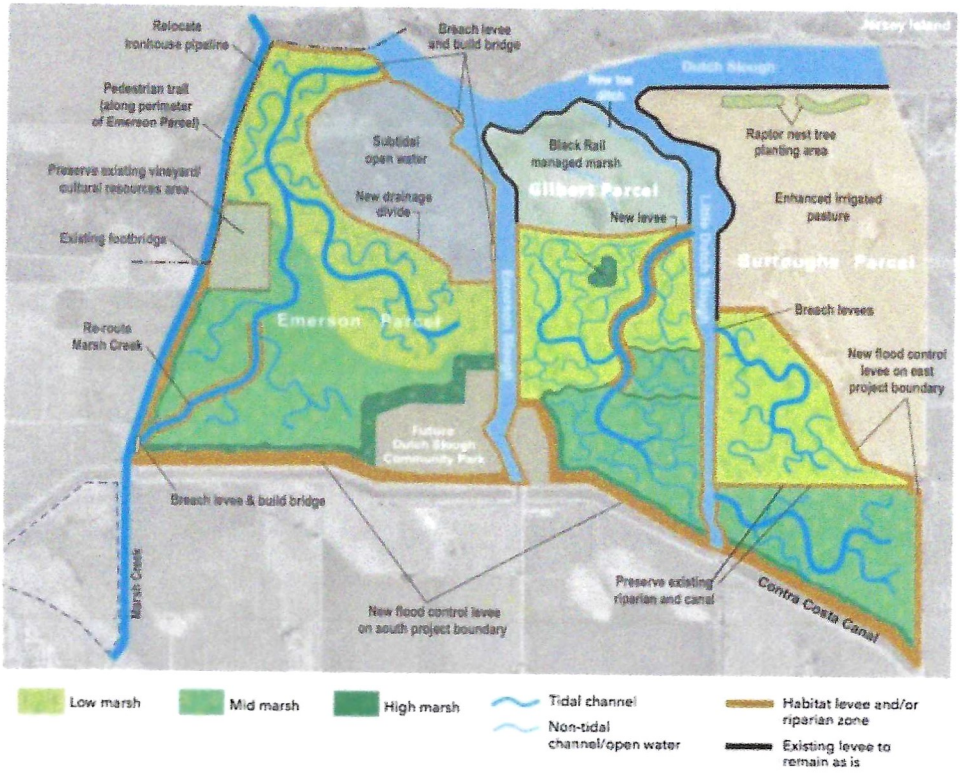
A drone view of a historic home near Dutch Slough in Oakley, Calif., on Tuesday, August 1, 2023. (Jane Tyska/Bay Area News Group)

A drone view of the Gilbert Tract near Dutch Slough in Oakley, Calif., on Tuesday, August 1, 2023. (Jane Tyska/Bay Area News Group)

DUTCH SLOUGH TIDAL MARSH RESTORATION PROJECT SITE MAP



California Natural Resources Agency

A drone view of the Dutch Slough Restoration Project in Oakley, Calif., on Tuesday, August 1, 2023. More than half-way complete, the project will create a powerful carbon sink to combat climate change while also restoring wetlands to bring back native wildlife to the area. (Jane Tyska/Bay Area News Group)

Tags: **Climate Change**, **Environment**, **Outdoors**, **Photos and Videos**, **PM report**, **Wildlife**


Judith Prieve, East County city editor/Brenti News editor for the Bay Area News Group is photographe for a Wordpress profile in Walnut Creek, Calif., on Thursday, July 28, 2016. (Anda Chu/Bay Area News Group)

Judith Prieve | East Contra Costa County editor/reporter

Judith Prieve is a reporter and editor for the Bay Area News Group who covers eastern Contra Costa County for the East Bay Times and The Mercury News. She has worked as a reporter, features editor and assistant metro editor at newspapers in Wisconsin and Northern California and has been at what is now the Bay Area News Group since 1990. She graduated from the University of Wisconsin -- Madison with a BA degree in English, and also studied abroad focusing on theater, arts and history through UWSP in London, England.