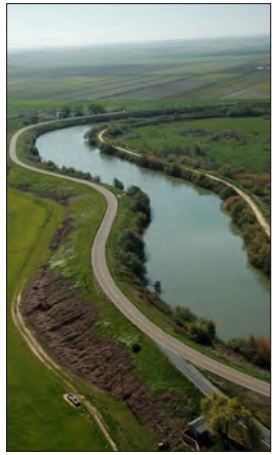
A Sustainable Future for Farming in the Delta

The Sacramento-San Joaquin Delta is the largest inland estuary system in the United States. This unique resource provides a passageway for migrating fish, a stopover for waterfowl on the Pacific Flyway, and other important ecosystem functions. The complex system of Delta levees protects local land uses and infrastructure critical to California's economy. The Department of Water Resources is committed to the development of successful, sustainable farming practices that promote the longevity and health of the Delta.



DELTA LEVEE HISTORY

The Delta was originally a system of comlex wetlands full of tules and cattails. Centuries of plant growth and decay created rich organic peat soil.

Levee construction began in the late 1800s around most of the Delta islands to reduce the threat of flooding and to allow agriculture. Over the years, agriculture has flourished because of the rich organic soils and abundant water sources.

LAND SUBSIDENCE

Unfortunately, the deep organic peat soils are highly susceptible to subsidence using some of the current agricultural practices. Subsidence eventually results in the sinking of island interiors, which then requires construction of ever-larger levees to prevent flooding.

Levee failure, and the resulting flooding, threatens Delta water quality, terrestrial habitats, infrastructure, legacy towns, and important agriculture.

FARMING RESEARCH

Research conducted by DWR, USGS, and the University of California has shown that growing crops that are flooded during most of the year (especially during the summer and early fall months) reverses subsidence. Tule wetlands and rice not only stop the peat soils from subsiding but also reverses subsidence by increasing root structure (accretion) which eventually yields soil production.

DWR Subsidence Research Projects

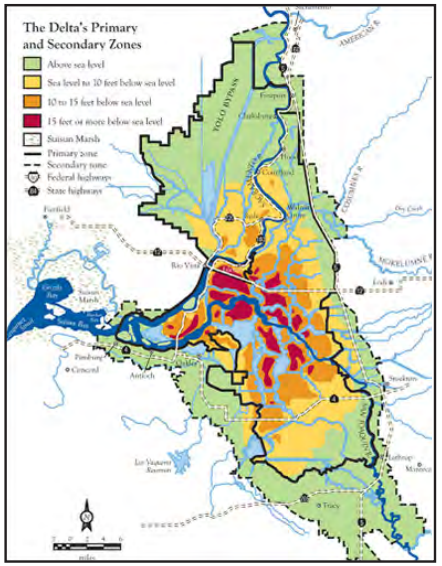
1997	15 acres	Research Wetland	Twitchell
2008	300 acres	Rice Research Project	Twitchell
2010	305 acres	Mayberry Farms Permanent Wetland	Sherman
2011	300 acres	Rice Expansion Project	Twitchell
Planned	500 acres	Southwest Wetland "Whale's Mouth"	Sherman
Planned	1100 acres	Wetland East of SR 160	Sherman
Planned	1500 acres	Wetland North of Mayberry Farms (Potential Expansion)	Sherman
Planned	50 acres	Chevron Point Tidal Marsh	Twitchell
Planned	665 acres	Wetland Expansion	Twitchell
Planned	275 acres	Wetland North of Rice Project	Twitchell

Since 1997, the 15 acre Subsidence Research Facility on Twitchell Island has been monitoring the effects of growing tules, including land surface elevation changes and carbon sequestration from decaying of plants. The data shows that surface elevation changes, due to accretion, ranges 1.3 – 2.2 inches each year. In comparison, on-going studies show that areas used for traditional agricultural purposes lose up to 2 inches per year, mainly from the oxidation of peat soils. The land surface net gain for growing tules on peat soils can result in up to 4 inches a year.

In 2008, DWR constructed a 300-acre research project on Twitchell Island to research the effect of growing rice. The initial research data from the first rice crops in 2009 and 2010 show rice production stopped subsidence, achieved small amounts of accretion, sequestered carbon, and acted as a sink for pesticides and herbicides.

By 2017, approximately 3,100 acres of wetlands on Sherman Island and 1,000 acres of wetland and tidal marsh on Twitchell Island will be completed to provide a full-scale test for carbon farming..

These large-scale projects are leading the way for new and innovative agricultral practices and providing information that can be used by the private sector to enter the carbon market.



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CARBON FARMING

In 2006, legislation required the California Air Resources Board to develop solutions, including carbon sequestration and carbon credit trading, to scale back California's greenhouse gas emissions to 1990 levels by 2020.

The Delta's peat soils are rich in carbon. Carbon can be sequestered in the cessation of ongoing emission of carbon associated with subsidence, and the sequestration of new carbon in the form of decaying plant matter.

This potential to increase wetlands and sequester carbon offers a unique opportunity to increase elevation on subsided lands, restore a large portion of the Delta wetlands, and continue to farm the lands for the production of a marketable commodity.

Subsidence research, conducted by DWR and other researchers, could assist Delta landowners trying to capitalize on the emerging carbon market by switching from growing crops to growing carbon.

BENEFITS

- Reduces the cumulative stress on the levees
- Decreases the risk of levee failure, flooding, and costs of recovery
- Halts the soil loss
- Reverses the effects of subsidence
- Sequesters carbon
- Generates carbon credits
- Creates habitat
- Reduces greenhouse gas emissions to meet the 2020 goal
- Provides climate change room for adaptation
- Preserves open space

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State of California
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Department of Water Resources
Floodsafe Environmental Stewardship and Statewide Resources Office

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PUBLIC SAFETY ENVIRONMENTAL STEWARDSHIP ECONOMIC STABILITY