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The Mt. View Project:

A Community Success Story



THE MT. VIEW WETLANDS PROJECT: A COMMUNITY SUCCESS STORY



*Mt. View Sanitary District
Wetlands are located adjacent
to large industrial facilities.*

Mt. View Sanitary District (MVSD) provides wastewater treatment for approximately 16,000 people living in and around Martinez, California. This community, led by an independent-minded Board of Directors and a forward-thinking engineer, created the first wastewater wetlands on the West Coast. The project saved the rate payers millions of dollars and established a valuable wildlife habitat in the process. This is the story of how Mt. View Sanitary District created a wastewater wetland for the enrichment of both the community and wildlife.

Sewage treatment plants, by their very nature, are often located at the fringe of development. The year Mt. View Sanitary District was established — 1923, it was located outside the City of Martinez, in rural Contra Costa County, California.

Mt. View was created as a special district to treat the wastewater from the rural portions of the county surrounding Martinez and was to be governed by a board of five publicly elected directors.

The board was an independent group and did not easily accept the Regional Water Quality Control Board's (RWQCB) idea in the late '60s of consolidating all of the small treatment facilities into a large regional plant. The result would have required pumping MVSD's wastewater to a neighboring facility to be treated, effectively dissolving their district. Not only would it have usurped their control, but it also was going to cost

over \$6 million. The District decided to search for an alternative.

MVSD tried to sell its water to neighboring industrial plants and to the highway department for irrigation. The District considered constructing its own deep-water diffuser in nearby Carquinez Straits, at a cost of \$2.38 million. Warren Nute, the District's engineer at the time, observed that the regulations the RWQCB were using stated that if the treated effluent was creating an environmental benefit, then the District would not have to remove its effluent discharge from Peyton Slough, a small creek, influenced by tidal action along part of its length, that delivers the District's effluent to Carquinez Straits and San Francisco Bay. The District then set about creating the first wetland on the West Coast using secondary treated effluent, to provide environmental benefits.





THE MARSH BEGAN TO GROW

In 1974 the District began with a simple 10-acre wetland divided into two sections. The area that was created by scraping away the topsoil became a shallow, open-water pond. The other area, whose topsoil was not disturbed, was quickly colonized by emergent vegetation, such as cattails.

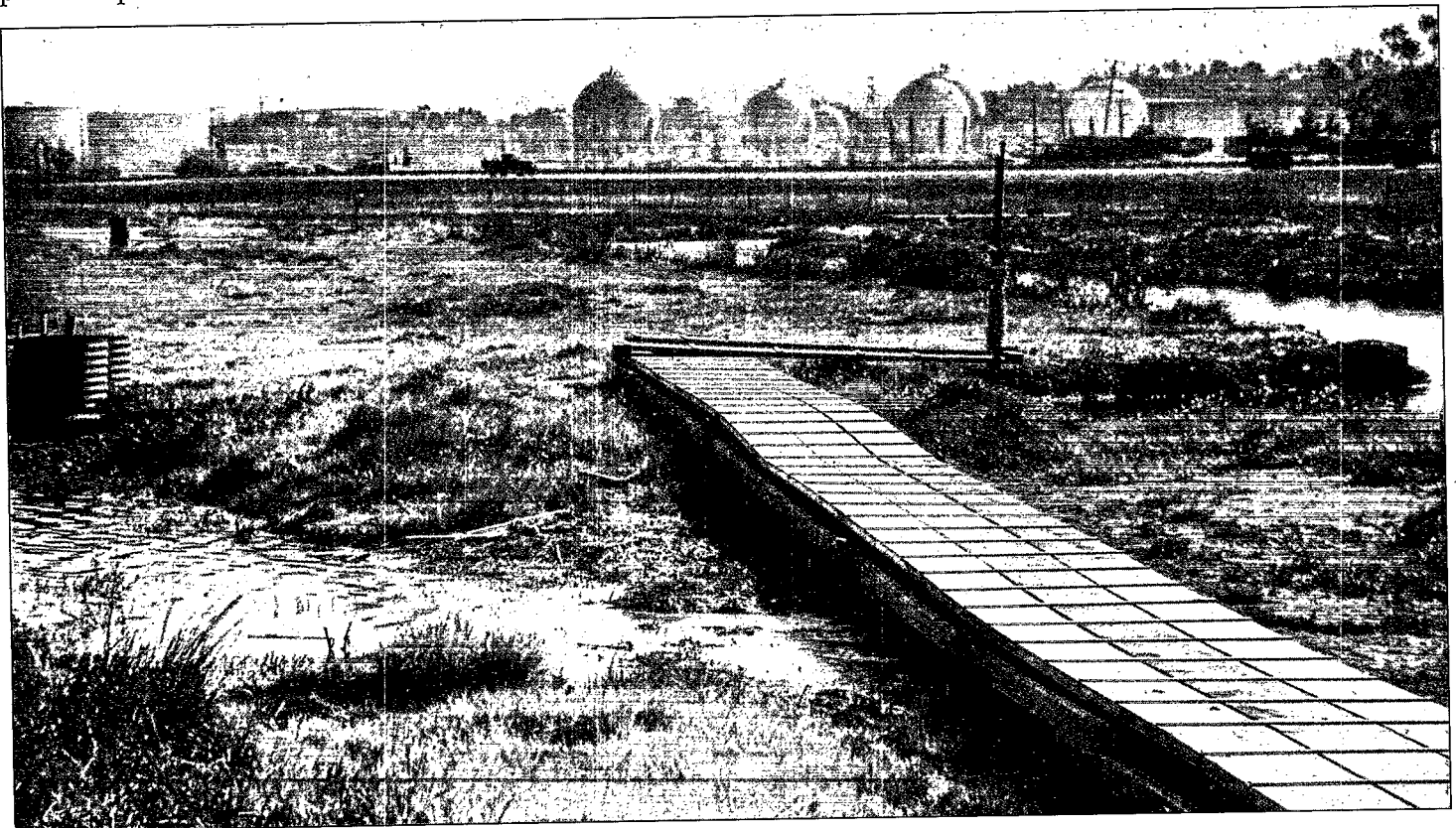
In 1977 the marsh was expanded to include 10 more acres of land divided into three marsh areas. One was constructed as an open-water pond with islands to provide protected nesting habitat for waterfowl.

A second marsh was seeded with plants to provide food for waterfowl,

such as water grass and alkali bulrush (*Echinochloa crusgalli* and *Scirpus robustus*). The third area was designed in a serpentine fashion to provide maximum water/plant contact to enhance treatment effectiveness.

The Mt. View Sanitary District marshes are located in an urban environment and the marsh is bisected by an interstate highway. The next 22 acres, added to the marsh system in 1984, were located across the interstate to the north. This area had been seasonally flooded and the District merely had to make minor changes to water control structures to allow the marsh's inclusion

A variety of habitat types and controlled public access promote wildlife use of the wastewater wetland.



in the system. The most recent addition to the wastewater wetland complex is a 43-acre section that also is located to the north of the interstate and adjacent to the previous 22 acres.

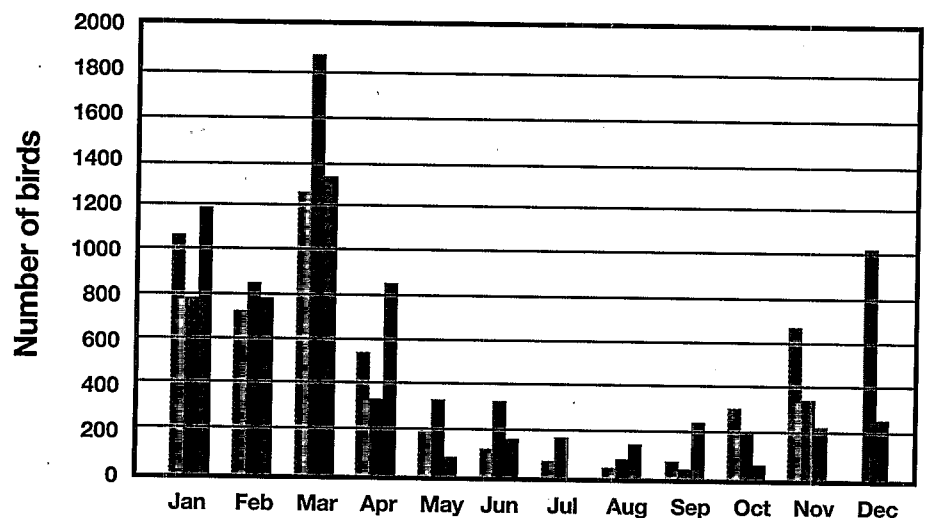
The wetlands area totals 85 acres. This bountiful wildlife habitat includes plants, animals, fish and invertebrates. Some of the animals are permanent residents of the marshes, while others are temporary visitors that stop along their migratory journey. Plants grow in the marshes as well as on the levees surrounding the marshes and a riparian corridor is beginning along Peyton Slough. There are emergent plants rooted in the bottom muds as well as submerged plants.

Wetland plants provide food and shelter for marsh biota and improve water quality. Birds, mammals, reptiles and amphibians eat plant leaves, seeds and roots of the more than 70 species of marsh and riparian vegetation. Dense growths of marsh bulrushes provide nesting sites for songbirds as well as ducks.

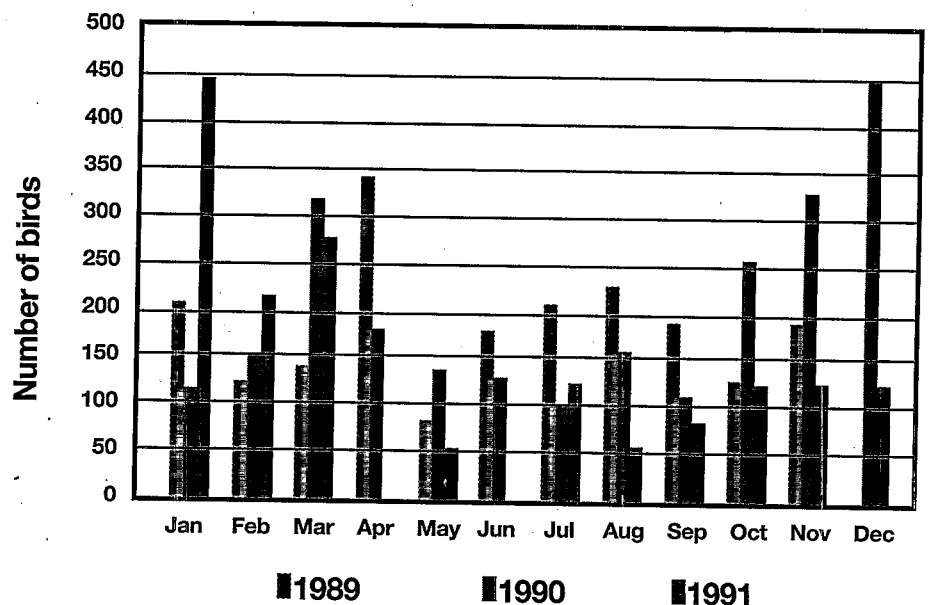
The most visible animals at the marshes are the more than 123 species of birds. The diversity of aquatic habitats attracts mallard and cinnamon teal to rest and feed in the open-water areas; avocets and black-necked stilts to probe for invertebrates in the mudflats; and red-winged blackbirds to nest among the cattail stands. There are resident birds in the wetland, such as song sparrows and American coot, in addition to migrant birds, as exemplified by sandpipers and pintail.

*Bird usage from 1989-1991
in Mt. View Sanitary
District Wetlands*

Birds Observed in the Waterfront Road Marshes, North of Interstate 680



Birds Observed in the Marshes, South of Interstate 680

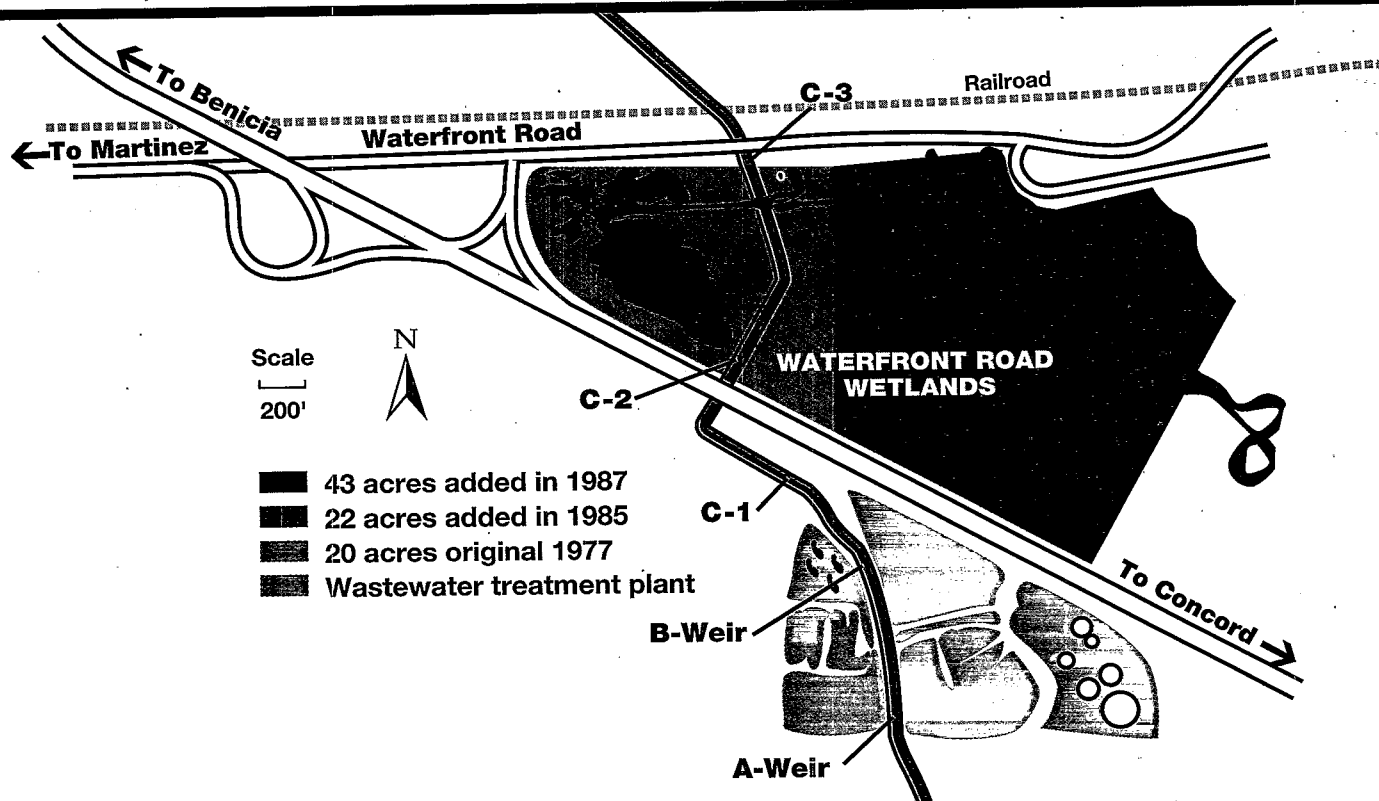




There are more than 15 species of birds that nest in the wetland. The area provides valuable nesting sites for waterfowl, shorebirds and songbirds. The wetland is also important because fresh drinking water is a requirement for ducklings. Later, as the ducklings mature, they develop salt glands that allow them to drink saline water. However, until that time, they must be reared in a freshwater environment. In an area such as San Francisco Bay, which has lost nearly all of its freshwater wetlands, appropriate nesting habitat is a valuable resource provided at the Mt. View wastewater wetland.

Fish also inhabit Peyton Slough and the marshes. Small fish eat midge and mosquito larvae to help keep the marsh free of these nuisance insects, and in turn they are preyed upon by herons and egrets. The discarded carapace of a crayfish is evidence of the raccoon's evening meal. Other marsh wildlife includes everything from pond turtles to striped skunks and an occasional river otter. A total of 34 species of fish, mammals, reptiles and amphibians have been observed at the wetland.

Schematic of the Mt. View Sanitary District marsh creation project.

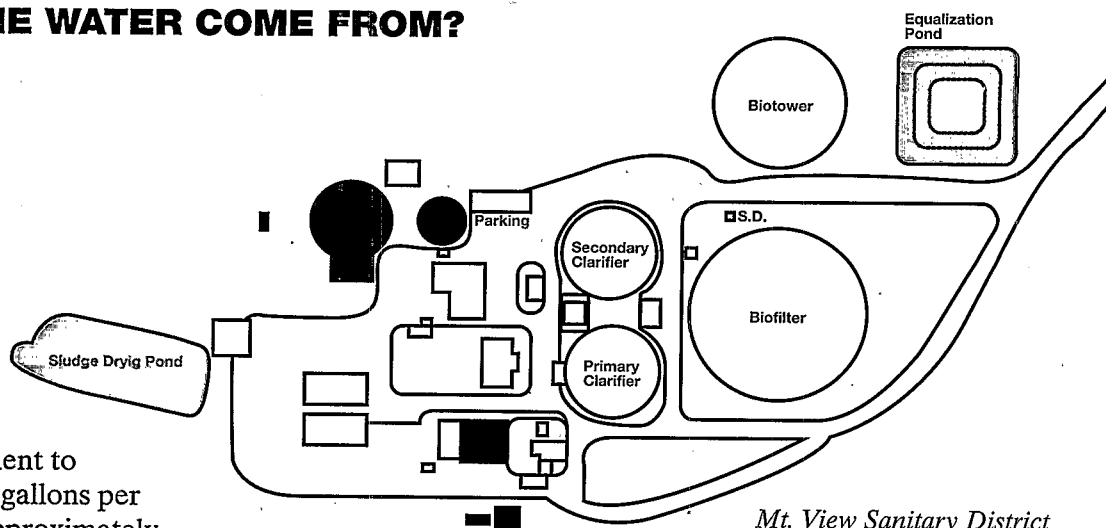


WHERE DOES THE WATER COME FROM?

Mt. View Sanitary District provides secondary treatment to approximately 1.3 million gallons per day of wastewater from approximately 16,000 residents in the Martinez, Calif., area. Although there is some light industry and commercial development within the District's service area, the primary source of the wastewater is residential. The District maintains strict pretreatment standards and prohibits the discharge of heavy industrial waste into its sewerage system.

The treatment train includes comminution, primary sedimentation, biological treatment by a two-stage, high-rate trickling filter, a biotower for ammonia removal, secondary sedimentation, effluent chlorination, dechlorination with sulphur dioxide, and sludge processing. A flow equalization basin assists in equalizing storm flows to the treatment plant to maximize efficiency.

Monitoring is conducted on the treatment plant influent, effluent, marsh discharges and the receiving water. Although the primary purpose for constructing the wetland is to create wildlife habitat, it also improves water quality for some parameters. There are numerous processes by which plants contribute to water quality improvements, including direct uptake of nutrients by algae and some rooted vegetation. The plants foster settling of particulate matter by slowing water movement and greatly increase the contact with microorganisms that live on the surfaces of emergent plants.

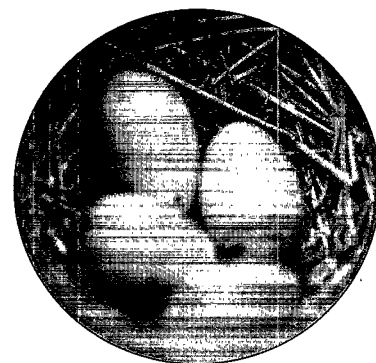


Mt. View Sanitary District treatment plant.

These microorganisms metabolize pollutants, decreasing their dissolved concentrations in the water. Monitoring shows that wetland nutrient concentrations follow a stable seasonal cycle that varies little from month to month, but clearly shows a difference between the cold, wet season (November through April) and the warm, dry season (May through October).

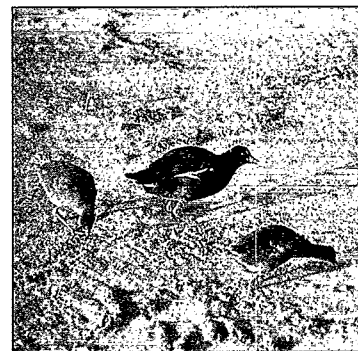
The concentration of nitrates decreases in the wetland during the summer months. There is limited evidence to suggest that the wetland is removing cadmium, copper, silver and zinc. In addition, periodic special monitoring studies are undertaken to answer specific questions concerning the processes or biota within the wetlands. Studies at the marsh have included an ammonia study and a fisheries and benthic invertebrate study.

Doubtless the largest special study, however, occurred after the 1988 spill of 440,000 gallons of crude oil into the marsh from an adjacent refinery. The cleanup efforts included picking up oily water by vacuum trucks, rototilling of contaminated soils and hand-cutting vegetation in less inundated areas of the marsh. The recovery of the marsh's vegetation and soils was monitored closely and eight months later this section of the wetland resumed operation.





KEEPING THE WETLAND WET



In 1974 MVSD created its wetland and, as with other man-made environments, routine operations and maintenance are required. Tasks required on a weekly or monthly basis include removing debris that collects behind weirs, examining levees for erosion and inspecting for animal burrows that could lead to levee failure.

The frequency of vegetation harvesting in the shallow marsh areas has proven to be related to its surface. Smaller marsh plots need to be harvested more frequently than larger areas. Marsh A-1 is approximately one acre and has had vegetation removed a number of times during the past 18 years. Similarly, a three-acre marsh plot that had internal levees subdividing it into smaller waterways also was in need of harvesting and levee rearranging after 10 years. Whereas the larger Marsh A-2, approximately four acres, is only now ready to be harvested after 18 years of operation.

Early maintenance activities included stocking the marshes with mosquito fish as predators for mosquito larvae. The mosquito fish population became self-sustaining after the first few years. There were so many of the small fishes that for a period of time, the MVSD marshes supplied fish to a local natural history museum to feed their live exhibits.

The original 10-acre marsh construction project cost only a few thousand dollars, and the first 10-acre expansion cost \$85,000. The District already owned the land for these segments of the marsh creation project. The first

Marsh Water Quality Analyses Monitoring Frequency

Parameter	Plant Effluent	Marshes
Dissolved Oxygen	—	W
Temperature	—	W
pH	—	W
Total Ammonia	M	M
Cu, Ni, Ag, Zn	M	—
Pb, Hg, As, Cd, Cr	Q	—
BOD	2/W	2/M
TSS	2/W	2/M
Avian Census	—	M
Animal Observations	—	M
Fisheries	—	Y

M = Monthly Q = Quarterly Y = Yearly W = Weekly
2/W = Twice per Week 2/M = Twice per Month

Marsh Water Quality—1991 Averages

	Marsh Influent		Marsh Effluent	
	mg/l	n (4)	mg/l	n
Biochemical Oxygen Demand	25	70	12	12
Suspended Solids	28	72	18	12
Oil & Grease	25	18	14	17
Residual Chlorine	17	17	36	17
Arsenic (2)	.003	3	.003	3
Cadmium	.0006	2	(2)	—
Chromium (3)	(3)	—	.007	1
Copper	.029	12	.001	12
Lead	.005	5	.004	5
Mercury	(3)	—	(3)	—
Nickel	.008	6	.01	10
Silver	.007	12	.001	12
Zinc	.125	9	.07	1

(1) All values are in mg/l except where noted.

(2) Averages cited are for measured levels only.

(3) None of the samples contained concentrations above the detection limit.

(4) n = Number of detectable data points.



22 acres to the north of the interstate were acquired by the California State Department of Fish and Game and is managed by MVSD. The 43 acres acquired in 1985 were purchased for \$204,887. It is likely that more acreage will be added to the wetland in the future as a result of the settlements from the oil spill. The annual operation and maintenance budget includes labor for marsh monitoring, special research studies, vegetation harvesting and levee repair. These costs average \$30,000-\$50,000 annually.

The total cost of the marsh over the past 18 years is less than one-third the cost ratepayers would have had to contribute to the neighboring treatment plant's deep-water diffuser.

Not only has the experiment been cost effective, but the marsh itself boasts a long list of contributions to the community. Visitors spend hundreds of hours enjoying the marsh and its wildlife. Bird watching and nature photography are favorite pastimes of local, regional and international visitors. Students from elementary through college come to observe and do research projects at the wetland.

The wetland provides open space in a rapidly developing county. The freshwater habitat is a link on the Pacific Flyway used by migratory birds. The effluent is viewed as a resource creating wildlife habitat and maintaining a small, freshwater surface inflow to San Francisco Bay, which has lost most of its freshwater tributaries.

The creation of Mt. View Sanitary District's wetland system is a community success story. The independent District was willing to question regional policy makers and in so doing pioneered the creation of wetland habitat using secondary treated effluent, saving local citizens millions of dollars.

The wetland serves as an outdoor laboratory for learning. Students from local elementary schools as well as college students are interested in the marsh.

This brochure is dedicated to the memory of J. Warren Nute, who pioneered the development of wastewater wetlands on the West Coast.

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