ONCE AND FUTURE BAY

Lessons from history for *revitalizing the Bay*

by Robin Grossinger and Peter Baye • design by Ruth Askevold

How relevant is the historical South Bay landscape to modern wetlands management and restoration? Are the Bay's native habitats simply like the Pleistocene megafauna—museum display material, interesting perhaps, but gone for good, with no place in a modern urbanized estuary? Or are they a key to true restoration of natural estuarine communities and ecosystems, the clues to a diverse South Bay landscape, the habitats that will make our restoration efforts produce more than generic, monochromatic parcels of pond or pickleweed? Do they even perhaps provide practical models for reconnecting human culture to the Bay waters lapping at the feet of our cities?

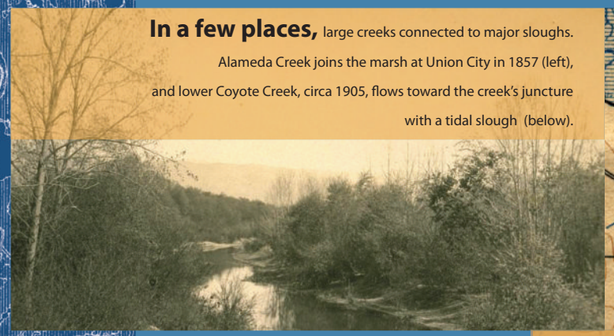
In the following pages, we illustrate a former and hidden landscape, concealed from view by its rarity yet in many ways poised to return. These subtle patterns are revealed through a combination of historical research—analysis of early maps, photographs, written materials—and present-day field observation. Together, these lines of investigation confirm both remnants and reassertions of the historical landscape. Most important, this perspective reveals natural, persistent relationships between habitats and physical processes—salinity gradients, tides, wave energy, groundwater emergence—most of which remain intact in some form today, ready to reassert themselves with a little help. In effect, these patterns "fit" the South Bay landscape into its physical setting, creating the context for diverse plant and animal species and for the human activities that have shaped Bay Area culture for several thousand years.

Background map from U.S. Coast and Geodetic Survey, T-2252, 1896, courtesy NOAA.

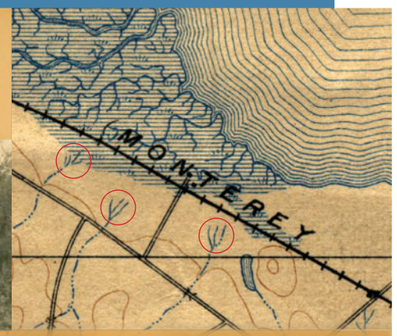
FORGOTTEN HABITATS of the SOUTH BAY

FRESHWATER ECOTONES

It's easy to forget that the saltwater tides weren't the only source of water to the bayshore marshlands. In fact, one of the major causes of the diversity of the historical South Bay landscape was the influence of local freshwater creeks. Major creeks delivered sediment from local watersheds for marsh development and created ecological gradients of fresh-to-brackish-to-salt marsh at creek mouths—habitats that have been almost completely lost. Away from the larger creeks, fresh water entered the marshlands through seeps, springs, and overland flows during floods, creating dramatic variations in marsh form and ecology. While the freshwater flows from local watersheds have been heavily constrained, there are still numerous sources of fresh water to the South Bay—from flood control channels to treated sewage effluent—that could be redesigned to support natural ecotones.



In a few places, large creeks connected to major sloughs. Alameda Creek joins the marsh at Union City in 1857 (left), and lower Coyote Creek, circa 1905, flows toward the creek's juncture with a tidal slough (below).



But most South Bay creeks historically spread into seasonal wetlands adjacent to the marsh. Creeks near Burlingame fan out onto the alluvial plain in 1896 (above).

Map of Alameda Creek from U.S. Coast Survey, T-635, 1857, courtesy NOAA; photo of Coyote Creek by Alice Iola Hare, circa 1905, courtesy Bancroft Library, University of California, Berkeley; portion of USGS 1896 San Mateo map courtesy Earth Sciences Library, University of California, Berkeley.

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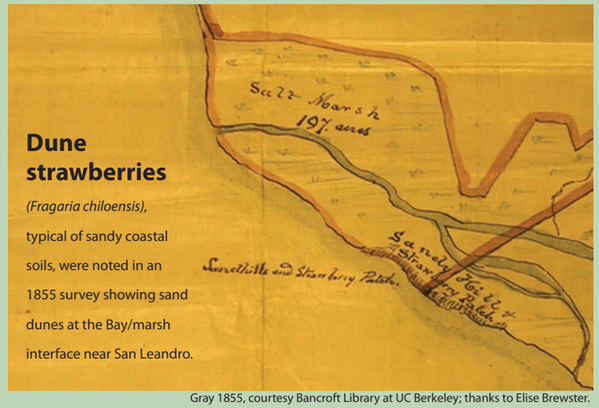
BEACHES

Variations in wave energy, shoreline orientation, and subtidal substrate led to discrete patterns of sand beaches, sandy marsh edges, and oyster shell beaches around the South Bay. The sandy beaches at the northern end of the South Bay were habitat for many plants specific to sandy marsh edges, including several that are now regionally extinct along the Bay shore, such as the dune strawberry (see right). Commonly located at the bayward edge of wide marshes, the beaches provided safe haul-out sites for harbor seals and may have been important nesting habitat for the now-endangered snowy plover. One South Bay beach, at Coyote Point, is still popular with swimmers today. And the beaches continue to come back, re-forming themselves at the Bay's edge.



Dune strawberries *(Fragaria chiloensis),* typical of sandy coastal soils, were noted in an 1855 survey showing sand dunes at the Bay/marsh interface near San Leandro.

Gray 1855, courtesy Bancroft Library at UC Berkeley; thanks to Elise Brewster.

The beach-dune complex mapped in 1855 (above right) is now the mouth of a flood control channel. However, a similar habitat returned nearby, just south of San Leandro.

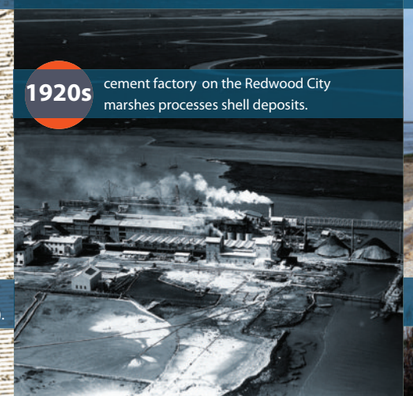
Sandy bay beaches and sandy salt marsh edges were the historic habitat of California sea-blite *(Suaeda californica),* an endangered species that became extinct in S.F. Bay. Its experimental reintroduction has begun, but successful recovery depends on restoring bayshore beaches, its obligate habitat.

Peter Baye

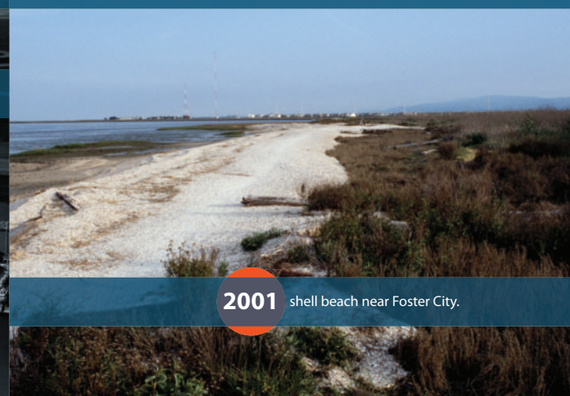
Left to right, from U.S. Coast and Geodetic Survey, T-2353, 1896, courtesy NOAA; photo by George E. Russell, circa 1920, courtesy California State Lands Commission; photo by Peter Baye.

Despite a century of being mined from the Bay for cement production, oyster shell fragments continue to wash up on the bayshore, creating shell beaches like the one below in Foster City.

1896 shell beach at marsh edge (this one near Dumbarton Point).



1920s cement factory on the Redwood City marshes processes shell deposits.



2001 shell beach near Foster City.

FORGOTTEN HABITATS

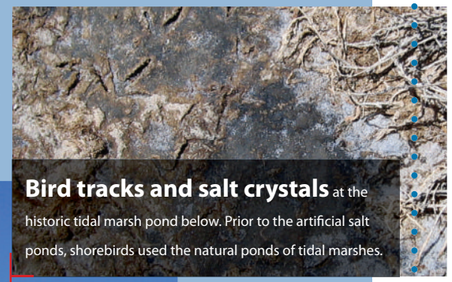
of the SOUTH BAY

More than *pickleweed and cordgrass*

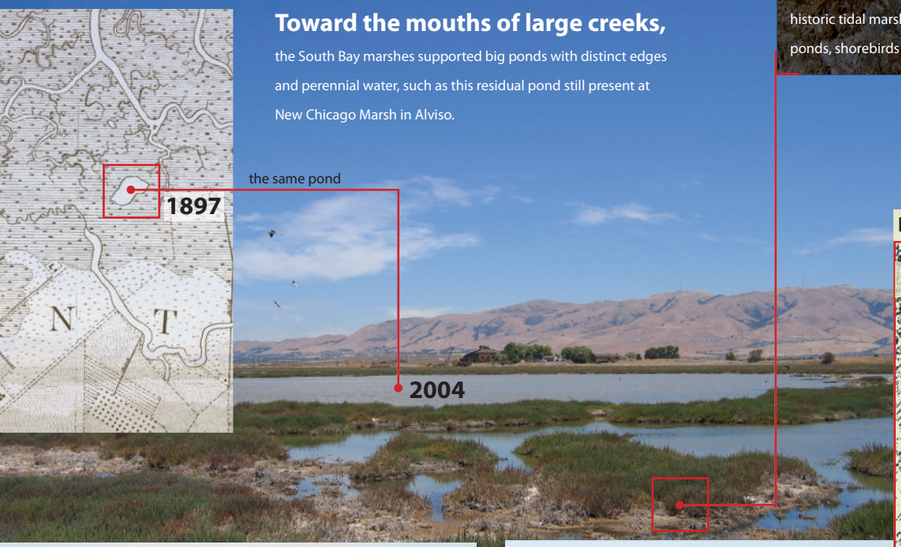
SALT PONDS, *SALINAS*, AND MARSH PANNES

A dominant feature of the South Bay marshlands was the thousands of shallow pannes and *salinas* gracing the vegetated plain. *Salinas* were the largest of the natural pondlike features; smaller pannes were found in the marsh interior. Together these features supported waterfowl, shorebirds, and, at their edges, distinctive plant communities—sometimes in the same place at different times of year.

Map below from U.S. Coast and Geodetic Survey, T-2313, 1897, courtesy NOAA; photos by Robin Grossinger.



Bird tracks and salt crystals at the historic tidal marsh pond below. Prior to the artificial salt ponds, shorebirds used the natural ponds of tidal marshes.



Toward the mouths of large creeks, the South Bay marshes supported big ponds with distinct edges and perennial water, such as this residual pond still present at New Chicago Marsh in Alviso.

the same pond

Mature marsh plains are heavily patterned with many plant species. This close-up of a residual historical marsh at upper Newark Slough illustrates a tangle of varied creeping salt-tolerant herbs, saltgrass, and grasslike plants, rather than solid stands of pickleweed.

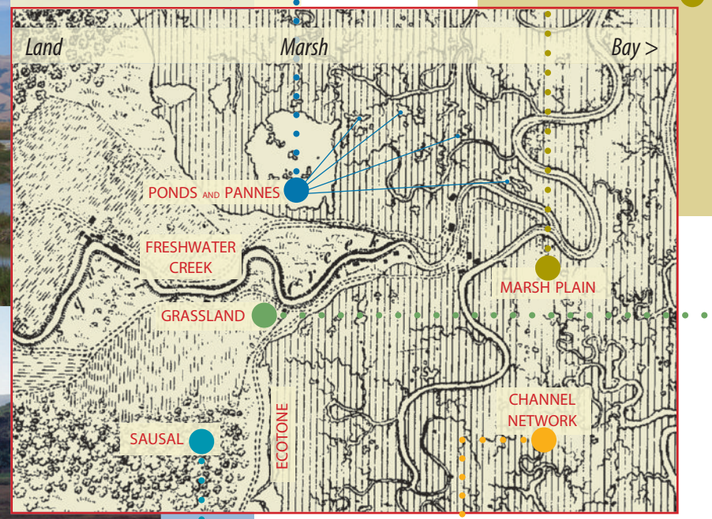
At the natural, gradual tidal marsh–grassland edge, annual spring wildflowers like smooth goldfields *(Lasthenia glabrata,* shown above from Petaluma) were historically abundant.

Photos by Peter Baye

THE DIVERSITY OF THE MARSH PLAIN

While we tend to envision vast, monotypic plains of pickleweed fringed by cordgrass—and have largely aimed for such in restoration efforts to date—both historical and present-day evidence suggests a much more diverse plant community once covered the bay-side marsh plain. Pickleweed and cordgrass are major—but not the only—components of a robust tidal marsh landscape.

LANDSCAPE PATTERNS, 1857



From U.S. Coast Survey, T-676, 1857, courtesy NOAA.

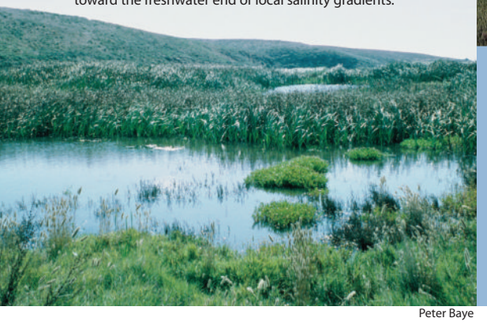
Peter Baye

Near Fremont, vernal pool complexes graded into the marsh. While we have only limited remnants of these wildflower rich habitats today, early botanical descriptions reveal a diverse assemblage of species such as *Downingia pulchella,* shown above from marshes near Sears Point.

GRASSLAND/MARSH ECOTONE

Because the landward edge of the marsh was impacted by Euro-American development so early and extensively, its characteristics have largely been erased from local memory. A rich plant community was found at the terrestrial edge of the South Bay, where tidal marshes graded into low-gradient grasslands and seasonal wetlands.

Brackish tidal marsh pond, at Limantour Estero (Point Reyes), is analogous to ponds that could return toward the freshwater end of local salinity gradients.



Peter Baye

Ponds cover much of the marsh plain along a tidal slough in Morro Bay (San Luis Obispo County).

Peter Baye

Peter Baye

SAUSAL/MARSH ECOTONE

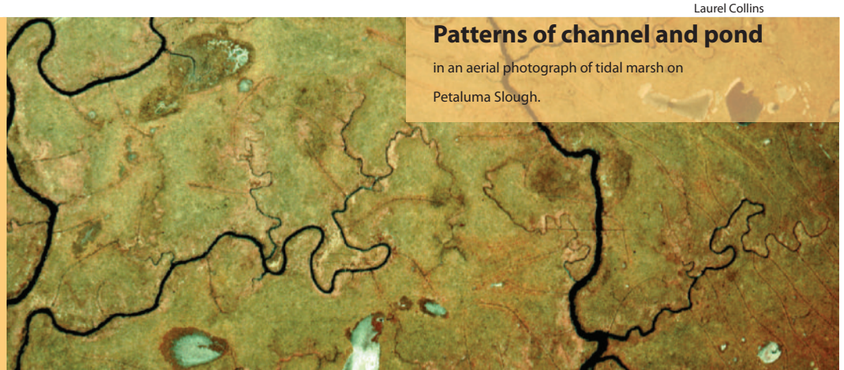
Sausals constitute an important ecological node in the South Bay landscape. These were dense groves of willow trees up to 30 feet high, situated around seeps and springs at the landward edge of the marsh. These groves ranged in size from 10 to 200 acres. Amid wide grasslands and marshes, the *sausals* provided valuable tree cover and riparian habitat for songbirds and amphibians. Today, one of the few residual *sausals* is located near Coyote Hills, where it occupies a small fraction of its historical extent but has expanded in recent years with the return of near-surface groundwater.

From U.S. Coast Survey, T-664, 1857, courtesy NOAA.

CHANNEL NETWORKS

Twice each day the tides pulsed water through 3,000 miles of sinuous South Bay sloughs, ranging from 1 to 1,000 feet wide. Estuarine fish followed the tides to feed in the marsh sloughs. At the highest tides, water spilled onto the marsh plain and refilled the ponds.

Patterns of channel and pond in an aerial photograph of tidal marsh on Petaluma Slough.



Laurel Collins

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THE LIVING BAYSHORE

Links between *people and the Bay*

Throughout history, people have interacted with the Bay largely through the diverse wetland habitats along its edge. These transitional environments of mudflat, marsh, channel, pond, and beach provided the practical and functional connection between the adjacent valleys and plains—where people live—and the Bay's waters. More recently the Bay has become primarily an open-water landscape, with relatively few of these transitional, human-scale gradients between land and water. With the loss, the Bay has become somewhat of a backdrop, largely inaccessible without a boat, a reliable background image for tourist postcards, picture-perfect views, and "splash-ball" home runs. With these changes and little in the way of locally consumed resources, the Bay no longer sustains a tangible connection to most of the surrounding population. Restoring the South Bay landscape is also about restoring the connections between people and the Bay.

Shellmounds reflect the value of South Bay habitats and species.

These massive mounds of shell, bone, soil, and artifacts were often several stories high, constructed by native peoples largely from Bay resources. Shellmounds tend to be located at the Bay's edge in areas of high ecological diversity; native peoples likely enhanced that diversity through land management practices. The distribution and contents of the South Bay shellmounds provide valuable long-term evidence of how the local indigenous people incorporated the bountiful resources of the Bay into their diet, commerce, and spiritual practices. While ongoing development continues to threaten these historic features, the salt pond restoration process provides an opportunity to reincorporate an understanding of these cultural and ecological landmarks into a restored landscape. Below, a person standing on a shellmound near Coyote Hills in 1935 gives an indication of how vast these features were.

Above, courtesy Phoebe Apperson Hearst Museum of Anthropology and the Regents of the University of California, photographed by Waldo Wedel, 1935, catalog number 15-10730, thanks to Kent Lightfoot. Below, from *New Historical Atlas of Alameda County,* Thompson and West, 1878, courtesy the Walsh family.

Roads follow landings to the Bay.

Historically, the broad marshlands of the South Bay moved vast amounts of water in and out of their channels each day, sustaining large tidal channels that scoured access to the deeper bay. Early landings—Alviso, Union City, Redwood City, Roberts Landing (below, near San Lorenzo)—were usually positioned along these natural access points linking land and water. With the diking of large areas of marshland, the natural channels filled in, but restoration promises to reestablish some of these natural corridors of human movement.

Hunting the marshes. While we tend to think of the Suisun marshes as the main locale for waterfowl in the region, most of the Bay's tidal marshlands were productive waterfowl habitat well into the 20th century. The journal *Overland Monthly* described "hundreds of shooting clubs and resorts… [from] San Leandro Bay down south to Alviso" in 1910, prior to the construction of most of the salt ponds. The several hundred citizens currently identified as members of local hunting clubs are testimony to the persistence of hunting in the South Bay.

Photo of duck hunter from *Overland Monthly,* November 1910, No. 5, Vol. LVI.

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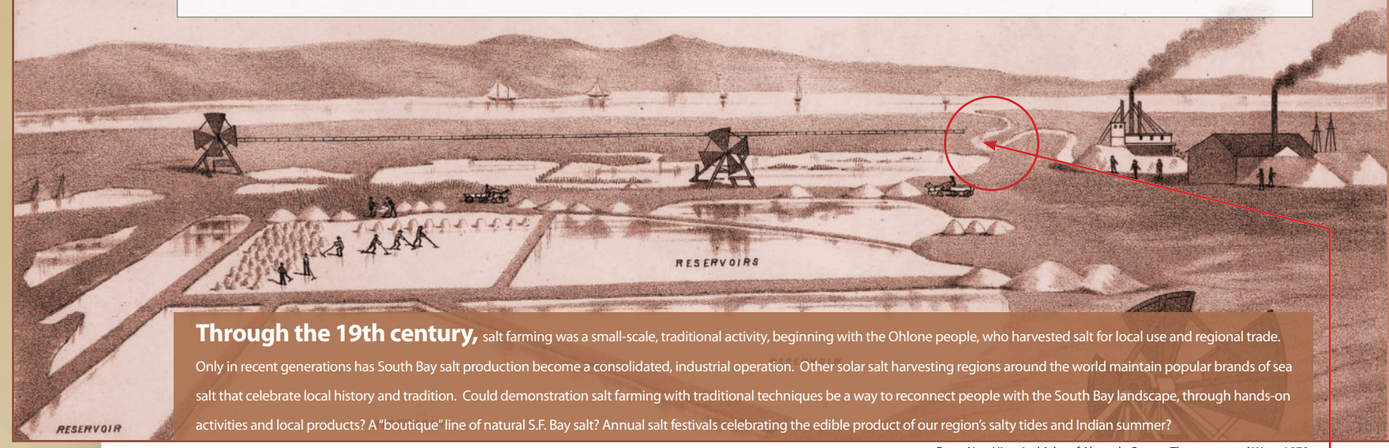
Salt pond history – *models for reintegration*

The development of artificial salt ponds has resulted in the most extensive transformation of the South Bay landscape. However, salt ponds were—and can be again—a natural part of the tidal marsh ecosystem. While we typically frame restoration options as salt ponds versus tidal marsh, history provides robust examples of their integration, through both natural process and local tradition.



Through the 19th century, salt farming was a small-scale, traditional activity, beginning with the Ohlone people, who harvested salt for local use and regional trade. Only in recent generations has South Bay salt production become a consolidated, industrial operation. Other solar salt harvesting regions around the world maintain popular brands of sea salt that celebrate local history and tradition. Could demonstration salt farming with traditional techniques be a way to reconnect people with the South Bay landscape, through hands-on activities and local products? A "boutique" line of natural S.F. Bay salt? Annual salt festivals celebrating the edible product of our region's salty tides and Indian summer?

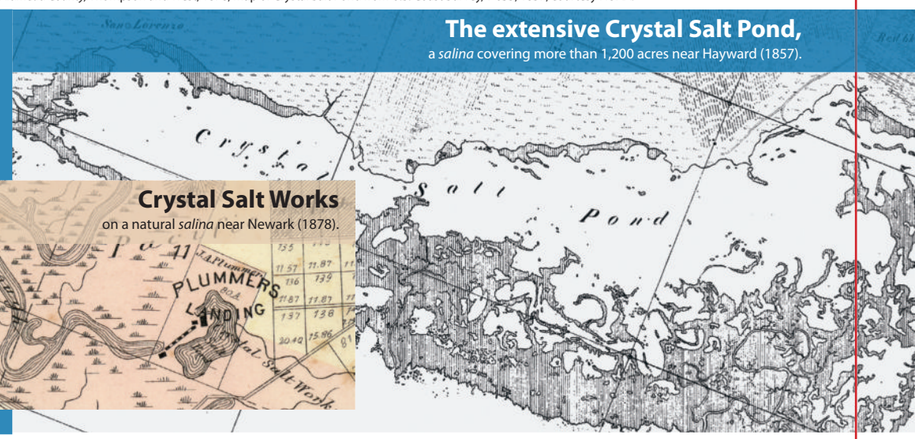
From *New Historical Atlas of Alameda County,* Thompson and West, 1878.

Map of Crystal Salt Works from *New Historical Atlas of Alameda County,* Thompson and West, 1878; map of Crystal Salt Pond from U.S. Coast Survey, T-635, 1857, courtesy NOAA.

Large historic salt ponds

were called *salinas* by Spanish settlers and "hot ponds" by Americans. These broad, open-water areas of the marshland captured water during high tides, which then evaporated during the dry, windy summer months. The salt pond industry expanded from native management of the salt ponds into one of the largest industrial solar evaporation complexes in the world, largely shaping the landscape we inherit today.

The extensive Crystal Salt Pond,
a *salina* covering more than 1,200 acres near Hayward (1857).



Crystal Salt Works
on a natural *salina* near Newark (1878).

From U.S. Coast Survey, T-635, 1857, courtesy NOAA; from U.S. Coast and Geodetic Survey, T-2252, 1896, courtesy NOAA; 1996 air photo courtesy BCDC and NOAA.

Evolution of salt ponds. During the past 150 years, the *salinas* were subdivided and expanded, transforming a marsh with scattered ponds (1857) into ponds with fringing marsh (1996). The smaller, late 19th-century salt works, independently managed at scales of 20 to 1,000 acres, demonstrate an intermediate level of management with a range of ecological and cultural benefits. The historical character and landscape position of these features provide evidence for the integration of modern salt ponds into a diverse South Bay landscape. (The channel meander circled in red provides a common reference point between the images.)