Habitat Characteristics of Past Delta Landscapes:
Knowledge for Improving Future Ecosystem Resilience

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Historical Ecology

* synthesizing historical data into useful information*

- Improves understanding of relationships between physical processes, habitat, and ecological function
- Describes the conditions within which species evolved
- Challenges assumptions
- Provides information about landscape change
- Helps identify opportunities within the contemporary landscape

*NOT a template from which to re-create the past*
"The lake was situated far out in an impenetrable tule swamp of immense extent... it was a sort of "sanctuary" to which birds came..."

"lagoons... whose waters flowed back swiftly into the Sacramento with the ebbing tides"

"nothing but tule, without a tree under which the navigator may find shade"

"In a grass-covered area between the forest and swamp"

"the river was filled with drift wood, forming a raft"
Historical Habitat Map
(DRAFT)
Delta Landscapes

- Flood Basins
- Tidal Islands
- Distributary Rivers
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<th>SELECTED LANDSCAPE CHARACTERISTICS</th>
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TIDAL ISLANDS: CHANNELS

- Mapped: 23,000 acres out of ~300,000 acres
- ~900 miles of tidal channel
- Densities generally between 20 and 40 ft/ac
- Sinuosity: 1.25 – 4.5
Spring tide: 3.5 ft

Tide: 1 in

Tide: 3.5 ft

Tide: 4 - 5.5 ft

The ordinary tides wet the lands when not leveed, but do not overflow them except at the spring tides…” (Day 1869)
How many sloughs and where?

Wallace 1876
Bouldin Island:

“In making the circumference of the island the line crosses **3 Beaver cuts and 3 sloughs**. The Beaver cuts being from 4 to 7 feet deep and the sloughs from 10 to 20 feet...The sloughs keep their width and depth for some distance inland and the surface being low at their heads…”

(Beaumont 1861)
TIDAL ISLANDS: CHANNELS

How wide were the sloughs?

~100m
10m
10m
13m
8m
8m
12m

General Land Office Survey
W. F. Benson 1878
FLOOD BASINS: PONDS AND LAKES

- Mapped: 4,500 acres
- Average size: 110 acres
- Maximum size: 630 acres
- 80% of total pond/lake area out of 40% of total area
“Though the lake was a large one it was very shallow - could be waded in all parts, except a small streak in the middle…” (Wright ca. 1850)

“many coves and slough-like branches” (Wright ca. 1850)

“small lakes or bayous, which seem to be filled at high water, but become stagnant during the dry season” (Wilkes 1845)
Tule marsh water was “so thoroughly impregnated with decaying vegetable matter that it looked more like sherry than water... In order to see the strange creatures in the water no microscope was required; they were visible to the naked eye... In lying down to drink from the edge of a pool we had before us for study a whole universe of animalcules.” (Wright ca. 1850)
Character of hydrologic connectivity

**In-stream flows:** inorganic sediment, short residence time

**Tidal marsh discharge:** organic material, zooplankton, longer residence time, capacity for nutrient exchange, warmer temperatures

“...creeping slowly along toward tide water, not in a direct or free channel...” (Board of Swamp Land Commissioners 1864)
They were used:

“...into the tule to open spaces which were covered with water where ducks and geese would light.” (Thornton 1859)

“The small fish run into the sloughs and lakes as soon as the water gets sufficiently high, and return to the river when it begins to get low.” (Sacramento Daily Union, 6 June 1854)

“subterranean excavations of the beaver always gave us a perpendicular drop of about two feet” (Wright ca. 1850)
DISTRIBUTARY RIVERS: LAKES AND PONDS

- Mapped: 740 acres
- Average size: 19 acres
- Maximum size: 214 acres
- 13% of total pond/lake area out of 15% of total area
“Along the edge of the lowland just below this terrace a string of lakes connected by sloughs extend throughout the greater part of the area.” (Sweet et al. 1908)
DISTRIBUTARY RIVERS: LAKES AND PONDS

Depth: 1 ½ fathoms = 9 ft
Area: 150-200 acres

Gibbes 1850
Salmon Slough: “The stream bed is full of logs and the boats grounded two or three times.” (Abella 1811)

“The current of that river being thus destroyed, the river was filled with drift wood, forming a raft…” (Naglee 1879)

“...great many old logs and an immense amount of driftwood and rubbish in Old River” (Tucker Field Notes 1879)
“Río del Pescadero [Old River]...fishing is done in it for salmon.”

“...it was salmon, tenderer, fatter, and more savory...for perhaps because there is so much fresh water here it grows larger, fatter, and better flavored.”
(Bolton [ed] 1927, “Anza’s California Expeditions” 1776)

“...we rested here [El Pescadero] and passed the time well with fresh salmon and wild grapes" (Cook 1960, “Father Vaider’s Second Trip,” October 29, 1810)
BENEFITS TO DELTA RESTORATION AND MANAGEMENT

► Improves understanding of the relationship between habitats and physical process

► Provides knowledge of the evolutionary template for species of concern and overall biological productivity

► Contributes to efforts to establish design principles and target metrics and recalibrates expectations

► Is useful to the process of establishing a unified vision for the future Delta

► Identifies opportunities (and constraints) within the contemporary landscape

► Helps individual restoration projects link into functional landscape units
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