I. STRUCTURE AND FUNCTION OF THE ECOSYSTEM

The boundaries of the coastal preserve extend from the confluence of Armand Bayou with Clear Lake (at NASA Road 1) upstream to the limit of tidal influence (Figure 1). The exact limit of upstream tidal influence is uncertain. The Texas General Land Office considers the limit to be approximately 2000 feet upstream of the confluence of Armand Bayou and Spring Gully (point A in Fig. 1). This establishes the preserve as approximately 6.8 miles in length. Alternatively, the Texas Water Commission has designated this point to be approximately 0.5 miles south of Genoa-Red Bluff Road, adjacent to the Baywood Country Club (point B in Fig. 1). Following the sinuous bayou path, this point increases the length of the preserve to 7.9 stream miles. The lateral boundaries are the mean high tide line, the limit of state ownership.

The tidal stretch of the bayou is designated as Segment 1113 by the Texas Water Commission. The non-tidal upstream portion of Armand Bayou itself and its several tributaries (Horsepen Bayou, Big Island Slough, Spring Gully, Willow Springs Gully) are not designated stream segments. The coastal preserve is an aquatic preserve, permanently or cyclically covered by tidal waters.

The Armand Bayou portion of the Galveston Bay ecosystem which is being incorporated into the coastal preserve has a linear structure. It is an open system which receives substantial inputs of freshwater, sediment, and nutrients from the surrounding upland areas and tributaries. It receives inputs of tidal energy and larval and juvenile forms of marine life from the bay itself. Galveston Bay has primary, secondary, and tertiary bay components. Lower Galveston Bay is a primary bay in this system; it is closest to the tidal inlet at Bolivar Roads and exchanges water and organisms directly with the Gulf of Mexico. Consequently, it experiences high salinities, from 20 to 30 parts per thousand (ppt). Upper Galveston Bay and Trinity Bay constitute a secondary bay; the width of the bay is constricted between Eagle Point and Smith Point and oyster reefs span this gap. As a secondary bay, this segment receives the brunt of freshwater, sediment, and nutrient input. Salinities are lower, frequently 10 to 20 ppt at the connection to the lower bay, approaching zero at the mouths of the Trinity and San Jacinto Rivers.

Tertiary bays are one step further removed from the sea. They are usually small, well-enclosed, basins which exchange material and organisms with secondary bays (Britton & Morton, 1989). Salinity ranges from fresh to slightly brackish but marine organisms predominate. Clear Lake is a classic example of a tertiary bay. It has a tightly constricted connection to upper Galveston Bay which restrains tidal influences. The lower reach of Armand Bayou, called Mud Lake, is broad and shallow and closely couples the bayou to Clear Lake, providing feeding grounds for the inhabitants of the tertiary bay.

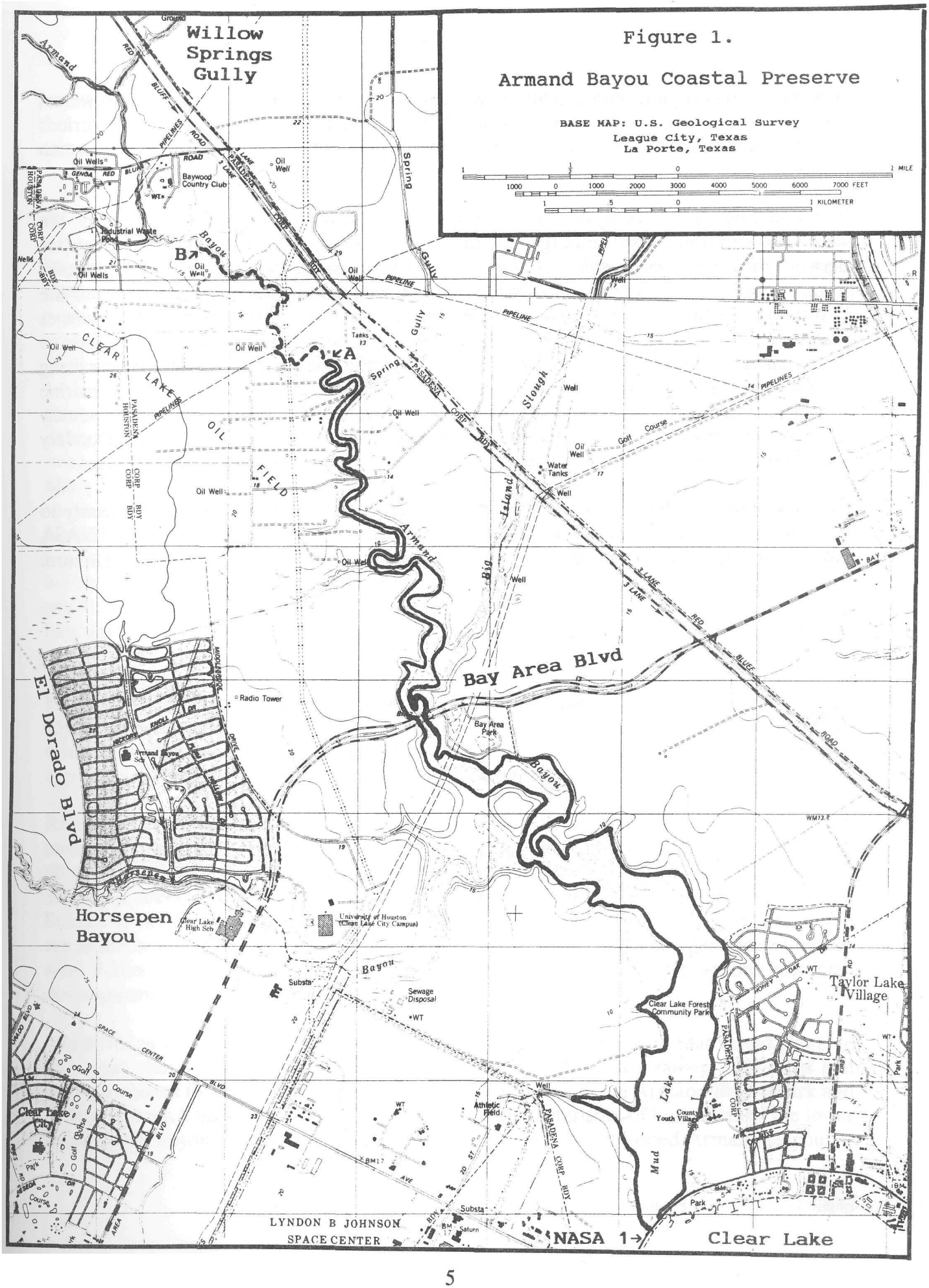
Figure 1.
Armand Bayou Coastal Preserve
BASE MAP: U.S. Geological Survey
League City, Texas
La Porte, Texas
1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER
Willow Springs Gully
Armand Bayou
Spring Gully
Big Island Slough
Mud Lake
Bay Area Blvd
El Dorado Blvd
Horsepen Bayou
Taylor Lake Village
Clear Lake City
Clear Lake
NASA 1
LYNDON B JOHNSON SPACE CENTER
Baywood Country Club
Bay Area Park
Clear Lake Forest Community Park
Clear Lake High Sch
University of Houston (Clear Lake City Campus)
Armand Bayou Sch
Radio Tower
Athletic Field
Sewage Disposal
Substa
Oil Wells
Oil Well
Water Tanks
Golf Course
Industrial Waste Pond
PIPELINE
PASADENA HOUSTON CORP BDY
CLEAR LAKE OIL FIELD
3 LANE RED BLUFF ROAD
SPACE CENTER BLVD

Armand Bayou is significantly influenced by activity anywhere within its watershed. Its waters originate from direct precipitation and runoff from upland areas. During extended periods of drought, flow in the bayou ceases except for supplementary waters provided by human activity.

The functions of the ecosystem follow its linear structure. The coastal prairies of the watershed contribute dissolved organic matter and both large and small particles of detritus derived from the decomposition of plant and animal remains. Partially decomposed leaves from the water-tolerant trees and shrubs of the fluvial woodlands along the banks of the bayou are flushed into the waterway with each flooding event. Streamside marshes manufacture more organic material for the detrital-based food chain. Detritus, colonized and conditioned by bacteria and fungi, forms the nutrient and energy source for organisms living in and on the mud bottoms of Mud Lake and Clear Lake. At this point, juvenile marine organisms find a rich feeding ground within Clear Lake. As they grow larger they gradually foresake this tertiary bay and reverse their initial migration, slowly traversing the secondary and primary bays of the estuary before returning to the sea to mature and reproduce.

To understand the importance of the Armand Bayou Coastal Preserve, it is necessary to understand the watershed connections and the role of estuarine components beyond NASA Road 1. To accomplish this task, major environmental components will be examined in turn.