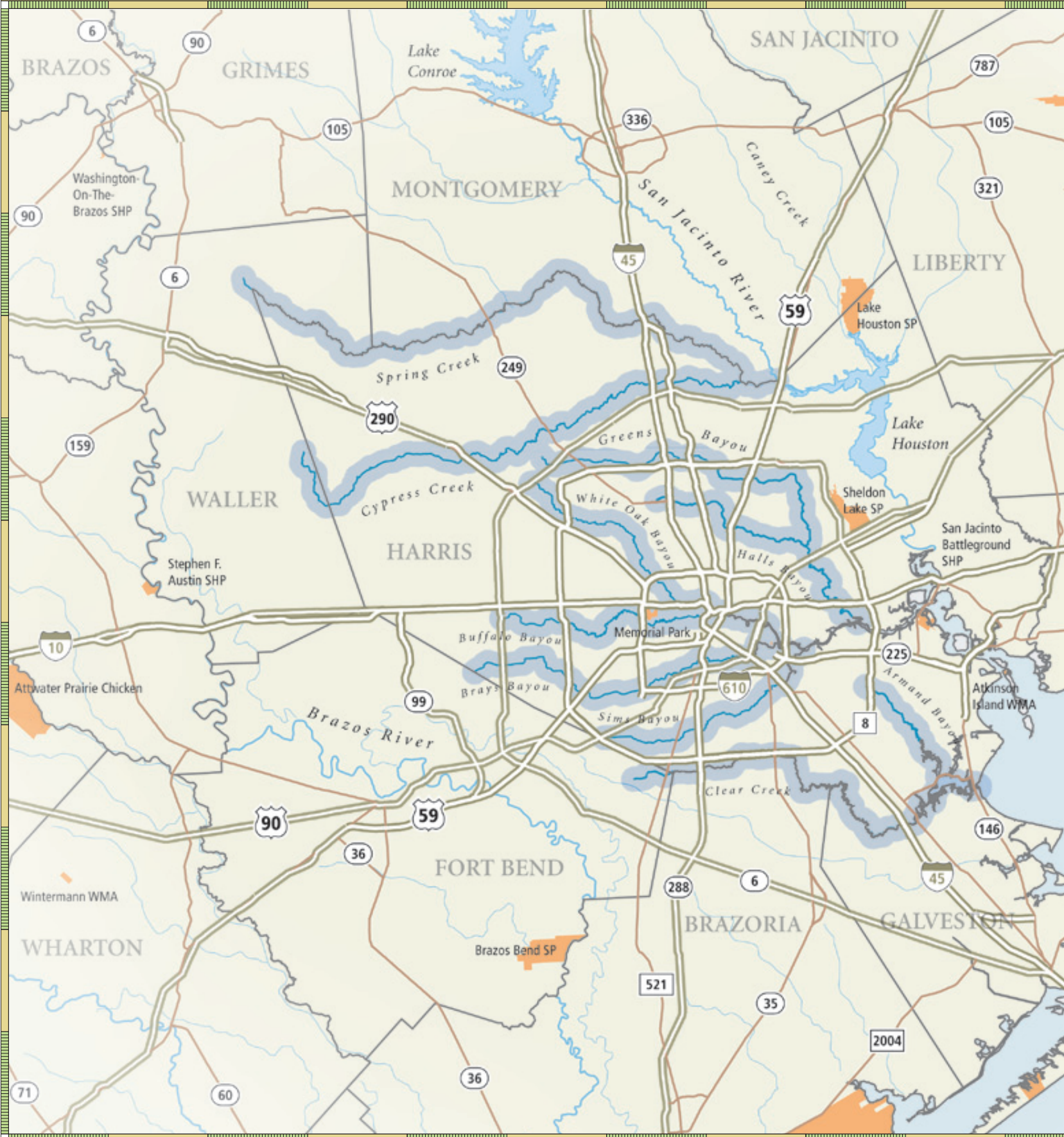
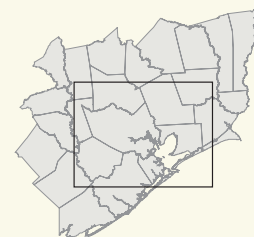
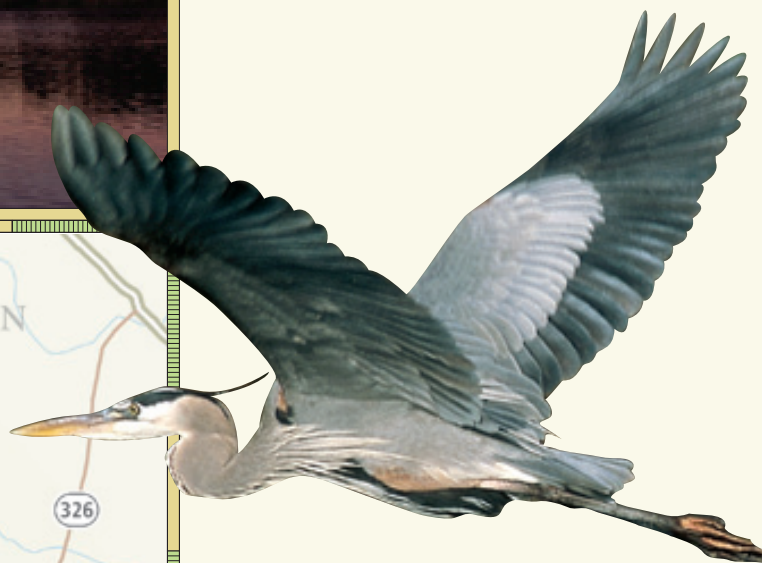
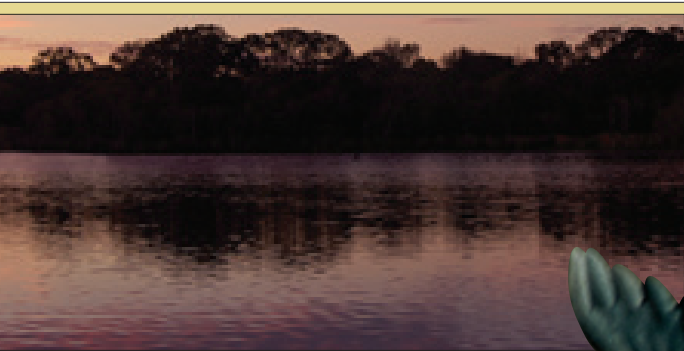


Bayou Wilderness





WE HAVE GOOD REASON to call Houston the Bayou City. It is crisscrossed by waterways of all types, cutting through the flat coastal plain. We have rivers, bayous and creeks, some coming in from afar, some rising in the Houston Wilderness and flowing into the estuaries or directly to the Gulf, and some flowing through highly developed portions of Harris County. This chapter is a tribute to the bayou wilderness that still exists within the greater Houston metropolitan area.

Harris County and Houston are bisected by Buffalo Bayou, which rises in the Katy Prairie west of the city and flows to the east through the Memorial area and right through downtown, its course eventually becoming the deepwater Houston Ship Channel.

Buffalo Bayou is joined by several other bayous that define various Houston neighborhoods. Its northern tributaries include White Oak Bayou, flowing in from northwest Harris County through the Houston Heights and emptying into Buffalo Bayou downtown. Hunting Bayou is a small waterway entering the Houston Ship Channel near East Loop 610. South of Bush Intercontinental Airport, Greens Bayou flows eastward near Beltway 8, and then turns south, again paralleling the beltway, where it is joined

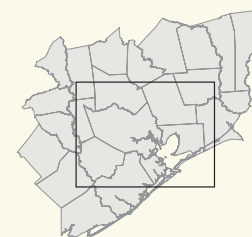


Experiencing a quiet morning on Armand Bayou. Even within the city limits, there are pockets of wilderness to enjoy where people can forget they are within a thriving metropolis.



*Bayou Wilderness inhabitants from top left to right: immature Long-horned grasshopper of the family Tettigoniidae; Hooded Warbler, *Wilsonia citrina*; Golden-winged skimmer,*

Libellula auripennis. Bottom left: The Sabine-to-Bagby Promenade Grand Opening celebrated the completion of a new 23-acre park that includes lush landscaping and trails.



by Halls Bayou on its way to the Houston Ship Channel. On the south side of the city, Brays Bayou flows from the southwest through the Houston Medical Center to join Buffalo Bayou east of downtown. Sims Bayou also drains southern Harris County, flowing through the Hobby Airport area to enter the deepwater Buffalo Bayou east of the Brays Bayou inflow.

Other natural watercourses in greater Houston are Cypress Creek and Spring Creek, which flow across northern Harris County to join the San Jacinto River in forming Lake Houston. Spring Creek forms the boundary between Harris and Montgomery counties, while Cypress Creek rises in Waller County and flows through the Katy Prairie. Both these creeks are bordered by pine forests with adjacent hardwoods and massive white sand bars, the appealing terrain of the FM 1960 area, Spring and the Woodlands.

To the south, Clear Creek flows from Brazoria County eastward to Galveston Bay, forming the boundary between Harris and Galveston counties. As it moves toward the bay, Clear Creek becomes Clear Lake, the setting now famous for NASA's Johnson Space Center, the home of the manned space flight program. The Clear Creek watershed also includes Armand Bayou, flowing into Clear Lake. Portions of the shores of Clear Creek and Clear Lake lie in Houston, Pasadena and a series of smaller communities—League City, Clear Lake Shores, Kemah, Seabrook, Taylor Lake Village, El Lago, Webster, Nassau Bay and Friendswood.

The size of the smaller creeks and bayous is misleading. These waterways are characterized by a relatively small incised channel that is cut into the clay of the flat coastal plain. Most of the time water flows in this cut channel. On some bayous the channel may be as small as ten to fifteen feet in width and only a few feet deep, while

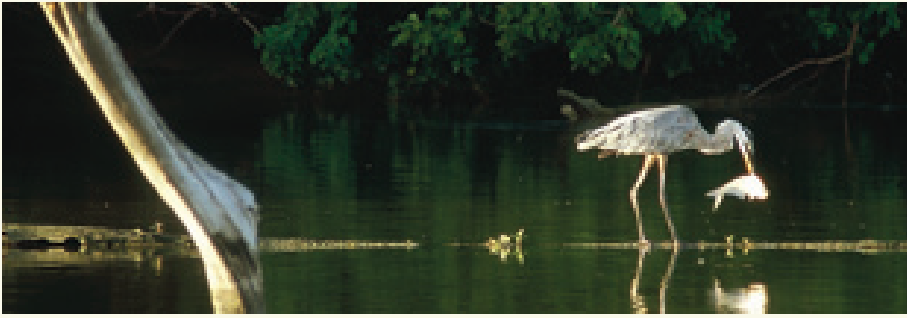
others are wider and deeper. The important point, however, is that the incised channels were formed over thousands of years and carry only the low to average flows. When big rains come, the creeks and bayous simply rise out of their banks and spread out to cover whatever land is necessary to accommodate the water.

And big rains do come to the Houston area. It is common for rainfall amounts of three to four inches to fall over a twelve-hour period. Our so-called one-hundred-year rainfall event—(rainfall intensity sufficiently rare that it occurs only once every one hundred years)—is estimated to be just over thirteen inches in a twenty-four-hour period. But we have had several measured events in which the rainfall exceeded twenty inches over a twenty-four-hour period. During Tropical Storm Allison in June 2001, a station in northeast Houston recorded more than twenty-six inches of rain in less than ten hours. Tropical Storm Claudette in July 1979 dropped forty-two inches of rain in northern Brazoria County in twenty-four hours. Big rains do indeed occur.

Looking carefully at natural streams and bayous, one can usually identify a relatively flat area adjacent to the incised channel, with a greater rise in the land surface elevation beyond this, farther



Anatomy of a Meandering Bayou. The water current is constantly eroding the outer bend, which creates a cut bank, and carrying sediment and depositing it further downstream on the next inside bend, which creates a point bar.



Species of the Bayou

Wilderness ecoregion include from top left to right: Great blue heron, Ardea herodias; Wood duck, Aix sponsa; Orchard Orbweaver, Leucauge venusta, and the migratory Monarch, Danaus plexippus.

away from the channel. This is the secondary channel that carries water during larger storms. It is called the floodplain of a stream or bayou. In its natural condition the floodplain is the site of great biological diversity, including varied hardwood trees and shrubs as well as a great diversity of mammals, birds, reptiles and amphibians.

This floodplain is part of the bayou. It functions as a flow zone during larger storm events, serving as an area that the bayou uses only part of the time. We can be sure that from time to time the floodwater will expand from the channel into this area. Our legal system, however, has failed to acknowledge that floodplains are part of the natural streams. Instead of setting aside the floodplain as a part of the watercourse, we have divided it up and allowed it to be sold for development. At best, this is extremely hazardous. Floodplain areas are bound to flood, and to flood repeatedly. They are part of the bayou, not part of the upland.

As Houston developed, housing and commercial structures were built adjacent to the bayous. In some cases structures were built close to the water for navigation and trade reasons. In other cases people wanted to be close to the water for the natural beauty. Predictably, these structures often flooded, and the flooding led to physical modifications of some watercourses in an attempt to reduce flood damage.

Some waterways were widened and deepened and lined with concrete, virtually eliminating their biological diversity; examples are Brays and White Oak bayous. Others, such as Buffalo Bayou east of downtown, were widened and deepened to provide deepwater navigation, removing the natural cypress stands and hardwoods. However, some creeks and bayous have escaped extensive modification and exist today in their natural state, offering respite from the surrounding city.

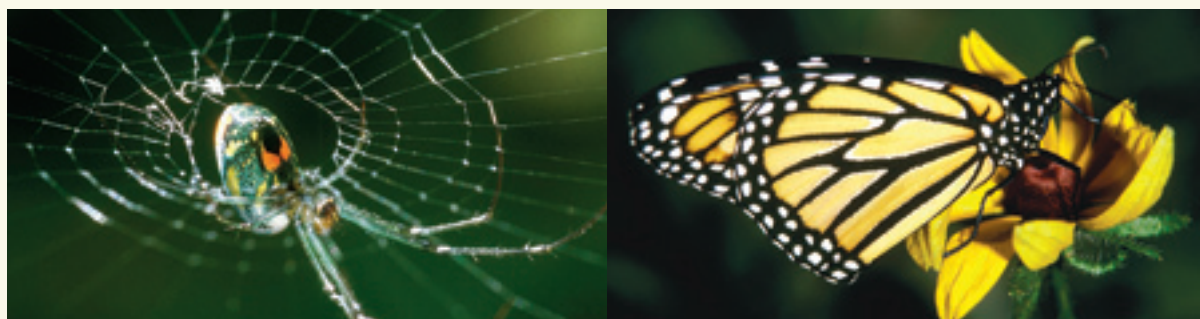
West of downtown, Buffalo Bayou is a ribbon of

life extending through urbanized Houston. This stretch of Buffalo Bayou was once the focus of a channelizing proposal that would have destroyed it but was saved by the intervention of the forty-first president of the United States, George H. W. Bush, when he was still a congressman, and by Terry Hershey, Houston's environmental god-mother. Today, it is simply an urban marvel.

Don Greene has been taking people on canoe trips down Buffalo Bayou for more than two decades. Through those many years, he has never lost his enthusiasm for the place or the trip. Don has great appreciation for the subtleties of the natural bayou, for how the stream flow creates eddy pools, for how the bank is eroded on the outer side of a bayou turn and how the land "accretes" on the inside of the turn. Don reads the water like most people read books.

A trip normally starts where West Loop 610 crosses Buffalo Bayou. Here, you put in at a shallow backwater and paddle out into the surprisingly fast flow of Buffalo Bayou. You have to watch for the pilings on the 610 bridge and avoid "strainers" where the current flows through downed trees. These strainers provide excellent aquatic habitat and are often perching sites for fish-eating birds such as the belted kingfisher and great egret. Strainers are also hazards to the unsuspecting canoeist. The current is stronger than you might think and can easily tip a canoe pushed against a downed tree. Everyone should be wearing a life jacket.

As you move down the bayou, city life slips away from your consciousness. The concrete and steel of freeway bridges and adjacent buildings transition to towering pines and oaks with an understory of yaupon and beautyberry. The noise so noticeable at the bridge fades away; soon the bayou is a quiet stream within a mixed pine-hardwood forest.



The elements of the natural bayou swim into focus. The banks are cut through clay and mud, with various layers clearly visible just above the water's edge. Certain layers appear to be weeping as groundwater seeps from a sandier zone above an impermeable clay layer; the groundwater moves slowly along within the more permeable layer and emerges where it can. After heavy rains the subsoil drains for weeks, slowly releasing into the bayou the rainwater stored during the storm.

A small sand bar at the water's edge shows a jumble of footprints. Side-by-side tracks with four long digits indicate the presence of a raccoon at the edge, probably washing off dinner. Farther down, the sand reveals the spread three-toed footprints of several large birds, the remains of a crayfish testifying that some predator was here. Butterflies flicker in the dappled sunlight falling on the bayou through the forest. Two sulphur yellow butterflies land on the sand bar and take water. Several orange and black butterflies flit among the flowering shrubs on the bank, along with numerous honeybees and bumblebees.

Pulling to the bank and walking quietly into the forest, you may catch a glimpse of the source of rustling in the leaves up on the floodplain bench. The animal taking itself out of sight is most likely an armadillo. Welcome to the bayou shore of Memorial Park and its floodplain forest, complete with large oaks reaching far above the yaupon and beautyberry understory.

Back in the canoe and rounding a bend brings you to another tree that has fallen in the water. A diamond-backed water snake glides gracefully away from the floating branches and from the paddlers steering around the obstruction. A fish rolls on the surface of the bayou, offering a passing glance at the prehistoric-looking alligator gar. A squeal may signal a pair of wood ducks taking off from a pool not yet in view. And all around

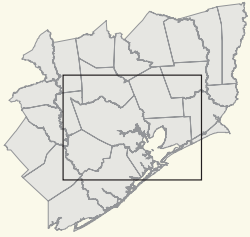
are the sounds of the woodland birds—the harsh cry of blue jay, the soft trill of the chickadee, the sweet inquiry of the cardinal and the piercing call of a pileated woodpecker emerging from the top of the floodplain forest, a dash of red and black in the blue sky between the emerald green trees.

A trip down Buffalo Bayou also provides testament to the power of the floods. One sees example after example of the failure of structures intended to control the natural force of the water—steel sheet piling pushed outward by the force of groundwater movement from soils saturated with floodwater, along with concrete mats and sheets collapsing into the water. While these streams look small, they become incredibly powerful when carrying the floodwater runoff of heavy storms.

Nearing the Shepherd Drive bridge, paddlers become aware of the city once again. Condominiums appear on the north side of the bayou, houses on the south. Continuing down the bayou takes you floating into downtown Houston, where glass-sheathed buildings scrape the sky in mind-bending contrast to the natural vistas of earlier in the day.

To enjoy the same habitats on foot, the Houston Arboretum offers an excellent trail system through the floodplain forest to the edge of Buffalo Bayou. Many of the trees and shrubs are marked, which reveals their impressive variety. The arboretum has identified one hundred and two species of trees and shrubs within its one hundred and fifty-acre tract, and most are signed and located on maps. The arboretum has a bird list with more than one hundred and sixty-five species that can be seen on the property at various times of the year; thirty-one mammals, including bobcat and numerous bats; thirteen amphibians, twenty-seven reptiles, and twenty-two varieties of fish.

The bayou is full of life because food, cover and water are found here in a space largely without



Top left to right: Great egrets, *Casmerodius albus*, in courtship; an Osprey, *Pandion haliaetus*, in flight; and a Green heron, *Butorides virescens*, devouring its prey.

Bottom right: There are many recreational opportunities along Buffalo Bayou to explore the Bayou Wilderness ecoregion such as biking, jogging, canoeing and kayaking.

a human presence. A fine time for a trip down the bayou is in spring, when the hardwoods put out their new leaves and the forest is painted in varying tones of fresh green; but any time on the bayou is a good time.

Clear Creek and Armand Bayou in southern Harris County provide a similar experience. Clear Creek rises in eastern Brazoria County and flows eastward through Pearland and Friendswood to League City, where it becomes the tidal estuary called Clear Lake. Armand Bayou flows southward from Pasadena to enter Clear Lake near the Johnson Space Center. However, unlike the natural portion of Buffalo Bayou, the lower courses of Clear Creek and Armand Bayou contain tidal wetlands as well as floodplain forests. The coastal habitat means that these waterways contain a greater diversity of fish and shellfish, including crabs and shrimp as well as a greater abundance of fish-eating birds such as the osprey, great egrets and even the reddish egret.

The preservation of bayous and creeks has been a long-standing interest for some Houston citizens. Their focused effort has resulted in purchase of open space adjacent to creeks and bayous to be set aside for public use. In this manner, many important lands have been preserved, including several tracts on Spring and Cypress creeks, Greens Bayou, Clear Creek and Armand Bayou. Today, these parklands are being connected by a series of trails that will allow much greater access to and appreciation of the bayou wilderness.

An exciting proposition is the attempt to restore bayous transformed in the past by channelization. Along both Brays and White Oak bayous are large developed areas that continue to flood despite the lining of the bayous with concrete. The continued flooding problems reveal an earlier lack of understanding of the hydrologic function of the prairies, which used to hold massive amounts of

rainwater in wetland potholes and flats as well as in rice fields.

As prairies to the west of Houston have been developed, the hydrologic regime has changed. Prior to development, rainfall was stored in the prairie wetlands, slowly running off into creeks and bayous over many days and weeks. After development, storm sewers and concrete drainage ditches push the storm water into the bayous and creeks much faster than under natural conditions, increasing the peak flows by a factor of five or even ten when compared to the original flows. This phenomenon was first recognized in the 1970s and is now well defined in the scientific literature.

The bottom line is that our earlier efforts to control flooding could not provide protection against the huge volumes of water dumped from upstream development, and our flooding problems persist. New policies have now begun to emphasize buying out flood-prone properties and removing the vulnerable homes. As we remove homes from flood-prone areas, opportunities arise for habitat enhancement even along channelized watercourses. In some places the stream courses can be widened to create wetlands. The forest can be reestablished on the bench above the incised channel. In short, to some degree we can allow the floodplains to return; there is no need for these places to remain biologically impoverished.

There is thus much to celebrate in our bayou wilderness. We have areas that have managed to emerge into the twenty-first century relatively intact and others that need to be rehabilitated. Trail systems connecting them will form a web reaching upstream from developed areas into the prairies and pine forests, and downstream to the estuaries and marshes, linking city dwellers of every species along the waterways to our rural surroundings, connecting us all to our wilderness.

