



LEARN THE SONG OF OUR LAND

× IF YOU BELIEVE THE HOUSTON REGION IS A FLAT FEATURELESS LANDSCAPE OF LIMITED NATURAL BEAUTY, THINK AGAIN. NOW IS THE TIME TO PRESERVE THE REMARKABLY COMPLEX ECOSYSTEMS THAT RING OUR CITY.

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BY JOHN JACOB

CATEGORIES OF HABITAT

Coastal Prairie: High Integrity

Prairies that have never been land leveled and, for the most part, have never been plowed. The full measure of landscape diversity is present.

Coastal Prairie: Moderate Integrity

Areas have experienced either no land leveling, but significant disturbance in terms of oil fields, very low-density development and the like, or moderate land leveling with no other complications.

Upland Forests

Undifferentiated forests, either hardwoods or pines, but are commonly coastal flatwood hardwood forests.

Bottomland Forests

Undifferentiated bottomland forests, mainly forests in 100-year floodplains.

Salt Marshes

Tidally influenced wetlands including marsh hay cordgrass and smooth cordgrass.

If we are to protect the world's multitude of places and creatures, then we must know them, not just conceptually but imaginatively as well. They must be pictured in the mind and in memory; they must be known with affection, "by heart," so that in seeing or remembering them the heart may be said to sing, to make a music peculiar to its recognition of each particular place or creature that it knows well. WENDELL BERRY, "LIFE IS A MIRACLE," 2001

Real sustainability has to be about *place*. It can't just be about consuming less. It's not even really about "the planet." It's about *us*, right here where we are. Is *this* place a sustainable place? Could our grandchildren or their grandchildren continue to live here and thrive? Sure, we can buy organic "sustainable" strawberries from the San Joaquin Valley now, but when it becomes too expensive to ship those strawberries 1,800 miles to Houston, will there be sustainable produce grown right here that we can buy? Just exactly what *could* we buy locally if skyrocketing fuel prices meant we would have to live off the land? Off our land, that is. What is there here that could sustain us?

But we need more than farmland to sustain us. We also need natural areas, both prairies and forests, to make sure we have enough clean air to breathe and enough clean water for both us and the rest of creation that depends on the waterways in this area. The farmlands, prairies, and forests that surround us can be thought of as our "agroecological" infrastructure. We can't do much without the "gray" infrastructure we are all familiar with—bridges, buildings, power lines, the Internet—but in the long run, we can't do *anything* at all without the green or agroecological infrastructure that sustains us and provides us with clean air and water. Unfortunately, we are about to lose the very best of what is left in terms of both farmland and natural areas, all in the next 30 to 50 years. We will consume at least 1,000 square miles of forests, farms, and prairies in this period if we continue building out in the same pattern and at the same density as we do today. What does this say about our long-term prospects for sustainability?

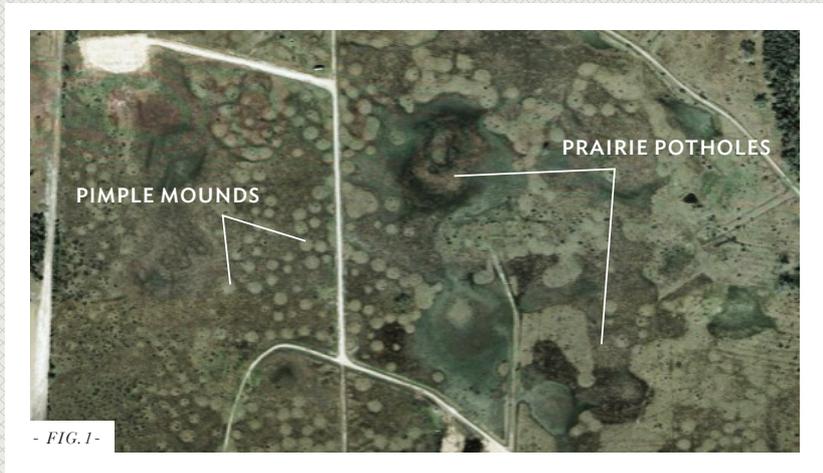
Incredibly, we do have a fair amount of agroecological infrastructure remaining in relatively good condition, even now, after all that sprawl has

destroyed. There are still some large, very significant expanses of farmland and natural areas across the eight-county region centered on Houston. Our city could be a thriving, sustainable metropolis hundreds of years from now, with a vibrant and productive hinterland providing real, place-based sustainability for the foreseeable future. But our window of opportunity for putting that future into place is fast closing.

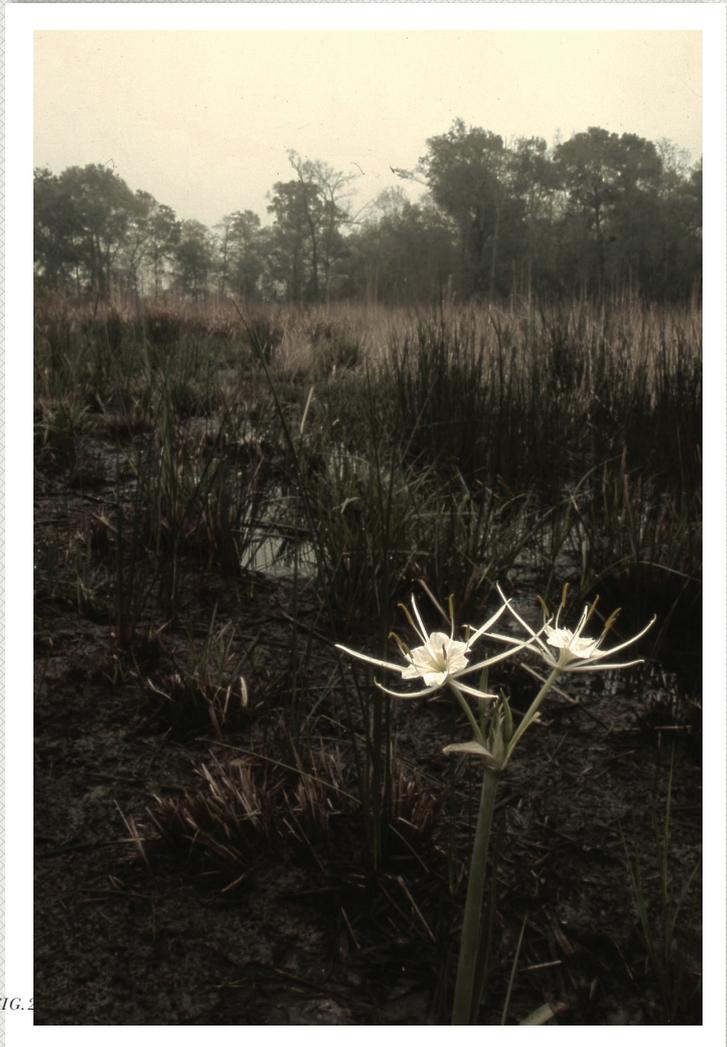
THE STORY OF OUR LAND

Place-based sustainability begins with understanding the makeup of our particular place. We have to learn the "song" of our place, as Wendell Berry suggests. But first we have to learn the notes of the song, the pieces that make up our landscape.

Just a few years ago, my grandson excitedly told me about a new program in his elementary school: "recycling for the rainforest." I was happy that he was learning about recycling, but for the rainforest? What about the coastal flatwoods of Texas? What about the coastal prairies? How is it that our children are learning about rainforests before they learn about *our* land? I argue below that landscapes on the upper Gulf Coast of Texas are extremely diverse and worthy of study by our best minds. It is a shameful travesty that our children are not learning about their own place on the planet. But the reality is that we have very few scientists studying the ecologies of our prairies or our forests. For so long, the Houston region has just been about developers making money and getting out. It is starting to be more than that, but we have so far to go.



- FIG. 1 -



- FIG. 2 -



- FIG. 3 -

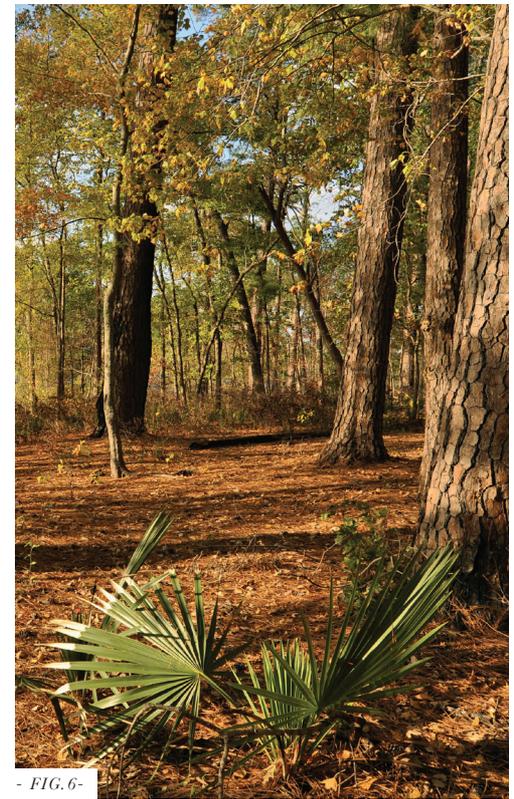


- FIG. 4 -



- FIG. 5 -

PHOTOS BY RON BILLINGS



- FIG. 6 -

COASTAL PRAIRIE: HIGH INTEGRITY

OPPOSITE

FIG. 1 *Shaped by wind, the small round white "dots" are "pimple mounds." The elongated and circular potholes (darker areas) are ancient river channel scar remnants.*

FIG. 2 *A spider lily rises from a prairie pothole.*

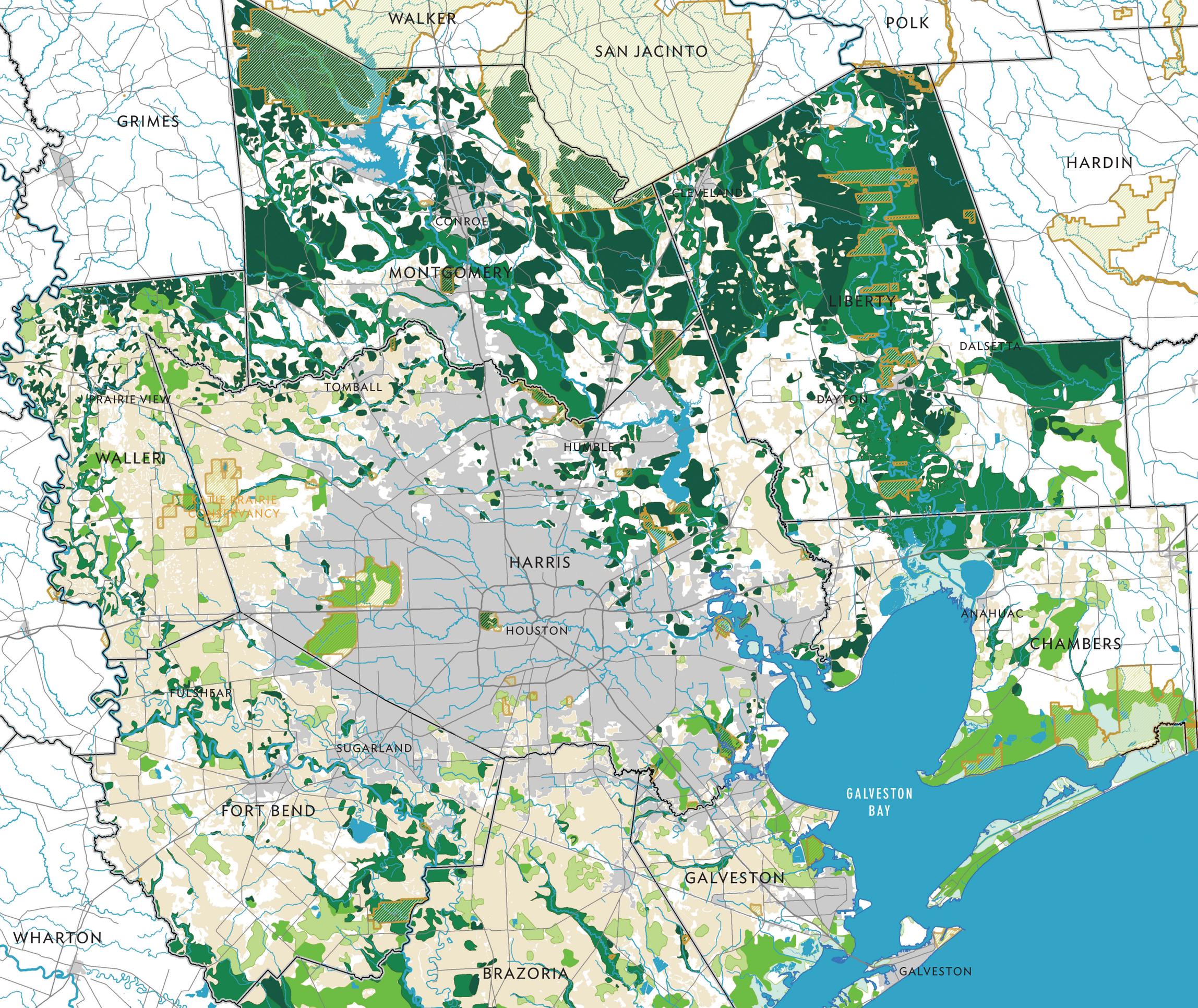
FIG. 3 *Abundant wildflowers bloom at the Deer Park Prairie.*

FIG. 4 *A prairie pothole at the edge of a woodland. A tightly packed mix of habitats is characteristic of many of our natural areas.*

UPLAND FORESTS

FIG. 5 *For some the soaring canopy of pines and hardwoods evoke a spiritual connection to nature.*

FIG. 6 *A native palmetto in the understory of an intact forest is a moment of small-scale beauty.*



WALKER

SAN JACINTO

POLK

GRIMES

HARDIN

CONROE

CLEVELAND

MONTGOMERY

LIBERTY

DALSETTA

PRAIRIE VIEW

TOMBALL

DAYTON

WALLER

LITTLE PRAIRIE
CONSERVANCY

HUMBLE

HARRIS

HOUSTON

ANAHUAC

CHAMBERS

FULSHEAR

SUGARLAND

GALVESTON BAY

FORT BEND

GALVESTON

GALVESTON

WHARTON

BRAZORIA



AGRO-ECOLOGICAL INFRASTRUCTURE OF THE HOUSTON-GALVESTON REGION

BY STEVEN MIKULENCAK

LANDSCAPE FEATURES OF REGIONAL SIGNIFICANCE

| | |
|--|--------------------------------------|
| | UPLAND FOREST |
| | BOTTOMLAND FOREST |
| | COASTAL PRAIRIE – HIGH INTEGRITY |
| | COASTAL PRAIRIE – MODERATE INTEGRITY |
| | ESTUARINE WETLANDS |
| | PRIME FARMLAND SOIL |
| | URBANIZED AREA |
| | CONSERVATION ZONES + PARKS |

ABOUT THIS MAP

This map shows the remaining significant habitat or natural areas in the greater Houston region. The criteria for “significant” were individual fragments greater than 100 acres and the presence of intact forests, or prairie complexes that have never been plowed for leveled. The map also shows prime farmland, land that has the best combination of biophysical and chemical characteristics for growing food and fiber.

For both prairies and forests, a few large segments make up the vast majority of the overall habitat. Just eight segments, each over 10,000 acres, make up 40 percent of the total remaining prairie. The story is the same for the forests. In general, the larger the habitat segment, the more varied and robust the potential ecology of that segment. Smaller segments, however, can still be very valuable, as they might be strategically located, and many small pieces often have very unique plant assemblages.

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Texas A&M University/Texas Sea Grant/Texas AgriLife

Cartographic Production by Steven Mikulencak, AICP
with support from Kirana Pandian

Data represented in this illustration is compiled from the Texas Coastal Watershed Program 2010 Landscape Survey, US Census Bureau, USGS, US Forest Service, US Fish and Wildlife Service, the National Wetland Inventory, Texas Department of Transportation, Texas Parks and Wildlife Department, and the Houston-Galveston Area Council.



10 MILES

The surface of the entire upper Gulf Coast of Texas is made up of sediments laid down by rivers. This is the most important point to remember about how this land came to be. Whether the land today is a bottomland that is currently flooded by rivers, or whether the land is higher and no longer flooded, it was all laid down by rivers and was once part of a floodplain. All of these sediments began their trip to the Gulf high in the Rockies eons ago.

The most recent of the sediments that make up our land, the bottomlands along our rivers, bear very distinct scars left by the rivers that laid them down. Looking at an aerial view of any present-day floodplain, it is easy to see that the river has moved around on this surface: there are oxbow lakes, for example, which are easily recognized as former channels of today's river. Over time, the river might even have cut across the same area several times, leaving a rather complex record of channel scars.

Present-day floodplains are only a few thousand years old at most, and some might only be about 500 to 1,000 years old. In contrast, the higher surfaces that most of us live on are at least 30,000 to 50,000 years old, with areas that might be well over 100,000 years old. These higher landscapes started out looking like the Trinity River bottomlands, but a lot could happen over the next 50,000 to 100,000 years. The wind blew, the buffalo roamed and wallowed, and the mastodons stomped across the landscape, reshaping an already complex landscape in new and remarkable ways.

"Potholes" and "pimple mounds" are some of the more interesting features that have evolved on this older landscape. A "prairie pothole and pimple mound complex" consists of depressions which are remnants of ancient river channels, and are about a foot or so below the surrounding landscape, while the pimple mounds are small hillocks (a few hundred square feet to an acre in size), likely wind-blown features formed in dryer eras in the past, and are no higher than about two feet above the surrounding landscape. The overall difference in elevation is not much in this landscape, almost invisible in fact to the untrained eye, but the short-range complexity of this landscape is unsurpassed by just about any landscape in the world. In a matter of inches or a few feet, one can change from an environment inundated and saturated most of the year (the deeper potholes) to a semi-arid micro-environment (the convex, water-shedding surfaces of the pimple mounds), with every gradation in between. This reworked ancient landscape, a palimpsest of these many geomorphic processes writing over each other, is in a sense a "chance melody" wrought by nature—an irreplaceable mosaic of short-range complexity that supports an extremely diverse set of flora and fauna. A simplified diagram can hardly do this landscape justice. The many gradations of lightness and darkness on aerial photos do a better job of revealing the true complexity.

Ancient channel scars are found on paleo meander ridges of the ancestral Brazos and other rivers. These ridges are about 10 feet above the surrounding landscape, and anywhere from one to four miles across. These ridges represent the last courses of these ancestral rivers on this landscape, essentially the rivers and their natural levees.

Potholes and pimple mounds are found both on the prairies and under the forests, but because they are easier to see on the prairie, we mainly call these landscapes *prairie* pothole-pimple mound complexes. It turns out that there are not many forests left on these kinds of landscapes. Just a few patches near Lake Houston are about all that remain.

THE CURSE OF FLAT LAND

The Houston region does not have any grand mountain vistas—no Garden of the Gods, no Yosemite. We do, however, have a landscape of unparalleled diversity. But it is a diversity you can't see unless you have been initiated. To motorists passing by at 70 miles an hour, there is absolutely nothing there.

So who mourns at the loss of this landscape? Not very many so far. It is difficult to rally folks to protect a landscape they can't really see, much less understand. There is a beauty on the prairie—it is the beauty of the ocean, the beauty of wide open spaces—but that's difficult to appreciate when the prairie has been reduced to a small patch. Trees have a better time of it: most people can still appreciate the beauty of a small mott (grove) of trees. But for both trees and prairies, we need large unbroken expanses to guarantee functioning ecosystems. Ten-acre patches do not an ecosystem make.

WHAT WE HAVE TODAY—THE ECOLOGIC MAP

NATURAL HABITAT

The vast prairies and forests that greeted the first Anglo settlers almost 200 years ago are long gone, but they are far from *all* gone. Some very large and significant patches remain, but the threat of losing these surviving areas to development is now very high. Some of the very best of what's left on the entire coast is in the urban periphery, an area not yet reached by either sprawl nor intensive row-crop agriculture. This is precisely the area now most under threat in the next few decades.

RIGHT *An interpretation of the pothole-pimple mound complex by artist Sarah Welch.*



BOTTOMLAND FORESTS



FIG. 7 *Bald cypress dominate this wetland forest.*

- FIG. 7-

In conjunction with the Houston-Galveston Area Council, the Texas Coastal Watershed Program—a part of the Texas Sea Grant at Texas A&M and the Texas A&M AgriLife Extension Service—recently undertook the mapping of the significant remaining habitat fragments in the eight counties constituting the greater Houston area. By “significant,” we mean habitat patches of 100 acres or greater that have some kind of ecological value. Within the ecological literature, 100 acres is considered a more or less minimum size where some semblance of ecological integrity can be maintained. Limiting our mapping to patches greater than 100 acres allowed us to complete the inventory with the resources we had at hand and in a reasonable time. The map is a major step forward in getting a handle on the remaining ecological resources in the region. Still, it should be recognized that no claims of 100 percent accuracy are made for this map, particularly for including every one of the smaller patches. Although it is unlikely that many 1,000-acre expanses were missed, some 100- and 200-acre patches here and there could easily have been left out, as well as the occasional patches of less than 100 acres with unusually intact flora that merit preservation as parks or educational sites.

The foldout map shows the result of the project, the “agroecological infrastructure” of the eight-county region. Habitat patches were outlined on high-quality aerial photography, mainly from Google Earth, and then transferred to a digital geographic information system for the final cartography and analysis. Areas of prime farmland were derived from the Natural Resources Conservation Service soil survey database. FEMA floodplain lines were used to differentiate bottomland from upland forests. Salt marshes were taken from the National Wetlands Inventory.

Houston is in a unique area: we sit astride an “ecotone,” a transition zone between two different ecological types or biomes. Transition zones are where things get interesting, whether ecologically or culturally. *Culturally*, we are in the transition zone between the South and the West. There is an interesting commingling of both, and emergent features occur here that belong to neither. So, too, *ecologically*. We are



- FIG. 8-

SALT MARSHES

FIG. 8 *Salt marshes provide critical habitat for virtually every commercial and recreational fish and shellfish species at some stage of their development.*

× what we can do.

We can rise to the occasion—we do indeed have it in us. But we will have to learn the song of our land. We will have to teach it to our neighbors. Our teachers will have to teach it to our children. We will all have to learn that our place, this place, is sacred ground: that it is special in its own right, but that most of all it is special because it is *our* place.

(1) Recognize what we have. There is extremely valuable land, both natural habitat areas and farmlands, still worth saving. We need to be able to articulate the value of what is left. How else will anyone know?

(2) Find ways to save the best of what’s left.

Mitigation of filled or developed wetlands is one of the best mechanisms we have. The US Clean Water Act requires that wetlands filled by development be replaced by created wetlands or by preserving and restoring other wetlands, but the U.S. Army Corps of Engineers considers most of our prairie pothole wetlands as well as the upland forested wetlands to be “closed depressions,” with no connections to state or federal waters, and therefore outside of their jurisdiction. This in spite of two separate, independent studies recently completed by Baylor and Texas A&M Universities demonstrating a very significant nexus between these kinds of wetlands and traditional navigable waters. During a full-throttle economy such as Houston enjoyed before the bust, we should be able to preserve the equivalent of an Anahuac National Wildlife Reserve every year if most developed wetlands were mitigated through the preservation and enhancement of existing wetlands.

(3) Study other methods of land conservation. For example, the transfer of development rights, carbon trading, and impact fees. Any of the methods would require imaginative use of available legal structures (see point 6 below). Not all land conservation requires land purchase. Land owners can be provided with incentives and paid for conservation easements.

(4) Name the prairies and forests. Everybody knows the name of just one prairie—the Katy Prairie. All the large prairies were once known by name. Naming specific prairies and forests helps make them part of our consciousness and more likely to be treasured and preserved.

(5) Build our communities in ways that honor what we must take of nature. Walkable, built-to-last, and “livable” neighborhoods are best for us—and best for the nature that surrounds us. We could take care of every one of the four million or so people coming our way in the next 30 to 40 years with infill development, and the result would be a much more interesting and vibrant city than we have today. The average density would only be about that of a single-family detached home on small lots. And we would have all the farmland and natural areas we have today to boot. We would have a walkable city, places in nature to enjoy recreation, and food from nearby farms. This is an easily attainable vision if we can come together on the essentials.

(6) Use our imagination. It's what we need most. Fortunately, this is something that Houston has always had. It is not true that we are just a *laissez-faire* city with no government intervention anywhere for anything. One simple example is our shift from groundwater to surface water for public use. This shift basically required that we abandon the doctrine of the rule of capture—which mainly means drill for water at will with no regard for the effect of drawdown on neighbors—and make a massive public investment in infrastructure for surface distribution of lake water. That was a shift completely out of character with a totally *laissez-faire* culture. We can do it again.

located where the forest meets the prairie. It is a zone of incredible biodiversity, where boundaries shift back and forth over time. We are also located where freshwater meets the sea. These perpendicular axes of diversity are what make this such an interesting place.

At first glance, it should be obvious from the map that some very significant habitat remains in the area, in spite of all that has been lost. These large patches are very valuable ecologically, and they function, or at least they can function, as healthy coastal ecosystems. The larger the patch, the more valuable it is. Again, 100 acres is the *minimum* size for ecological integrity. A fully functioning prairie capable of supporting the full range of wildlife once found here would likely require tens to hundreds of thousands of acres of unbroken prairie expanses. These large expanses can no longer be found in our area, but there are still some substantial prairie patches that comprise several tens of thousands of acres. There are nearly 200,000 acres of 1,000 to 10,000-acre patches, and an equal acreage of greater than 10,000-acre patches. At best, only about 25 percent of these larger patches are currently protected lands. These large patches are the “arks” to a sustainable future that we must save now. We know so very little about prairie or forest ecology, and it is clear that much of what we need to know to develop a deeper form of sustainability in the long run might be found in these natural areas. What we don’t know about these areas far exceeds what we do know. It is imperative, then, that we have large functioning areas to study in the future.

The recently rescued 50-acre Deer Park prairie is miniscule compared with these larger prairie tracts. The tract is small, but the remnant vegetation is spectacular. Some have complained that the \$4 million raised to save this remnant could have saved well over a thousand acres in the periphery of Houston. But the fact that public attention was drawn to the plight of this prairie and that as much money was raised perhaps suggests that attitudes about conservation of natural areas may be shifting. We will need some major shifts, and as much as \$1 billion, to ensure our grandchildren can still experience the prairies and forests in something close to their original state.

Notice the very large and rich areas of forest across the north and northwest of the Houston area. Most under threat are the forests of Montgomery County, a very fast-growing county where we can pretty much write off most of the upland forests if the status quo there remains in place. The bottomland forests are under less threat just because they are less easily developed, but the ecological functionality of the system depends on the adjacency of different woodland types, and development seems to increasingly find its way into the margins of the bottomlands. There are still some very high-quality forest patches, such as the area along Lake Creek, but there is no plan in place by any agency or jurisdiction to save this or any other forest.

Another very important area for the entire region is the large corridor along the Brazos River on the southeast flank of the greater Houston region. The area has the largest and most diverse representation of all the ecotypes in our region. The Brazos River itself acts as a connecting element that ties these pieces together, linking them to smaller but still significant pieces of prairie and woodlands to the north, including the fast-disappearing post-oak savannahs to the extreme north. Of course, the river ultimately joins all this to the Gulf. This southeastern flank is in many ways the crown jewel of the entire Houston habitat area. But some of the very best pieces of this complex ecosystem will soon be threatened as the Grand Parkway makes its way through the area. In particular, the proposed highway threatens one of the largest extant prairie pieces, what we call the Damon Prairie. No doubt its memory will be preserved in the name of some subdivision carved from this prairie. And perhaps a few native prairie plants incorporated into the landscapes of the suburban yards will help convince the residents that their development was really “low impact” after all.

IF THE OIL ECONOMY REMAINS STRONG FOREVER, AND WE NEVER EXPERIENCE ANY SHORTAGES OF GASOLINE OR OTHER PETROLEUM PRODUCTS WITH THEIR ATTENDANT PRICE SHOCKS, AND AS LONG AS THERE IS ALWAYS A “SOMEWHERE ELSE” THAT OUR FOOD COMES FROM, THEN THERE IS PROBABLY NOTHING TO WORRY ABOUT.

FARMLAND

P rime farmland is what soil scientists call “good dirt,” which is what the original settlers called the soil that brought people here—mainly the black coastal prairie soils, but also the friable loamy soils of the prairies, such as the Katy fine sandy loam.

Prime farmland is soil with the fewest limitations in terms of growing crops. It is friable, or easy to crumble, and it holds nutrients and water just loosely enough to make them readily available for plants. In other words, this soil is worth more than its weight in gold.

In terms of place-based sustainability, prime farmland is what we really need a lot of. We were endowed with a lot of this kind of farmland at the outset. Unfortunately, we have decided to grow our city in exactly the direction where the very best farmland is, i.e., to the west. We are paving over our most valuable resource at an unprecedented rate. On the other hand, if we think it might be important to have some high-quality farmland nearby someday in the future, then we might need to think about how we value land today.

The future value for land, farmland, or natural lands, unfortunately, is always “discounted” for those strictly interested in making money off the land. The value of the land today is always greater than the value tomorrow (unless of course a large roadway like the Grand Parkway is about to come near your land). The discount rate is about the only calculus we allow for thinking about the land. So a strip mall will always be a much “higher use” than a farm, and the discount rate tells us that it is better to cash in sooner than later. Perhaps the real discount rate, the sustainable discount rate, should be less than one—i.e., land will have a higher value in the future. Place-based sustainability for our grandchildren requires that we set a very high value on the future value of both natural areas and farmland, because it is quite likely we will need those kind of areas even more in the future.

Houston is a place built on imagination. We imagined a space center on the open prairie, and up it sprang. We imagined a medical center without parallel, and it was built. We imagined a light rail system, and built it against all odds. Must our imagination be limited to the built environment? Can we not also imagine intact prairies, forests and farmland surrounding cities and towns of this region? Can we engage the same political will that built Houston to save and improve the vast green infrastructure that still surrounds us? Will Houston be worth living in if we can't? 