Reading the Florida Landscape

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Edited by

Robert Norman

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PREFACE

Reading the Florida Landscape encourages the reader to identify evidence of land use decisions and events that have occurred in the past to better understand how these have influenced the health and function of ecosystems in the present. Using interviews with conservation scientists and historical case studies, Robert Norman has blended skills and knowledge gained from his experiences as a physician and an Advanced Florida Master Naturalist to discuss how to identify, or perhaps diagnose, actions and events that have influenced the structure and function of Florida environments. While this book doesn't attempt to explain the myriad physical, biological and anthropogenic forces that have influenced Florida's diverse ecosystems over the centuries, it does present interesting examples and useful concepts and, by doing so, provides yet another pathway for students of nature to explore.

Martin Main, PhD, Founder and Leader of the Florida Master Naturalist Program, University of Florida IFAS, (www.MasterNaturalist.org).

INTRODUCTION

Learning about our natural world is a lifelong journey that can take many paths; with each new learning experience, there is a gateway to fresh opportunities. Even expert ecologists and naturalists continually strive to expand their knowledge because nature is dynamic and understanding how and why ecosystems change in response to actions and events can guide future strategies to sustain environmental health and achieve conservation goals.

As a physician and naturalist, I look for key signs and markers on the body, and an ecologist does the same for our landscape. What is healthy and what is not? Both of us see ghosts on the landscape of our chosen terrain and readily detect what had been living and thriving before and what has been replaced or changed. An ecologist reads the land and can readily sense what maladies are occurring and what needs to be done to maintain the natural order. How can we all learn from this? First, we need to absorb what the ecologist reads and how it is read. We all look at the same landscape. How can we improve our reading of the landscape?

I have had training in ecology, history, geology, anthropology, and science during a long life of searching. However, I am often left with a "collection of data" when I study certain systems. The workbooks of many courses are filled with hundreds of items on individual animals and plants and it is left to the reader to organize the jigsaw puzzle into something that is cohesive and meaningful. We are often given thousands of names and bits of knowledge with little guidance on how to put them to use and make sense of the full story of the characters and action. We are the ones left to weave a tapestry that fits all the players together.

I have had many discussions with my naturalist colleagues about evidence-based nature and ecology case reports. I offer a series of case studies using the medical model of a differential diagnosis for nature and ecology to encourage evidence-based natural observations as a springboard for further nature and ecology discussions.

Clinical cases are an integral component in modern medical education, assisting the trainee or clinician to work through unusual or difficult cases using pattern recognition and best practice techniques. My field of dermatology is a highly visual subject requiring the practitioner to read and describe often very subtle differences in the presentation of patients and

accurately define the diagnostic and management criteria on which to base clinical decision-making. In the world of medicine, case studies offer a primary way to demonstrate the unique qualities of a particular disease or occurrence, and are a great tool for exchanging data so that others can learn and be prepared if they see a similar pattern. After many insights have been collected, it may be possible to see a trend, syndrome, or a new reaction or outcome. In a similar fashion, I believe that the cases included here will help boost our ecological acuity. I have included many "case reports" with observational insights in my book. My hope is that the observations will result in an exchange of ideas and new insights.

Here is another insight from dermatology. Although when we envision life on our skin as the creeping and hopping evident in larger creatures, the huge majority of our fellow travelers in our own private biological gardens, statistically, are harmless or beneficial. Each of us supports billions of creatures; since no one can escape from our animal origins, it is wise to understand what is happening. Just as we have only begun to explore the undersea world and outer space, the world of our skin is still a great mystery. Our skin is an ecosystem, just like rivers and hammocks, and carries with it all the same issues—self-sustaining boundaries, competitive forces for food and growth, and intimate interconnections between itself and resident and transient biota. Each of us is part of the greater ecosystem, and therefore we have an obligation to get out and explore what lives around us and how we influence and are influenced by our world. Once you step out and begin to love nature, you will always have something to do, see and learn.

I believe that we are evolutionarily destined to feel most alive in natural environments and over time, in the best of all worlds, nature becomes part of our extended phenotype. We should choose wisely about how we treat our Earth based on our acquired physical and emotional knowledge.

As an Advanced Florida Master Naturalist graduate from the University of Florida (http://www.masternaturalist.ifas.ufl.edu), I am a disciple and a great advocate for this or similar training if you have the opportunity to participate. In the Florida Master Naturalist Program (FMNP) workbook, it states it does "not attempt to create experts in botany, herpetology, or any other discipline, but initiates what is for many a lifelong process of learning, of observation, and of sharing with others. Most importantly, helping others to feel a greater connection with the land is not, nor will it ever be, about 'who knows the most'. Recognize your knowledge shall always increase and yet always be limited."

Almost all of the cases in this book came from observing nature and from the simple curiosity about what made the scene in front of me occur. What are the names of the characters in the narrative I am lucky enough to

witness? I have included several narratives from my monthly nature column, "The Great Florida Outdoors" to enhance the experience of reading both the landscape and this book. I have included trips to the Myakka River and Caladesi Island. I have been very fortunate to have teachers much wiser than me to help guide me and provide experience and key insights. With each new encounter, we can increase our appreciation of the wonderful opportunities we have in nature to celebrate our surroundings.

I hope this book will add to your knowledge and hopefully get you to ask more questions about nature. With knowledge comes responsibility, and my hope is that you join the powerful movement to understand what we need to do to continue to enjoy and read our amazing natural world.

Thank you to my family, friends and teachers including Ed Shindle, Jim Buckner, Roger Hammer, Bob Simons, Jeanne Murphy, Brian Lane, Rich Kern, Jack Putz, Marty Main, Susan Carr, Frank Delargy, Carol Lippincott, Reed Noss, Scott Rothberg, Tom Wessels, Jeff Ripple, Guy Marwick, Clyde and Niki Butcher, Ibsen Morales, and many others who have taught me about nature, ecology, photography, and life. Providing insights and differential diagnoses in nature and ecology requires rigorous scientific inquiry and application of cogent theories, and the naturalists I have consulted are among my most reliable sources. I wish to thank Helen Edwards and Cambridge Scholars Publishing for their encouragement and support. Eleanor Moore did a great job fixing a tough manuscript. Even during a worldwide pandemic, she came through with excellent proofreading and editorial help. I appreciate all the fine efforts on my book and will be happy to work with you both again in the future.

Please note that I have tried to do my best to make corrections and changes as needed following the advice of my reviewers. I have also tried to recognize and acknowledge all the sources of quotes and information. I apologize for any errors.

Note—all photos are by the author unless otherwise stated.

1.

READING THE FLORIDA LANDSCAPE

Ecology is our attempt to understand why and where organisms occur. A key to reading the landscape is to be aware that organisms do not occur randomly in nature. Each organism is distributed in response to resources (such as food, water, cover, space, and mates), interactions with other organisms (such as predation, herbivory, and competition), and in response to environmental conditions (such as flooding, droughts, frequency of fire, and temperature).

Ecosystems are areas in which physical, chemical, and biological processes operate to support a community of organisms that are interacting with each other (biotic interactions) and with non-living components (abiotic factors). Ecosystems can be defined at small scales, such as a pond, but are typically are defined at large scales, such as watersheds.

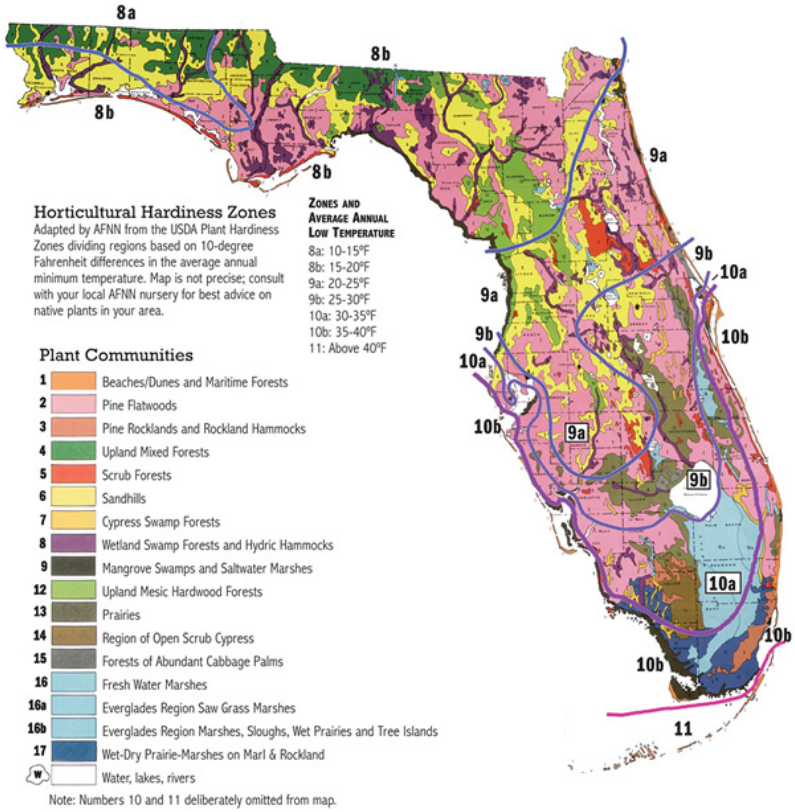

Figure 0-1. Horticultural hardiness zones in Florida

If you want a comprehensive list of Florida ecosystems, look at the site, www.fnai.org. It is an excellent, comprehensive guide.

Florida Ecosystems

Florida is home to 45 terrestrial ecosystems that range from small islands of subtropical hammocks and rocklands to vast dry prairies, sandhills, scrubs, flatwoods and floodplain forests. And despite little change in elevation, the difference of a few feet on the Florida peninsula can yield major landscape variations. Within flatwoods, for example, almost imperceptible drops in elevation create a mosaic of depression marshes, dome swamps, and wet prairies. The topography changes more dramatically in the Panhandle where high bluffs and steep ravine systems flank the

Apalachicola River and its tributaries. The state's 1,200 miles of coastline, including estuaries, seagrass beds, mangrove swamps, and coral reefs, together with thousands of inland freshwater lakes, rivers, streams and springs, support numerous aquatic communities.

Florida's current and historic coastlines also influence its geology. Rising and receding seas deposited great quantities of limestone over many thousands of years, resulting in an abundance of karst features such as sinkholes, caves, depressions, limestone outcrops and more than 300 large artesian springs. A series of sand ridges in the central peninsula were once islands surrounded by a vast sea, isolating plants and animals that evolved into unique species. The state's peninsular geography spans temperate and subtropical zones, which, combined with its distinctive geology and climate, contribute to habitat diversity as well as an amazing array of species. (Thank you to Landscope.org/Florida.)

Here are some brief descriptions of some of the Florida ecosystems to use as a reference while exploring:

FLORIDA ECOSYSTEMS

Cypress Swamps/Ponds

Near, or in, standing or running water

Dominated by bald cypress & pond cypress; other species include willow, black gum, and red maple

Many birds and animals

High value for recreation, wildlife, and environmental protection

Hardwood Swamps

Border rivers and wet basins

Soils very poorly drained, dark, medium-coarse textures; periodic flooding is essential

Dominated by deciduous hardwoods (e.g. red maple, water tupelo, green ash, elm, etc.) and bald cypress

Important for watershed protection & wildlife (that can move out of the area during wet periods)

Flatwoods

Throughout Florida; level topography; poorly drained; shallow water table; often with interspersed wetlands

Sandy soils, often with a spodic layer

Open pine woodland, dominated by slash and longleaf

Succeeds to hardwoods (oaks, persimmon) if fire absent

Understory dominated by saw palmetto, gallberry, bracken fern and huckleberry

Diverse wildlife

Extensively used for timber production & grazing

Figure 0-2. Osceola National Forest

Hardwood Hammocks

North Central Florida; small communities

Sandy to clay soils

Xeric, mesic and hydric communities

Dense stands of shade-tolerant hardwoods, such as beech, holly, black cherry, laurel oak, live oak, sweetgum, magnolia, hophornbeam, hornbeam, dogwood, hickory etc.

Mixed evergreen-deciduous forest with a large number of tree and shrub species per unit area

Climax vegetation of ecological succession

Understory may be fairly open; good wildlife habitat

Valuable for development, watershed protection, timber production
(Tallahassee Red Hills)

Oak Hammocks

Variant of upland hardwood hammocks
Dense laurel and live oak, cabbage palms in South Florida
Soils poorly drained, often with limestone near surface
Variety of uses

Longleaf Pine—Turkey Oak Hills

Throughout the state, north of Lake Okeechobee
Sandy soils, well to excessively well-drained
Two dominant tree species, with fairly sparse ground cover & few shrubs
Frequent fire is important
Variety of wildlife species
Good for urban development, timber, pasture, irrigated farming
(Osceola National Forest)

Figure 0-3. Osceola National Forest

Sand Pine Scrub

Uncommon; on deep, excessively well-drained sandy soils
Dominated by sand pine (even-aged) and/or thick, scrubby oak with some palmetto
Fire-based community, needing intense fire every 20-40 years
(Ocala National Forest)

Other important ecosystems that need to be mentioned are pine rocklands, rockland hammocks, mangroves, beach dunes, and various types of prairies. Roger L. Hammer is a retired senior naturalist from Miami-Dade Parks Department and is currently a part-time instructor and fieldtrip leader for the Fairchild Tropical Botanic Garden. "Pine rocklands comprise a globally imperiled ecosystem in Miami-Dade County and on Big Pine Key," Roger Hammer said. "Rockland hammocks are mostly formed of tropical trees (and are wholly tropical in the Keys) and are unique to southern Florida. Various prairie types are found throughout Florida. Mangroves are the guardians of Florida's shorelines, as are beach dunes. Sandhills and Lake Wales Ridge scrub are also key ecosystems."

An important tool in reading the landscape is to practice pattern recognition. When you notice a certain plant, such as a resurrection fern, step back and look at the environment you are in. Does this fern fit the picture of what you know about this particular ecosystem?

Plant communities are the product of the physical growing conditions that occur in any given area including soil characteristics, water availability, and competition for sunlight. Although many different types of plant communities exist, most can be grouped into one of two major categories, referred to as wetland or upland habitats. Wetlands generally are areas that are flooded or have sufficiently saturated soils to support plants recognized as wetland vegetation. Transition zones, in areas where uplands and wetlands meet, typically support a gradient of both wetland and upland plants species. Each transition area varies in size and plant type depending on changes in hydrology, as in recent years with great variations in amounts of rainfall.

The Florida Department of Environmental Protection (FDEP) takes an ecosystem management approach to "protect the functions of entire ecological systems through enhanced coordination of public land acquisition, regulatory and planning programs." To maximize conservation and natural resource management, it is important to delineate and protect ecosystems to protect the plant and animal communities that depend upon them. The goal is to maintain the historic ecosystem processes which are

vital for maintaining native plant and animal communities that have evolved with them. The health and recovery of ecosystems includes monitoring changes in plant communities and often of key species or functional groups of organisms that serve similar ecological roles (e.g., herbivores, predators, or scavengers). If top level predators (e.g., panthers, wolves) are lost from ecosystems, changes may occur that influence animals and plants at other levels in the ecosystem—a process known as a trophic cascade. This comprehensive approach to ecosystem management is perhaps the most effective means of protecting natural resources.

Tom Wessels' book *Reading the Forested Landscape* is a guide to deciphering the varied forest patterns of central New England. He introduces the reader to the clues that can explain changes in forest composition. He writes, "In the majority of cases, these changes will be the result of differing forest disturbance histories—the impact of past logging, fires, or blowdowns on a forest." He continues, "Most people who share a love of nature have been taught to see the landscape in a piecemeal way. They know how to identify plants, birds, amphibians, and fungi. They may even know quite a bit about the ecology of these organisms, but they have not learned to see nature in a larger context. It is wonderful to know nature through one-on-one encounters with other organisms, but it is perhaps more empowering to gain a fuller understanding of the patterns that have shaped its landscapes. Through some knowledge of history and the broader view of seeing a forest and not just its trees, we begin to see the forces that shape a place. This new way of seeing creates reverence, respect, a sense of inclusion, and accountability. Reading the landscape is not just about identifying landscape patterns; more importantly, it is an interactive narrative that involves humans and nature. For those interested in enhancing their sense of place, I know of no better way than by becoming intimately acquainted with their local forests and the fascinating stories they tell."

As Florence Williams writes in *The Nature Fix: Why Nature Makes Us Happier, Healthier, and More Creative* (W. W. Norton & Company), "I find the intellectual compulsion to break apart the pieces of nature and examine them one by one both interesting and troubling. I understand it's the way science typically works: to understand a system, you have to understand the parts, find the mechanism, put your flag on a piece of new ground. The poets would find this is nonsense. It's not just the smell of a cypress, or the sound of the birds, or the color green that unlocks the pathway to health in our brains. We're full sensory beings, or at least we were once built to be. Isn't it possible that it's only when you open all the doors—literally and figuratively—that the real magic happens?"

Disturbance

When you are reading the landscape, especially in the presence of ecologists, the word “disturbance” will certainly arise in conversation.

The term disturbance certainly can have negative connotations in everyday use. When discussing ecosystem function, however, species have evolved mechanisms for coping with natural disturbances that are necessary for maintaining plant and animal communities to keep ecosystems healthy. Disturbances include unnatural, natural, and uncommon natural disturbances. Natural disturbance processes include fire, flooding, and drought, and differ among various types of plant communities. Fires are rare in mixed hardwood swamps, but frequent fire is important for maintaining herbaceous marshes.

Natural Disturbances

Hurricanes

Strong Winds – Generated inside the storm. Severely damage human infrastructure

Heavy Rain – Source of Flooding and Landslides

Tornadoes – generated by rotating motion of tropical cyclogeneses

Storm Surge – often most destructive force, difference between acute sea level rise and long-term sea level rise

Unnatural disturbances, such as clear-cutting a cypress swamp or randomly cutting vines in a forest negatively influence plant communities and ecosystems. In certain communities, it may take years to recover. Uncommon natural disturbances such as hurricanes or catastrophic fire may cause similar changes. Chronic disturbances such as those caused by invasive species, damage from off-road vehicles, or changes in hydrology will negatively affect ecosystems until the disturbance is removed and the system begins to recover.

Scott Rothberg is a PhD student at the University of Florida (UF) whose graduate studies center around landscape conservation planning. His research specializes in balancing conservation and development in Florida’s fire-dependent heartland. “Storm surge is a temporal rise in the level of the ocean. There have been incidences of 35 ft or 10.5 m above mean sea level. The surge is created by strong winds moving a wall of water ahead of a cyclone. The pressure surge created by the wind-driven surge moves on the right-hand side of the cyclone ahead of the portion moving to the coast. When the storm moves ashore, the wall meets the land, and the water washes

inland flooding areas far inland before rushing back out to sea," Rothberg said.

In the absence of natural disturbance processes, plant communities typically undergo gradual changes referred to as succession. Succession is where existing species are replaced by those better adapted to the new environmental conditions. Succession is always operating at some level. Disturbance temporarily stops the process and returns plant communities to an earlier successional state. In the absence of disturbance, plant communities may reach a point where historic disturbances no longer function normally (e.g., long periods of no fire results in extensive fuel loads and catastrophic fires) and ecosystems are negatively affected.

"Florida's landscape is conditioned by past, present, and future conditions," Rothberg said. "These states transition the landscape from existence, to interference, and to resilience. The initial state, the landscape that existed in a pre-Ponce de León era, is the raw landscape ecologists and planners identify as pristine. Florida is a biodiverse land of water and fire. Inland and coastal dependencies on water attributed to flat topography, abundant rainfall, and the flow of water in uplands actively recharge the system. The presence of endemic flora and fauna co-habiting with indigenous American people was a complex balance."

"How long has disturbance been a factor?" I asked.

"Disturbance has been present on the Florida landscape since lightning struck the Coastal Plain and large omnivores roamed," Rothberg said. "Upland and wetland ecosystems are pattern-based ecosystems. Natural stochastic disturbances disrupt upland and wetland systems and support a greater diversity of flora and fauna across the landscape. Mandates and ecological requisites exist that recognize the importance of maintaining uplands and wetlands to provide ecosystem services to people, such as recreational space, water recharge, and carbon sequestration. Disturbance is the homeostatic driver of the landscape. Intermittent episodes of imperturbation allow swamps to grow thick and allow new successional stages of forests to take hold. Then, without compromise, disturbance occurs in the form of hurricanes, grazing herds, and lightning strikes."

"How did we learn to deal with disturbance?" I asked.

"America's first people witnessed the rejuvenating impact of periodic disturbance and emulated the practice. The resulting landscape anticipates and responds to grazing and fire. Adaptation strategies in the flora and fauna evolved to capacitate the disturbance leading to a naturally reflexive, established range of existence," Rothberg said.

"The interfered landscape began to take form in the post-Ponce de León era and has become distressed increasingly into the present day. Symptoms

of the distress can be divided into physical modification of the landscape structure and negative changes to the functionality of the landscape. Physical modification did not occur at the same time as European settlement. Many first-generation European Floridians replicated the subsistence practices of native Floridians. Agricultural and grazing practices were adjusted to incorporate fire disturbance and reap the benefits of the fertility spring that became available immediately after. Even ranchers used the disturbance to draw cattle from the far reaches of the land to survey the herd. In a survival-of-the-fittest (or survival-of-the-leanest) espousal, the cracker lifestyle perpetuated the Florida lifestyle," Rothberg said.

"The land-boom that arrived with Florida statehood in 1845 accelerated physical modification. As early as 1969, researchers, including Levins, noted that when landscapes become physically fragmented, the proximity of the remaining landscape patches has measurable influences on genetic connectivity for species of both plants and animals. The strength and weakness of the remaining connected linkages (or corridors) can assist or inhibit the ability of flora and fauna adapted to Florida landscapes to persist. In the late-2000s, Laurance et al. described how perforations, dissections, and shrinkage lead to shrinkage and attrition of the landscape," Rothberg said. "When patch fragments are initially formed, there is an increase in the population size of species within an isolated patch. Sometimes referred to as 'crowding of the ark,' the reality is that the future loss of species as a consequence of past actions has already occurred. Piecewise, these modifications have led to discontinuity in the landscape structure in Florida. At present, the influence of physical modification to the landscape is easily discernable from satellite imagery."

"In your research and studies, you often focus on landscape functionality. Please explain this in relation to Florida," I said.

"Landscape functionality is intrinsically tied to physical modification, yet functionality also broadens the influence of people on the landscape to a social and political component. The disturbances that once roamed across the landscape are now influenced by changing industries, urbanized boundaries, jurisdictional precedence, and constituency-driven policy. Large ranches are less common than in the past and, as a result, less grazing occurs from domesticated cattle. Without replacing the browsers, this changes the composition of the landscape. Naturally occurring disturbances are now classified as natural disasters requiring swift responses. Suffice to say, Florida's inhabitants have become disconnected from landscape processes," Rothberg said.

"What is the effect of our rapid population growth in Florida?" I asked.

"It has been perceived that population growth is detrimental to Florida," Rothberg said. "In the 1960s, Dobyns identified that the population of the First People reached approximately 100,000-900,000 before the Europeans arrived. The population of Florida took until the mid-1920s to reach the same level of settlement. In the present day, more than 350,000 people move to Florida each year. The University of Florida GeoPlan Center uses data from the Bureau of Economic and Business Research (BEBR) to project population growth in Florida to the year 2060. In 2005, 17.9 million people inhabited Florida. Using moderate population growth models, BEBR predicts that the population of Florida will increase to 35.8 million people by 2060."

"What landscapes will be most affected?" I asked.

"Projections made before the 2008 financial crisis have since changed. A stronger focus on conserved, less speculative real estate development spending and informed investment into equities has affected the geographic distribution of population growth forecasts. Additionally, climate change scenarios have led policymakers to reevaluate the resiliency of land at low elevations susceptible to flooding along the coast," Rothberg said. "Pending updates to the 2060 population growth model are expected to hold current population growth forecasts constant, and factor in the loss of coastal development to moderate climate change scenarios. This means that Florida will still expect 35.8 million people by 2060, except they will be concentrated away from coastal counties. The result is hypothesized to show a greater dependence on developable land inland, and will disproportionately impact pyrophilic, upland landscapes."

"What's in the future?" I asked.

"The resilient landscape has not been achieved, although it is a potential future for Florida's landscape. With 825 miles of beaches, 33 first magnitude springs, 105 million visitors in 2015, and a +65 billion-dollar impact on Florida's economy, there is tremendous potential to incorporate technological innovation into the remediation of Florida's landscape. Some steps in this process are the identification of similar symptoms distressing Florida's diverse regions, identifying the challenges that must be met to confront those problems, and fully encapsulating what it is to read the Florida landscape," Rothberg said.

Figure 0-4. Hillsborough River

One of the places I have explored for many years with my outdoors buddy, Ed Shindle, is Cow House Creek, a first order, ephemeral wetland that flows into the Hillsborough River. Before entering the Hillsborough, it widens and slows. The drainage basin of the river consists primarily of natural wetland, urban development and some cattle pasture. We have hiked up and down the dry creek bed in April and May and witnessed the surging waters of June and July. During our adventures, Ed discovered two springs that can often be seen bubbling up. On many trips up and down the Hillsborough River (sometimes joined by our friend, Arnold, known as "Yakman"), we have noted the seasonal changes in hydrology due to high rains and drying and natural disturbances in this community. I highly recommend exploring a particular area over and over again throughout the year to learn to read the landscape. As you explore, look at the animals that inhabit the area (note the changes in plumage and behavior), variations in growth and vegetation, and signs of disturbances.

Figure 0-5. Dry Creek Bed—Cow House Creek

Figure 0-6. Cow House Creek spring

Figure 0-7. Cypress roots—Cow House Creek

Figure 0-8. Cow House Creek in May 2018

Many years ago, Ed and I decided we wanted to kayak the entire Hillsborough River, from the origins in the Green Swamp down to Tampa Bay. Whenever we could get on the river, over many days and weekends, we accomplished the task. We are now paddling again or exploring for the first time many portions of the river and tributary creeks.

The Hillsborough River flows 56 miles from its head waters in the Green Swamp to its mouth in Tampa Bay, and its watershed extends over parts of three counties, Hillsborough, Pasco, and Polk. The history of human activity in Hillsborough River State Park dates to prehistoric times when native peoples hunted, fished and foraged along the river's flood plain. In the late 1700s, Wills Hills, the British Colonial Secretary, and Lord Earl of Hillsborough were given jurisdiction over the area. Afterward, they sent surveyors to report on the new colony and the river needed a name—they titled it the Hillsborough. Many events occurred over the years, including the building of forts and bridges during the Seminole wars. In the 1930s, during the Great Depression, the Civilian Conservation Corps (CCC) was deployed there and the area surrounding the river was established as a public park.

As we have explored this magical river, the offerings of nature have been both varied and eye-opening, including a series of rapids created by the river as it flows over outcroppings of Suwannee limestone. We have paddled over

the challenging waters of the 17 Runs, which took many hours of hard work, pulling our kayaks over logs, and portaging to get down the river.

Figure 0-9. Hillsborough River rapids

Cypress trees with glistening knees, pine flatwoods and hardwood hammocks fill the woods on any trip down the river. Animals include turtles, woodpeckers, owls, turkeys, deer, and occasional alligators. Limpkins, herons, egrets, anhingas, and many other varieties of Florida bird life fill the air with flight and sound.

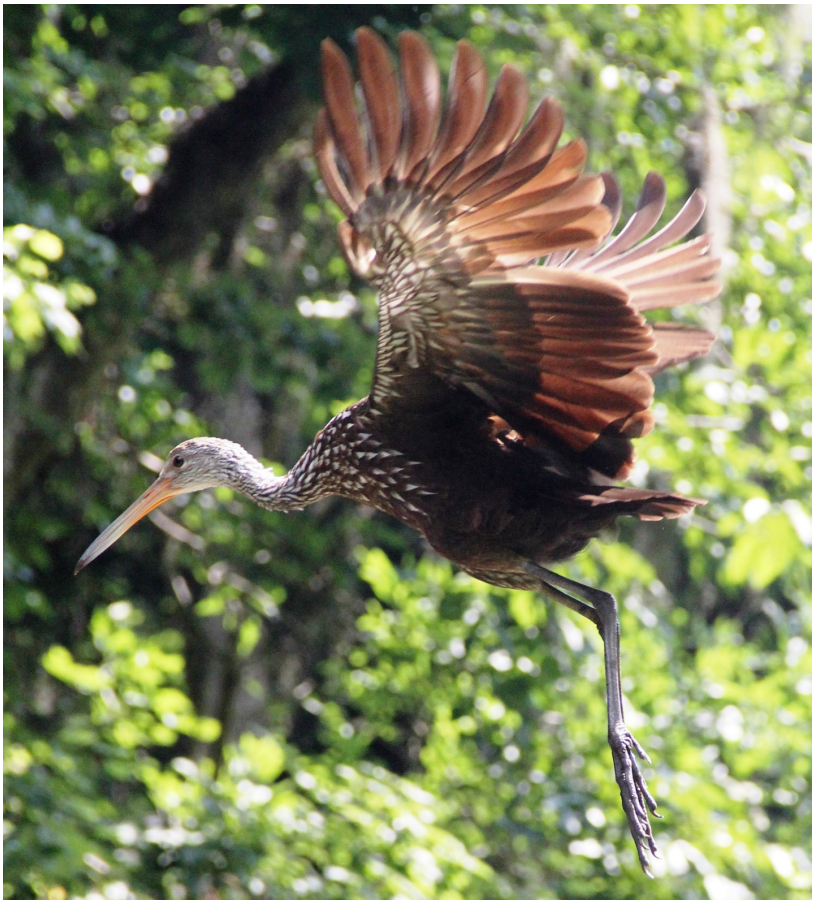

Figure 0-10. Limpkin (*Aramus guarauna*) in flight over the Hillsborough River

One of the roughest portions for me was closer to downtown, along the University of Tampa and the urban buildings and cement borders that line the shores. When the big boats come by, they provide a whitewater experience that requires extra caution and no inviting shores for respite. Unless you like this kind of adventure, I would advise you to paddle in the more scenic and natural domains of the river!

The Hillsborough River was chosen by Canoe & Kayak Magazine as one of "North America's Best Close to Home Paddling Adventures," and once you experience its beauty you may be forever hooked. Get out and