Call From The Wild: Canoe Shark River Slough

Where Do You Draw the Line?
The New Wetlands Delineation Rule
Enjoying a Little R&R on the Nature Coast Greenway

In the cool dawn of a January Florida morning, a light fog rises up from the surface of the Chassahowitzka River. From the boat ramp, along the half-mile corridor to the river’s headwaters, blue herons sit in silent watch. Just below the water’s surface, so close you can reach out and touch them, silvery fish glide through the grasses that reach up toward the sky.

Canoeing along atop the water, we pass a tangle of mangroves and cypress. Then, as we round the bend, the world below us opens up to reveal a blue-green cavern that pours forth the warm water of the river. We are at the river’s headwaters.

Just a short six miles west from headwaters to the Gulf of Mexico, the Chassahowitzka contains an eclectic mix of flora and fauna — all visible in the magnificent setting that is Florida at its natural finest.

“It is a great place to fish,” enthuses Frank Frati, manager of the Citrus County campground and boat ramp located on the Chassahowitzka site. “Right here you can catch both freshwater and saltwater fish. There’s sheepshead, mangrove snapper, largemouth bass, freshwater catfish, mullet, pilchcr, grunt, sea trout, drum, black sea bass, redfish, and ladyfish.”

The Chassahowitzka campground and boat ramp are included in a parcel of property owned by the taxpayers and managed by the Southwest Florida Water Management District. It is the northernmost boundary of a proposed Nature Coast Greenway and Wildlife Corridor that extends southward through Bayport, Jenkins Creek, and Aripeka into Pasco County.

“Did I say mangrove snapper?” Frati asks before he moves on to list the wildlife one is likely to see at Chassahowitzka: cooter turtle, blue heron, squirrel, brown pelican, raccoons, a variety of owls, and snowy egret.

The Chassahowitzka property lies about 20 miles north of a second site, known as Oak Sound, that will be part of the proposed greenway. The Oak Sound property was recently acquired for the public by the Southwest Florida Water Management District as part of the WeekiWachee Riverine System. It was purchased from Oman Construction Company of Nashville, Tennessee.

Prior to acquisition by the Southwest District, the Oak Sound property housed a mining company and was destined to become a housing development complete with golf course and shopping mall. The property is now being evaluated for the development of management and recreation plans to allow the public to enjoy its natural beauty along with the Chassahowitzka. When opened to the public, Oak Sound will play a major role in preserving the environment and the wildlife that call the area home.

Initial plans are to let the public roam Oak Sound as freely as possible, if not by vehicle, by foot. Much of the property is dense woods, too grown-over for easy travel of any kind.

In a matter of minutes, a hiker could pass through a diversity of natural systems ranging from sinking swamps to the sandy soils of the pinewood uplands.

BY MARY ANN MCKINNEY

The Nature Coast Greenway and Wildlife Corridor totals 84 square miles and stretches 200 miles from Pasco County to Apalachicola. The Pasco, Hernando, Citrus region is shown below.
A panoramic view of Oak Sound shows the limerock mining undergoing conversion to a more natural-looking terrain.

"Seems like a long way from civilization when you get back in places like this," said Ron Daniel, the District's land acquisition manager. "It's so quiet and peaceful. Even when it's ready for recreation, you'll see many areas kept primitive."

The Oak Sound terrain allows for passive recreational activities, like hiking and camping. But perhaps its most endearing feature is the 11 lakes that were created from years of limerock mining.

"We envision this to be a beautiful park some day in the not-too-distant future," Daniel said a year ago when the Oak Sound property was purchased. "People won't even realize it was once a lime rock pit. It will have a natural look."

In fact, Daniel's prediction already is coming true. The healing process has begun. "It's going to take some time, though, before the healing process is completed," said Fritz Musselman, the District's land resources director. "It's been a mine for many, many years. You don't bring it back overnight."

The Nature Coast Greenway that includes Chassahowitzka and Oak Sound totals 84 square miles and is part of a 200-mile corridor that stretches from Pasco County to Apalachicola. The Chassahowitzka site, indeed the entire greenway area, is rife with bio-diversity representative of coastal and upland areas, and contains a number of endangered plants and animals of special concern.

If you get to the Chassahowitzka and want to stay, there are 32 primitive campsites, and 56 improved campsites available along with rental canoes, kayaks, and pedal and jon boats. No camping permit is required. Campers can make arrangements at the county-operated boat house. In no time flat, you, too, could find yourself paddling along a peaceful piece of Florida's natural history.
Getting There

To get to Chassahowitzka, follow Miss Maggie Drive west from the intersection of U.S. 19 and U.S. 98 south of Homosassa in Citrus County. Miss Maggie Drive ends at the campground and boat rental/launch facilities. The Oak Sound facility is not yet open to the public. Information about recreational opportunities on that property will be included in the Recreational Guide to the Southwest Florida Water Management District Lands following completion and approval of management and recreation plans. Information about the Chassahowitzka River Campground and Recreation Area is available at (352) 382-2200. Additional information on the Nature Coast Greenway and Wildlife Corridor is available from the Gulf Coast Conservancy, (352) 686-1519.
Florida's water management districts have compiled a directory to a gourmet twelve course feast of publications and other materials available to Florida residents upon request. Please contact your water management district to get your copy today!
influence of excessive moisture) colors in the upper six inches. The discovery of hydric soil can move a marker beyond the edge where the wetland plant species are growing. Sometimes there is more to a wetland than meets the eye and the scientists have to literally dig for more information.

**An Obligate By Any Other Name is a Wetland Plant**

On the proposed school site, while the soil scientist is pressing muck between his fingers, the botanist is stopping to smell the flowers and sometimes to pluck and name them. The site is a classic pine flatwoods with a saw palmetto understory. Dave Black is looking for the obligate plants — plants that survive in saturated soils or wet conditions — and areas where these plants outnumber the upland plants. He tromps over the wiregrass and ignores it because it is a facultative (fac) plant — it can grow in both wetlands and uplands so it is neutral and not indicative of a wetland boundary. Melaleuca is considered a fac plant.

Black uses a laminated field guide with the new rule’s vegetative index. He looks at the plants which make up the area’s canopy, subcanopy, and ground cover. The list puts the plants in three categories: obligate, facultative, and facultative wet (fac-wet). The fac-wet plants can be found in uplands; but, under natural conditions they are typically prolific in areas subject to surface water inundation and/or soil saturation.

Black finds marsh dog fennel (obligate) and St. Johns wort (obligate) which is usually yellow but because it is winter-time is brown. He picks a couple of interesting insect-eating plants for his collection of pressed plants for teaching wetland identification. Butterwort has sticky leaves which unsuspecting bugs become attached to and are soon
WHY MOURN A MARSH?

When it comes to counting wetlands, we are somebody! Florida has 11 million of the nation's remaining 99 million wetlands (in the lower 48 states). That's almost 30 percent of the state's land mass. After almost a century of continuous assault on wetlands, the state is regul-
digested. The pretty little red sundew looks innocent enough but also likes a tasty insect. These are obligates found in acid wetlands, according to Black. The dahoon holly, arrowhead, willow, umbrella sedge, pickerel weed, and pond apple add to his list of obligate plants which altogether total 17. He names 39 plants (within the wetland area) which fall into the rule's vegetative index — 34 are either obligate or facultative.

There is a preponderance of gallberry on one part of the property. The federal wetlands rule which is regulated by the Corps of Engineers (COE) places the gallberry on the list of wetland plants. However, the state places gallberry on the upland list. Hence, there are two flags marking the St. Lucie Country wetland's borders. The COE also says the slash pine grows in a wetland. According to Black, once a slash pine gets started and establishes itself, it can handle water. The federal government's rule is national in scope so it takes into account vegetative growth in all parts of the United States. "We once had six flagged lines, now we have two," says Bob Weigt, Sr. "This is workable. The joint permit applicant with the COE just needs to include space enough to distinguish between the two boundaries."

The H2O Factor

The third leg of the wetlands triangle is hydrology. A depressional flow-way runs through a portion of the property in St. Lucie.

"Wetlands resemble New York City. Some animals and plants would die if they had to live anywhere else, while others just like to stop in temporarily."
— Science News

From Rediscovering the Value of Wetlands, Florida Water Fall 1992

Skilled ecologists in the field make the determinations as to where to draw the wetland boundaries. Reasonable scientific judgement is the key to rule application.
County. There are usually hydrologic indicators in a wetland area, but every effort should be made to “acquire detailed knowledge about the site prior to considering factors which are directly caused by the immediate presence of water,” according to the wetlands delineation manual. Indicators — there are 13 listed in the rule — may include algal mats (non-vascular plant material which develops during periods of inundation and remains after the water has receded), aquatic mosses on trees, water marks on vegetation, and rafted debris. Even swamp buggies parked in the area could be a clue to the area’s hydrology.

Reasonable scientific judgement is the fourth tool in the delineation process and is key to rule application, according to Cantrell. “The community types described in the manual serve as ecosystem models by which the rule was developed,” he said. The rule is not all-encompassing.” According to the Florida wetlands manual, identifying and delineating a wetland involves “the ability to collect and analyze information using technical knowledge, personal skills, and experience to serve as a basis for decision making.” That’s reasonable scientific judgement — a euphemism for the yet-to-be-extinct human factor.

Every effort should be made to “acquire detailed knowledge about the site prior to considering factors which are directly caused by the immediate presence of water,” according to the Florida Wetlands Delineation Manual.

The pre-application field investigation report for the 10-acre St. Lucie County property described the wetland delineation as follows:

A depressional flow-way was delineated through the central part of the project area extending from the northern to southern property boundary. Along the south property boundary, a surface water ditch was delineated in the western half of the site which became a jurisdictional wetland in the eastern half along Walton Road. About 20 percent of the site, totalling +2 acres, is wetlands.
Welcome to Field Trip No. 61, an innovative learning experience featuring environmental education alfresco.

Hosted by the Northwest Florida Water Management District, the ongoing program includes a guided tour of the District’s Lake Jackson stormwater treatment facility, lectures, demonstrations and plenty of hands-on activities.

Begun in the spring of 1994, the program has quickly gained in popularity among area educators. More than 1,200 Leon County public-school students in grades K-12 have participated. About 750 students from 43 classes attended during the 1994-95 academic year. And, based on the flood of information requests from schools, hundreds more are expected for the upcoming school year.

The two-hour program focuses on a variety of issues, including water pollution, watershed management, resource protection and preservation, stormwater runoff and environmental concerns related to Lake Jackson. Its comprehensive, multi-disciplinary approach prompts many levels of awareness.

“On the surface, the program teaches children about biology, science, the food chain and ecosystems,” said Northwest District Environmental Engineer Pam Latham, who conducted several tours. “But on a deeper level, it stresses the vital importance of preserving our water resources for existing and future generations.”

In terms of instruction, “the hands-on, sensorial methods used, combined with self-discovery, helps make abstract ideas become clearer and more tangible,” added the former high-school biology teacher. “Classroom preparation...
before the trip promotes even further understanding of the concepts."

To assist, the District sends environmental information, brochures and lesson plans to participating teachers prior to each trip.

Through the Surface Water Improvement and Management (SWIM) program, Leon County schools receive reimbursements for field-trip expenses incurred, such as transportation and substitute teachers' costs. Much of the equipment used on the field trips was obtained through a U.S. Environmental Protection Agency education grant, made possible through SWIM matching funds.

Once at the site, activities and presentations vary in length, content and complexity, depending on grade levels. For instance, middle- and high-school students often perform water-quality experiments, using scientific equipment to measure parameters such as turbidity, pH and dissolved oxygen. Younger children, on the other hand, make discoveries through observation techniques employed.

Clearly, the most popular demonstration appeals to all ages. To portray the negative effects of stormwater runoff, an interactive, three-dimensional tabletop model of a watershed — complete with miniature homes, roads, cars, animals and waterways — is used. After Koolaid, cocoa and oil are sprinkled on the model's surface to depict pesticides, sediments and pollutants, water is sprayed to simulate the stormwater runoff that occurs after a rainfall.

Watching the mock pollution accumulate in the model's water body enables students to easily relate the demonstration to the real-life situation at Lake Jackson, according to field-trip guides.

The 4,000-acre lake, nationally renowned for fishing and recreation, "has been degraded over the years from encroaching urban development and stormwater runoff," said Tyler Macmillan, Northwest District Resource Planning Section director and Lake Jackson's SWIM coordinator.

To help protect and restore the lake, the District began operating the stormwater-treatment facility in 1983. As a coop-
How We Affect Our Water Quality

Objective:
To look at the role we play in affecting the quality of water.

Background:
Water pollution is caused by many things. Pollution caused by sewage and industry has to be addressed by national and local governments. But some of the problems caused by stormwater runoff can be handled by us. We must take a closer look at what we can do around our homes. Some change of habits could lead to our discharging "cleaner water," which would help to maintain our water quality.

Procedure:
List and discuss ways members of your community, such as builders, farmers, homeowners or residents, could help to improve the quality of water.

Examples:
Builders could plan developments that control sediment runoff or collect runoff from parking lots in holding ponds so that pollutants from the lot surface are not discharged into our waters. Homeowners could use phosphate-free detergents to help cut down amounts of nutrients entering our lakes and streams. The nutrients can build up, causing aquatic weeds to grow, cutting off circulation and even causing oxygen depletion. Homeowners could apply fertilizers more carefully, keeping fertilizers away from driveways or roads where they can be washed into our surface waters. We can be careful to use correct amounts and not overuse water. Overwatering can wash fertilizers off and cause them to penetrate below the root zone, where they are useless to the plant and can work their way into our water table. Other areas of discussion might include washing cars on grass instead of concrete, keeping animals and compost away from streams, etc.

Follow-up:
Make a list of examples that might apply to local neighborhoods. Print and distribute your list, or place the list in banks, etc., where people in the neighborhood can become aware of how they can help protect water quality.

How to Get WET

The first step is to know your watershed address! Everyone in Florida has one and the surest way to figure it out is to look at your property tax bill. Just in case you don’t have this handy, or don’t own your home, check out the inside back cover of this magazine, find the water management district you live in and from there, “go with the flow!” Call your water management district environmental education coordinator for information about Project WET workshops. The rest should be pretty easy!

As in natural systems, diversity is healthy! Each of the Florida Project WET sponsoring agency partners will offer WET workshops in a different way, often in conjunction with their existing teacher education efforts. For example, in south Florida, the WET program will be offered as an element of the ongoing, two-day Water Workshops available in each of the 16 southern counties. Consult your school district environmental education contact for more information. Teachers who have already participated in a basic water workshop will have a chance to get the Project WET Curriculum and Activity Guide and the latest local water resource management information by attending an advanced workshop. Check with your water management district education coordinator for details.

In our schools, teams of teachers, administrators, and parents are involved in planning school-based integrated and interdisciplinary curricula which often spirals upward through advancing grade levels. Supplementary programs like Project WET, and its sister programs PLT and WILD, are outstanding resources for teachers. All Project WET activities are multidisciplinary and hands-on. Integrating language arts, mathematics, science, geography, history, government, and health, they are easily adapted by educators of all disciplines.

Recognizing that people have individual learning styles, Project WET offers multi-sensory learning strategies such as: whole body, hands-on, inquiry, graphing, mapping, role playing, modeling, multimedia, and experimentation. Further, special efforts have been made to link Project WET activities to emerging state and national curriculum and to aid educators in mainstreaming materials into existing school curricula.

So, What Are You Waiting For? GET WET!

The target audience is broad. If you teach kids and you want to make learning relevant to their lives, Project WET is for you! After all, every living thing needs water. It constitutes as much as 70% of our body weight and covers two-thirds of our “water planet.” Did you know that today earth has essentially the same amount of water as when water first formed on the planet billions of years ago? The water molecules in our bodies may have cycled and been recycled countless times.

As part of our integrated resource and ecosystem management strategy for a sustainable Florida, the water management districts and the State Department of Environmental Protection are committed to the education of the teachers of our youth. This is a longterm investment in the future of our water resources and this planet we call “Spaceship Earth.”

Sandi Robinson is the assistant director of National Project WET and The Watercourse. She is the author of several children’s books about the environment including The Rainstick: A Fable. Sandi is also the co-author of Discover A Watershed — The Everglades produced in partnership with the South Florida Water Management District.

Roy King has served as the environmental education program director for the South Florida Water Management District for the last five years and will be the first Project WET Coordinator for Florida. In a former life, he was the Project WILD Coordinator for the state.
"The new rule more accurately reflects what Mother Nature gives us as a wetland boundary."

—Richard Cantrell,
Department of Environmental Protection
WETLANDS: Where Do You Draw the Line?

By Jan P. Loftin

On a clear January morning, a small group of serious-looking individuals was seen entering a thicket of woods in St. Lucie County. On further investigation, it appeared they were digging up a little dirt for the St. Lucie County School Board. They were also identifying some pretty shady specimens to determine if the place was being used as a local watering hole.

Does this sound like sinister business? It is actually the fight for the environment to restore and preserve Florida's remaining 11 million acres of wetlands. Required by Florida law, the group seen entering the woods were delineating wetlands — identifying wetlands and determining their boundaries before a property is developed. Is there a bog or a marsh that provides an oasis for traveling waterfowl? Are there water-storage and pollution-filtering benefits? The clues can be subtle or overt as this type of investigation takes into account the substrate (dirt), biota (plants and animals), and the hydrology (effects of the water).

A 60 percent loss of Florida wetlands during this century prompted regulatory efforts that put the onus on the developer to preserve land at the project site, restore a like amount elsewhere, or purchase wetland-mitigation credits when development impacts an area classified as a wetland.

A new day has dawned for wetland delineation. Effective October 3, 1994, the state passed the Florida Environmental Reorganization Act of 1993 which encompasses the new Wetland Delineation Rule 62-340 F.A.C. It is one of the first wetland rules in the country to combine local and state rules into one in an attempt to streamline wetland delineation and permitting in Florida.

Previously, there could be four or more lines declaring the wetland boundaries — lines drawn by the Department of Environmental Protection (DEP), the water management districts (each with different criteria), county administrators, and local agencies. An application for a wetland impact permit needed the approval of all governmental entities with jurisdiction over the property. One agency alone could derail a project. Now, a single rule unifies the methodology used to determine the boundaries of a wetland.
“We human beings like to pigeonhole,” said Richard Cantrell of DEP's Bureau of Submerged Lands Division. (He helped to develop the new rule.) “We create boundaries with rigid concepts. Mother Nature does not give us a precise edge. Some areas are gradual, not abrupt. This rule more accurately reflects what Mother Nature gives us as a wetland boundary.”

According to Cantrell, though the concept of what people call a wetland goes way back before the scientific process, this new rule was developed with the concept of applying science. Instead of being national in scope, the new rule “is specially designed for Florida because it looks narrowly at a smaller area,” he said. “It fits the landscape.”

**So What's New?**

In the new rule, wetlands are defined using three legs of a triangle: soil, vegetation, and hydrology. A combination of any two legs defines a wetland. Four tests using these parameters indicate where a wetland begins and ends (see Testing ... One, Two, Three, Four on the opposite page). The site under investigation only has to pass one of the four tests in order to be classified as a wetland.

“The new rule is much better,” according to Environmental Consultant Bob Weigt, Sr. of Weigt Consulting in Hobe Sound. “The soils are cross-referenced with the plants. This helps in the decision-making process.”

According to Cantrell, there are skilled ecologists in the field making the determinations. The St. Lucie County School Board was looking at a proposed site to build a new school. They used the services of Environmental Consultant Bob Weigt, Jr. who, along with Soil Scientist Greg Sawka and Botanist Dave Black from the South
Florida Water Management District, inspected the property to delineate the wetland.

A shovel, a map, a plant field guide, and some bug repellent were the tools of trade as they trekked through the 10-acre site to investigate a depressional wetland in the midst of sandy upland flatwoods. In one area, a distinct line separated the feather-like swamp fern from the sturdy palmetto. "That's textbook there," said Sawka, referring to a natural delineation between the wetland plant and the upland plant. Where the plant lines were not as distinct, he scooped out a 12-inch plug of soil with his shovel and analyzed the organic accretions in the top half. (Soil scientists make an evaluation on where the water table comes up to within six inches of the surface based on the color patterns — the gray and orange streaks — which show iron movement.) After describing this soil as having a very sandy subsurface with a mucky-textured surface layer and topped with a thin layer of muck, Sawka proclaimed it, "Great hydric soil!"

**Soils Take Center Stage**

Hydric soils are soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part of the soil to support hydrophytic vegetation — plants that grow in an aquatic or very wet environment. The new rule places greater emphasis on hydric soil as an indicator for delineation of wetlands. The Florida Wetlands Delineation Manual, produced by the DEP and the water management districts, emphasizes that because soils are a very powerful aspect of wetland delineation, identification of hydric soils should be performed by a trained soil sci-

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**Testing... One, Two, Three, Four**

The new wetlands delineation rule has four tests — A, B, C, D — to determine the boundary of the wetland. The site only has to pass one test to be classified as a wetland. Each test constitutes the mandatory two-legs of the wetlands triangle: soils, vegetation, hydrology.

**Test A:** There are more obligate plants (plants that almost always grow in saturated or inundated conditions) than upland plants and:
1. one of twelve listed hydric soil indicators are present, or
2. substrate is non-soil (the site does not have soils), it has a rock-outcrop soil complex, or it is an artificially created wetland or
3. one or more hydrologic indicators are present

**Test B:** The obligate plants plus the facultative-wet plants (plants that can grow in uplands, but are more at home in areas with saturated soils or water inundation) comprise at least 80% of the total plant species excluding facultative plants and at least one of the Test A criteria.

**Test C:** Prima facia soils (very wet soils) which have not been artificially drained and:
1. belong to one of the seven listed soil groups or
2. are saline soils (salt flats or tidal flats) or
3. are in a frequently flooded depressional hydrologic mapping unit which has been verified in the field.

Note: This test cannot be used in pine flatwoods or improved pastures.

**Test D:** 1. The presence of hydrologic indicators and
2. One of 12 listed hydric soil indicators and
3. Reasonable scientific judgement indicates hydrology (inundation or saturation) is present.

To determine the boundaries during onsite investigations, field experts begin in the middle of the wetland area and move landward until all tests fail.

For a copy of The Florida Wetlands Delineation Manual, please contact the Department of Environmental Protection, Bureau of Submerged Lands Division.
THE ANSWER IS . . .
THE DEFINITION
OF A WETLAND

(You have 30 seconds.)

As defined in subsection 373.019(17), Florida Statute, wetlands means those areas that are inundated or saturated by surface water or ground water at a frequency and a duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils. Soils present in wetlands generally are classified as hydric or alluvial, or possess characteristics that are associated with reducing soil conditions. The prevalent vegetation in wetlands generally consists of facultative or obligate hydrophytic macrophytes that are typically adapted to areas having soil conditions described above. These species, due to morphological, physiological, or reproductive adaptations, have the ability to grow, reproduce or persist in aquatic environments or anaerobic soil conditions. Florida wetlands generally include swamps, marshes, bayheads, bogs, cypress domes and strand, sloughs, wet prairies, riverine swamps and marshes, hydric seepage slopes, tidal marshes, mangrove swamps and other similar areas. Florida wetlands generally do not include longleaf or slash pine flatwoods with an understory dominated by saw palmetto.

(Sorry. It has to be in the form of a question.)

entist. It also states that there is no substitute (such as a county soil survey map) for onsite observation and field expertise. On the St. Lucie County soil survey, the majority of the site is mapped as Waveland fine sand — typically a nonhydric soil; however, the onsite investigation showed muck and mucky-textured surface layers in the center of a depressional flow-way.

A soil is saturated if the water table is within six inches of the soil surface for sandy-textured soils or within twelve for loamy or clayey-textured soils. The depths of the water table cause a capillary rise of water to the soil surface (similar to a paper towel dipped in a glass of water — the part under water is saturated and the portion directly above acts like a wick and seeps up the water). If the duration of saturation is long enough, the oxygen content of the water in the topsoil is exhausted. Organic matter begins to accumulate creating a tell-tale soil morphology which shows inundation or saturation. This morphology becomes the hydric indicators.

These characteristics or indicators were developed for Florida's soils. Four of the indicators that are evidence of a water table at or above the soil surface for more than several weeks during the growing season are muck of any thickness, sulfidic odor, mucky texture, and gley (sticky, bluish-gray soil layer formed under the
Thousands of tiny river hom snails cling to thriving beds of eelgrass and strappleaf sedge along the Ichetucknee's river bottom.

Gulf sturgeon, a federal threatened species, travel from the coastal estuary up the Suwannee River to spawn. The springs are known to be important resting places for these ancient fish as they migrate upriver. The Suwannee is the only river system in the eastern Gulf of Mexico that supports a healthy, functioning population of Gulf sturgeon.

And of course, there are the manatees. During winter months, these gentle giants seek the comfort of the average 72-degree springs to help them survive the cold weather.

During summer months, creatures of another sort are drawn to the springs' cool waters to escape the sultry, sweltering heat. Thousands of visitors flock to these refreshing coves to enjoy diving, snorkeling, swimming and inner tubing. Florida's springs have become so popular, in fact, that they are nearly being "loved to death."

Peacock Spring near Mayo, to name just one, features one of the most extensive and spectacular caves in the world, with more than 35,000 feet of passage mapped and explored.

Heavy traffic — by car and by foot — has left many of these fragile areas in dire need of restoration. Regular pedestrian traffic up and down the banks has led to shoreline erosion. As tons of sand and soils slide into the springs, water quality is reduced and spring habitat becomes degraded. Excessive vehicle traffic has compacted the ground around the springs, contributing to runoff and erosion.

Besides overuse, some North Florida springs are being threatened by groundwater contamination which appears to be caused by nearby human activities. Through a number of cooperative interagency programs, the Suwannee River Water Management District is working with landowners to reduce the amount of pollutants that seeps into groundwater and flows into springs.

The Suwannee River district is also performing restoration work at a number of local springs. This year, Suwannee, Falmouth, Charles, Guaranto and Blue springs have received or will receive improvements that include stabilization of erosion; new walkways, stairways and handicapped access ramps to the springs; upgraded parking areas; and landscaping with native plants. To ensure the public's safety, springs are closed to the public while work is underway.

"For years our springs didn't seem to get the attention they needed or deserved," said Rob Mattson, Suwannee River district biologist. "But over the past three or four years, there's been a lot more interest in acquiring and restoring springs for protection and preservation."

Funding assistance for acquisition and restoration projects has come from sources including the state's Conservation and Recreation Lands (CARL) program and the Department of Environmental Protection's Pollution Recovery Trust Fund. In most cases, management and upkeep of the public springs becomes the responsibility of local counties once restoration is completed.

We set off in the cool of the morning, and descended pleasantly, riding on the crystal flood, which flows down with an easy, gentle, yet active current, rolling over its silvery bed; how abundantly are the waters replenished with inhabitants: the stream almost as transparent as the air we breathe...
Call From The Wild:

CANOE SHARK RIVER SLOUGH

BY GEORGE HURCHALLA

Aft er pulling through a dense wall of sawgrass on Tamiami Trail, my mother and I emerged into an open prairie that expanded infinitely to the south. The spikerush glowed golden in the early morning sun, and the air was crisp and cool under a brittle blue sky. We canoed through spring-clear water that was two to three feet deep, over an area that was normally dry ground. Underwater, the periphyton bloomed in ornate patterns that resembled a reef of staghorn coral.

This breathtaking environment I found myself in with my mother, on a perfect Florida winter morning, is a place that has seen few people but the Seminole Indians pass through it by their own power. It is the Shark River Slough, the true river of grass in the heart of the Everglades. In the 1800s, only the Seminoles knew how to navigate their way effortlessly through this maze of sawgrass. The situation hasn’t changed much in this century, except that the slough is now part of the Everglades National Park and the Seminoles don’t venture into it much except for occasional burial ceremonies. That means that these days the art of slough travel isn’t known to anyone. You just have to plunge in and hope you come out the other side.

Hugh Willoughby was the first white man to cross the Everglades by his own navigation, completing the journey by canoe in two weeks in January of 1897. Ninety-eight years later we planned to cover some of the same territory that Willoughby had, and I had finished reading his account of his trip only a few days before we set out. It had not encouraged me. My mother had walked through the slough in 1988, during a drought, and her memories of it were a little more encouraging.

After a few miles, the sounds of Miccosukee airboats from reservation territory on the other side of Tamiami Trail faded away, and we were in one of the most serene and beautiful environments in the world. The clarity of the water was an object of endless fascination. We had never imagined the gin-like dream world that unfolded beneath us. Just when I was about to pinch myself, the sound of a small outboard engine startled me. I looked around. There was nothing but the sound, again and again, of a four horsepower outboard revving up and dying away. The mystery was later solved by our nation’s Attorney General (who also happens to be my aunt), who confirmed it was an alligator, having heard one make the exact same noise before. (It’s useful in Washington to know your gators.)

In the early stage, the canoeing was effortless. The sawgrass was low and sparse, and the spikerush hardly slowed us down at all. The easy going was on the eastern and western edges of the slough, but rarely ever, now or a hundred years ago, has there been enough water covering these prairies to allow unfettered canoe travel over them. We were in one of those rare times.

As my mother gazed over at a small stand of cypress in the distance, she remarked: “Do you think that’s a buzzard, George?” I looked over to where she was pointing and saw the silhouette of a terrifyingly huge bird perched in an upper limb. “If it is, it’s some sort of condor,” I muttered.

I had never seen a bird of such imposing bulk in the wild before and the glimpse of a white head through my telephoto lens confirmed that it was the only thing it could be: an American bald eagle. We paddled over to it, expecting the eagle to be spooked by our presence. However, it did not show the slightest sign of interest in us as we drew to within thirty yards of the tree. Admiring its cold arrogance, I realized it ignored us because, like us, it was at the top of the food chain. In fact, there were far more things that we humans feared than it did.
Just after the Shark Valley Observation Tower came into view a few miles off, my mother uttered a cry of alarm. The focus of her attention was an innocuous looking tree about four feet tall. More than half of it was below water, and it stood singularly alone in the midst of the prairie.

"A melaleuca!" she cried, in the spirit of a Crusader who had just unearthed a pagan. I understood her horror. This obnoxious Australian import had been introduced in the beginning of the century as part of a plan to drain the Everglades. It thrived in areas that were more often under water than not, proliferated wildly, and as a result sucked water out of wetlands at an astonishing rate. It was a mark of pride to the Park Service that they had eradicated virtually all of the melaleuca from within the park's boundaries. I yanked it out and handed it to my mother. She sighed with relief. "We might have just saved them $50,000."

With our trophy plant lashed to the floor of the canoe, we began searching for the airboat trail. We jogged back and forth, south, east, and north, avoiding the dense patches of sawgrass until we saw white markers to our north that delineated the trail. It appeared that we had not begun looking for the trail early enough and had passed well to the south of it before making our eastward turn. This mistake was going to be mirrored, ironically enough, on the following day with far greater consequences.

The major hammocks, which did not seem like much on our topo maps, turned out to be far larger than we had expected. They were shaped like tadpoles with endless tails. The airboat trail passed within a hundred yards of Seagrape Hammock and almost touched upon Gumbo Limbo Hammock. This was the closest we would come to dry land until we got to Pa-hay-okee. Despite Hurricane Andrew having roared through here only two and a half years before, both hammocks looked in surprisingly good shape. On Gumbo Limbo, a plethora of tall gumbo limbos rose undamaged above the other trees, with the occasional mastic amongst them.

As the trail curved around the hammock and headed south, we paralleled the tail of the tadpole. This narrow strip, which lay under water, was mostly comprised of willow and tailed off into a thick wall of sawgrass.

Gliding along under the still cloudless sky, cooled by a light breeze, I was overcome by a naive smugness. It was all too perfect, too easy. My mother was worried by my smugness. By either the law of Reno family adventuring or the law of the Everglades, I would be punished for it.

Amidst the splendor there were eerie things to be found, and the alligator holes were the eeriest of all. In dry times, they were but a few feet deep, but now they were like six to seven feet deep springs. We would occasionally burst out of the sawgrass into one of these circular openings and stare down at a bottom that seemed so close you could touch it, half expecting to see a big gator lying down there in slumber.

Fish were abundant, mostly small bass. Gar, one of the old staples of the Miccosukee diet, were rarely seen but often heard. My mother kept saying nervously, "I wish they wouldn't do that" every time one exploded near the boat upon being disturbed. We saw an alligator snapping turtle, the largest and crankiest of the slough turtles. Its foot long tail, which gives it a look in accord with its temperament, was impressive.

By late afternoon the hammock called Panther Mound lay a quarter mile to the east, and we had come as far as we had planned on this day. All we needed to find now was a place to nestle the canoe in for the night. There was one promising little clump of vegetation just off the airboat trail, about half the size of my grandmother's porch, with a little channel running through the middle of it. As we approached, we saw a small alligator swimming along the edge of the sawgrass. It meandered into the channel as if going home to mother. We thought perhaps we'd choose another site.

We settled for the lee side of a house-sized hammock a little further on. Since the hammock was entirely under water, we didn't think parking beside it was likely to adversely affect anything. A pair of buzzards decided it was likely to adversely affect us, and settled on top of nearby trees shortly after we arrived. After paddling around the corner to find a good vantage point for the sunset, I fired up our propane stove. We started with an appetizer of ramen, followed by a black bean soup, and then the main course of angelfish pasta with broccoli. With an infinite supply of fresh water at hand, three dollars worth of instant meals, and nature's unparalleled colors, the dinner was as perfect as one could ask for. The pig frogs croaked throughout with ribbits of immodest tone and volume.

Rearranging the gear in the canoe to give us as much space as possible, we tucked ourselves into our sleeping bags. Though we hadn't felt a mosquito in our whole day of paddling, come nightfall we found our mosquito nets indispensable. The mosquitoes emerged from the hammock like thousands of tiny vampires voraciously intent on making up for their daytime rest. The worst part was the buzzing. I was awakened again and again by the monotonous, nerve-rattling drone. Each time it was a vision of a bejeweled sky, and after gazing for a while at the heavenly expanse and the occasional shooting star, I would fall peacefully asleep again.
The wildlife noises of the slough were unlike any I had ever heard before. The day had given us the four horsepower alligator and a bird that sounded like a horse galloping, but the night gave us an astonishing variety.

At around four in the morning, the air grew noticeably colder. When we awoke at six, we discovered that the chill was accompanied by a howling wind out of the southwest. We brewed up coffee and oatmeal, and watched the sunrise as it lit up the sky to the north of Panther Mound. As soon as the sun had risen over the horizon, the buzzards gave up hoping for our demise and flew off.

My smugness received its first challenge when we began the day’s paddling. The slough runs southwest toward the headwaters of the Shark and Hamony Rivers, and the wind was blowing straight up the slough at us forcefully. Against a 35-40 mph wind that scorned us for the tiny speck of insignificance that we were, the effortless movement of the day before transformed into a sluggishly struggle to make progress.

Clouds darkened the sky throughout the morning, and the broad dark band of a cold front dominated the horizon to the west. My will to fight the wind diminished, and we agreed to put up in a patch of sawgrass and let the front roll over.

"I thought you said the weather was supposed to be clear both days," my mother said accusingly. "Well, the extended forecast a few days ago didn't say anything about a cold front," I cheerfully replied. "It just said it was going to get cold Saturday night. I didn't bother making the connection that cold fronts generally precede cold."

The magic had gone out of the slough for the moment. The storm still seemed far off when we got into the strand of sawgrass, but no sooner did we get our gear safely back in our dry bags than the first raindrops hit. We threw our sleeping bags over ourselves for cover — having brought no rain gear — and settled in for the duration. The wind was blowing so hard that it blew most of the rain over the tops of the sawgrass, and beneath in our shelter we were cozy. Sawgrass could be your friend too.

A half hour later I peered out from under my bag to see a grey sky but no more rain. I sat up and made coffee, which drew my mother out from under her bag, and we took in the changes. The air was a bit crisper, the wind had increased and switched direction by sixty degrees to WNW, and quickly departing clouds were once again revealing the inimitable Everglades-blue sky behind them. My smugness returned. "Even when it does its worst, this is still wonderful," I laughed.

My mother did not welcome the return of my naive optimism. It didn't last, anyway, because the next few hours were still a seemingly losing battle with the wind. We left the trail eventually to cross the slough, and met up with heavy sawgrass for the first time. When pulling a canoe through sawgrass, the most critical bit of protection — beyond full clothing coverage — is duct tape. It's important to duct tape your sleeves to your sleeves, or if you're wearing a short-sleeved shirt like my mother was, simply duct tape your arms all the way up to the elbow. If you don't, your wrists bear a stinging cross-croix of slices that resemble those of an indecisive suicide attempt. Twenty yards into the sawgrass patch, I fully understood why Willoughby had said:

"We could not get by that terrible strip of grass into which I did not dare venture and to penetrate even a short distance might take weeks of trying labor." We gave up and retreated, until we found a place where the sawgrass got lower and my mother picked an arbitrary destination to fight toward. After a hundred yards of heave-hoing through the sawgrass, I saw reason for optimism ahead. There was some open water. Once we had broken through I surveyed a line to the southeast with cautious joy. As far as I could clearly see there was an opening across the slough that ran in a straight line between all the hammocks, a band some twenty to fifty yards wide of light sawgrass and spikerush. Best of all the wind was directly at our back. We no longer had to paddle and I alternated between standing up to act as a sail and sitting down to sceer better. What a difference! We roared, we flew, we rocketed across the slough. The fact that we had no idea where we were mattered not in the least; just that we were going somewhere, anywhere, at a good clip. Golden gloomed the spikerush, blue filled the sky, and once again we were at peace with the slough.
Then we came across a most unusual tableau. In a field between two hammocks, right in the midst of our course, lay two airplane sections a hundred yards apart. We could not make out if they were wing sections of a small plane or tail sections of a large one, and we could make no accurate guesses about how long they had been there. The only major Everglades crash that we knew of was a Pan Am flight in the early 1970s, but that had been north of the Tamiami Trail. Oddly enough, there were no traces of the rest of the wreckage in the vicinity. The two sections lay tilted in the muck like sentinels, another set of ghosts that the slough preserved perfectly over time. (We later learned from Ranger Bob Panko that they were the tail sections from a pair of World War II military aircraft that collided with each other while bringing troops home.)

Though there was little change in scenery to signify that we had left the slough and entered the prairie, reefs of periphyton appearing again were one sure sign. We continually scanned a 180 degree arc ahead of us, searching the horizon for the Pa-hay-okee Lookout structure and sighting it at least ten or fifteen times. Unfortunately, each closer study revealed tops that swayed in the howling winds. We kept on, covering miles of prairie without seeing anything that could signify where we were. My mother thought we needed to go east. I thought south. As usual, we compromised and went southeast.

We entered great stands of cypress, which limited our choices of direction. It was my turn to defer to my mother's willfulness toward easting. We passed through the first strand of cypress and encountered high sawgrass, and soon depression and defeatism were back with a vengeance. I had already accepted the certainty that we were sleeping out another night, but I was in no mood to deal with sawgrass again. My arms grew weary of the pulling, so I got out and pushed us through the thigh-deep water.

In the next cypress stand we both lurched our way through the muck, tripping over cypress knees and hauling the canoe over logs. Both of us were somewhat grim now. I noticed in my mother a set-jawed determination that her sister is famous for, and realized that she planned to do everything she could to make sure she slept in a warm bed that night.

Suddenly we were out in open prairie. I had lost my willfulness somewhere back in the sawgrass and was open to any sort of suggestion, so it surprised me a bit when my mother abandoned her easting impulse and willfully declared that we should head due south. We went about a half mile when an exquisite sight crossed my vision. A car. A mile ahead I saw a car go by. I had never been so happy to see a car in my life.

My soughing impulses had been vindicated. The water didn’t run low until the last few hundred yards, and we happily trod the rest of the way over the pinnacle rock. Still we had to be cautious, for pinnacle rock is eroded in such uneven and jagged ways that it is easy to break an ankle setting your foot in a hole. Just before the road a small deer bounded into view, its white curled tail flashing through the air as it sprang off through the dwarf cypress.

We hauled the canoe up to the roadside just as the sun was setting, and admitted the big yellow ball as it disappeared behind the cypress. I unwrapped the duct tape from my arms and changed into some more friendly looking clothing, reasoning that it might help our chances of attracting someone to stop. After five cars passed by my outstretched thumb, my mother suggested we start waving them down. Soon a car pulled over for us.

“I’m assuming Pa-hay-okee is this way,” I said, pointing in the direction they were going. “My van is there.” “Oh, no, Pa-hay-okee is back the other way,” said the pretty, rosy-cheeked woman in the passenger seat. “It is not far, though.”

“I told you so, I told you so,” my mother chortled in the background. We were too far south. “You will have to go to the other side of the road,” the woman stated helpfully. Another car stopped right behind them, occupied by a middle-aged couple, and they took me back to Pa-hay-okee. Of course the battery was dead, but they gave me a jump.

On our way out of the park, my mother and I hypothesized about how we could have possibly ended up where we did. It was off the bottom of our topo maps, so they weren't any help. We threw up theory after theory, but we couldn't agree on any of them. The one thing we could agree on was that at some point we had been, as described by Marjory Stoneman Douglas in Everglades: River of Grass, somewhere “that has not known one single human thing, only the beasts and snakes and birds and insects that know nothing else since their time began.”

George Hurchalla, an engineer by training, is a writer who shares his experiences as he “bounces around the world,” according to his mom. He grew up in south Florida, but now calls Tahoe, California his home.

Maggy Hurchalla is an avid environmentalist who served as a Martin County commissioner for 20 years. She is now a member of the Conservation Alliance of Martin County, the Coastal Advisory Commission, and the Governor’s Commission on Sustainable South Florida.
This year's brutally cold winter days turned most of the country into an icy tundra and sent even the all-weather birds south to Florida in their search for food and shelter. Why not start now to turn your backyard into a wildlife refuge and a mecca for next year's hungry foragers? To wake up to the chirping of birds as they hop from perch to perch feasting on the bounty you have provided is to experience the sound of nature's chimes.

You have to look quickly to catch a ruby-throated hummingbird making a spectacle of itself as it darts in and out of the orange-red tubular-shaped blossoms of a firebush. The red-breasted robins and wood thrushes aren't as skiddish as they move between the eucalyptus and sea grapes for brunch — any berry bushes will do. And the butterflies splash color all over the yard as they flutter around the milkweed and the penta. The brilliant orange and black wing-spread of a monarch as it glides atop the breeze to catch up with the zebra swallowtails brings a sense of giddiness even to the most somber.

Anyone can bring nature a little closer to home by planting the right plants in the right places. To encourage the hummingbird, plant their favorite nectarating blossoms in sunny habitats. Coral honeysuckle, cross vine, and red buckeye are plants the elusive hummingbird cannot resist. The plant list is endless for the other Florida birds such as the red-bellied woodpecker, chickadee, warbler, sparrow, and the mockingbird (our state bird).

A diverse mixture of trees, shrubs, and vines will feed the birds and provide habitat for nesting. The gumbo-limbo tree produces clusters of red fruit enjoyed by mockingbirds and warblers. The succulent fruit of the southern crabapple, black cherry tree, and hollies are natural picnic baskets for a variety of birds. The beautyberry and wild coffee plant are shrubs with fleshy berries — these along with the muscadine grapevine are sweet additions to your bird refuge.

The novice gardener can start small with a butterfly garden. Pentas in colors of white, pink, purple, and red give your yard the look of an English garden. Confetti, purple, and yellow lantana and purple and pink porterweed, once regarded as unruly weeds, have now found a place in the natural landscape as butterfly plants. To attract the most butterflies, plant the nectar-producing flowers as well as the host plants which provide food for the caterpillar stage.

Wildflowers native to Florida are the biggest butterfly draw. How about the grounded furry creatures? Suburban Florida is home to the cottontail rabbit who likes green plants, woody blackberries, and tree bark. Even the field mouse could enjoy your natural habitat — it has a place in the food chain as an insect eater. The lofty mammals such as the flying squirrel like to find cavities in mature oak trees. Bats (don't worry, they are nocturnal and their appetites for insects are insatiable) sometime nest in Spanish moss.

Reptiles and amphibians are also our friends as they keep the insect population in check. Native ground covers are excellent habitat for these shy creatures — the box turtle, lizards, and even an occasional rat snake.

Planting a wildlife refuge goes hand-in-hand with using xeriscape principles. To promote water conservation, the water management districts encourage the use of xeriscape or water-wise landscaping. Instead of planting large expanses of grass (which could use up to 70 percent of your home water use), planting drought-tolerant and low-maintenance plants is part of xeriscaping. So, you can double your pleasure by building habitat for the critters.

Next winter, when we have another blue-skied lousy day in paradise and the animals stop by, you provide the munchies.

A source of information used for this article was "Planting a Refuge for Wildlife," produced by the Nongame Wildlife Program, Florida Game and Fresh Water Fish Commission, 620 South Meridian Street, Tallahassee, FL 32399-1600.

For more information on Xeriscape, contact your water management district and ask for a Plant Guide.
Habitat for Hummingbirds *(And Other Critters)*

Plan your landscape to provide food and shelter for wildlife.
The plants listed below are suggestions and will create a very diverse landscape.

**NORTH FLORIDA**

1. Pine
2. Red Mulberry
3. Flowering Dogwood
4. Wax Myrtle
5. Southern Magnolia
6. Blueberry
7. Viburnum
8. Cherry Laurel
9. Red Maple
10. American Holly
11. River Birch
12. Fringe Tree
13. Red Buckeye
14. Black Gum
15. Hawthorne
16. Red Cedar
17. Persimmon
18. Live Oak
19. Coral Bean
20. Cabbage Palm
21. American Beautyberry
22. Elderberry
23. Pokeweed
24. Sweetgum

**SOUTH FLORIDA**

1. Pine
2. Red Mulberry
3. Wild Coffee
4. Cocoplum
5. Paradise Tree
6. Blueberry
7. Stopper
8. Florida Tierra
9. Coffee Colubrina
10. Geiger Tree
11. Necklace Pod
12. Sea Grape
13. Silver Palm
14. Black Gum
15. Firebush
16. Red Cedar
17. Persimmon
18. Live Oak
19. Coral Bean
20. Thatch Palm
21. Blolly
22. Elderberry
23. Pokeweed
24. Gumbo-limbo
HOPPING IN PILLOW SLIPS THAT SIMUL- 
LATE CADDIS FLY CASES, STUDENTS PLAY A GAME 
of tag that illustrates how macroinvertebrate populations 
indicate water quality. Third graders imagine they are 
shrunken to the size of water molecules and take an incredible 
journey through the water cycle. Scouts build rainsticks, an 
ancient instrument that imitates the sound of rain, and learn 
how diverse cultures celebrate water. High school seniors 
become CEOs and analyze the relationship between eco- 
nomics and environmental quality.

What do caddis flies, water molecules, rainsticks, and 
CEOs have in common? They are all subjects in the Project 
WET Curriculum and Activity Guide, the centerpiece for a 
highly innovative water education program, Project WET 
(Water Education for Teachers).

The goal of Project WET is to facilitate and promote 
people’s awareness, appreciation, knowledge, and steward- 
ship of water resources. The program accomplishes this goal 
by developing and disseminating classroom-ready teaching 
aids and establishing state and internationally sponsored 
Project WET programs.

Florida has an innovative partnership for sponsoring 
Project WET in the state. Four water management districts 
and the Department of Environmental Protection have 
teammed up with The Watercourse and the Western Regional 
Environmental Education Council (WREEC), interna- 
tional co-sponsors of WET, to offer this supplementary, water 
science and education program to educators. Water resource 
agencies and conservation organizations around the country 
are already using these highly adaptable materials. Florida is 
currently the 36th state to sponsor Project WET.

What’s WET?

While the exact format of the in-service workshop will 
var from watershed to watershed, participants familiar with 
Project Learning Tree (PLT) and Project WILD will feel at 
home when they attend a WET workshop.

Like the PLT and WILD programs, all Project WET 
materials are appropriate for formal and nonformal educa- 
tors of young people in grades K-12. Public and private 
schools, childcare centers, museums, parks, libraries, nature 
centers, zoos, colleges and universities, and aquaria.

The central theme of PLT is the importance of plants 
in ecosystems. WILD focuses on the importance of habitat 
to wildlife. Aquatic Project WILD examines the water 
world primarily as it relates to wildlife. The WET materials 
build upon the success of these programs and improve the 
activity format.

The scope of the Project WET program is broad. This 
fact is reflected in the range of water education concepts 
presented in Project WET materials and the diversity of 
themes it addresses including:

- Water education involves a variety of teaching strategies.
- Water has unique physical and chemical characteristics.
- Water is essential for all life to exist.
- Water connects all Earth systems.
- Water is a natural resource.
- Water resources are managed.
- Water resources exist within social contexts.
- Water resources exist within cultural contexts.
If: water is life...
then: water conservation must be our way of life.

Your Water Management Districts encourage you to support Earth Day – EVERY day.
COVER

A CALL FROM THE WILD: CANOE SHARK RIVER SLOUGH
By George Hurchalla
Navigating through a maze of sawgrass, the author experienced slough travel during a rare time when water covered this part of the Everglades.

FEATURES

SPRING INTO SUMMER
By Cindy Johnson
As the temperature rises, take a cool dip in one of north Florida's freshwater springs.

TURN YOUR BACKYARD INTO A WILDLIFE REFUGE
By Jan P. Loftin
Anyone can bring nature a little closer to home by planting the right plants in the right places.

FLORIDA'S WET PARTNERSHIP
By Sandra Chihowlom Robinson and Roy I. King
Florida catches the wave of an innovative water education program.

WETLANDS: WHERE DO YOU DRAW THE LINE?
By Jan P. Loftin
The new wetland delineation rule uses soil, vegetation, and hydrology as parameters to determine where a wetland begins and ends.

DEPARTMENTS

NATURE'S CLASSROOM
Catch of the Day: Environmental Awareness
By Lorin P. Joyner
Students learn first-hand about Lake Jackson and the effects of stormwater runoff.

WILDERNESS GETAWAY
Enjoying a Little R&R on the Nature Coast Greenway
By Mary Ann McKinney
Chassahowitzka and Oak Sound are part of a 200-mile corridor that stretches from Pasco County to Apalachicola.

On the Cover:
Standing in his canoe, a very tall George Hurchalla gets a bird's eye view of the gin-clear water in the Everglades as he experiences "one of the most serene and beautiful environments in the world." Photo by Maggy Hurchalla

Back Cover:
Truly, a River of Grass — "golden glowed the spikerush, blue filled the sky, and once again we were at peace with the slough." Photo by George Hurchalla
Behold, for instance, a vast circular expanse before you, the waters of which are so extremely clear as to be absolutely diaphanous or transparent as the ether ...

But behold yet something far more admirable, see whole armies descending into an abyss, into the mouth of the bubbling fountain; they disappear!

I look down again to the fountain with anxiety, then behold them as it were emerging from the blue ether of another world ...

— naturalist William Bartram, 1775

Spring into Summer
BY CINDY JOHNSON

Like brilliant aquamarine gems, Florida's natural springs adorn the landscape, exuding a mystique that has lured man for centuries.

At once tranquil and translucent, dark and deep, these dazzling pools have drawn the curious, from ancient Indians to present-day divers, offering comfort to the body as well as to the soul.

Revered for their "healing" properties, mineral springs once attracted people of every race and culture suffering from arthritis, rheumatism and other chronic conditions. Some were later converted into posh health resorts by shrewd businessmen. Even Spanish explorer Ponce de Leon sailed to Florida's east coast in search of the fountain he believed would provide the secret to eternal youth.

The rich and fascinating history behind many of these springs is still reflected today in the colorful names they bear — Convict, Baptising, Iron, Copper, Jack's Run, Rum Island, Warrior, Otter, Devil's Eye, Blue and Peacock. The sites of early Indian villages or Spanish missions, many of these clear, natural pools today are protected and preserved for public recreation.

Unlike the mysterious murky waters of a swamp, or the ocean's dark, pounding waves, most Florida springs are crystalline pools in which even the squeamish can find comfort in being able to clearly see what lies beneath their feet.

And the view is magnificent.

Dazzling limestone rock fashioned into spectacular underwater caverns. An array of unique and endangered aquatic plants and animals. Acres of unspoiled wilderness submerged beneath some of the cleanest, clearest water to be found anywhere.

Cool in the summer and warm in the winter, Florida's springs attract creatures great and small, from the tiny sand grain snail to the giant sea cow.

Though the Sunshine State may be famous for its coastal white-sand beaches, it also boasts one of the largest concentrations of freshwater springs in the world.

Some 300 springs have been identified statewide. Of those, 90 are located within the Suwanee River Basin.

... an enchanting and amazing crystal fountain, which incessantly threw up, from dark, rocky caverns below, tons of water every minute ...

Sixty-five million gallons of water per day flow from each of nine North Florida springs. Classified as "first magnitude," these springs discharge an average of 100 cubic feet or more of water per second. Of the 78 first-magnitude springs identified in the United States, Florida has 27 — more than any other state.

The region's karst geology and the rivers which carve channels through this geology create the perfect conditions for spring development. Springs occur when artesian pressure causes a natural flow of groundwater onto the
earth's surface. As rain filters down into the Floridan Aquifer, natural acids in the rainwater dissolve the aquifer's limestone. This creates large cracks, cavities and tunnels.

As rainwater enters or "recharges" the aquifer, enormous pressure is placed on water already there. This pressure moves water through the aquifer through new cracks and tunnels, as well as through the permeable rock itself. Sometimes this water flows out naturally to the surface at places called springs.

When the openings are large, spring flow may become the source of rivers such as the Ichetucknee, Silver, Wakulla or Weeki Wachee. Four North Florida springs — Manatee, Fanning, Troy and Madison Blue — contribute nearly 368 million gallons per day to the Suwannee River.

When rivers flood, the external pressure created by floodwaters causes many springs to reverse flow. Falmouth Spring in Suwannee County is one spring which does this regularly.

Springs tell us a lot about current hydrologic trends and human impacts on our water supplies. Low spring flow may indicate drought conditions. Or, it may signal excessive groundwater withdrawals, as may be the case in southern parts of the state.

Springs also play an important role in supporting diverse and abundant freshwater plant and animal life. There are more species of fish, amphibians and reptiles in Florida than any other comparable area in the world. Molusks (snails and clams) and a variety of crustaceans such as grass shrimp and scuds abound in North Florida springs. Albino crayfish and shrimp, adapted only for a cave existence, navigate blindly through the underwater caverns associated with springs, surviving on decaying plant and animal material washed into the caves through sinkholes.

One small spring found along the west bank of the Ichetucknee River — a popular recreational paradise near Lake City and Fort White — is the only place in the world where you can find the sand grain snail. The spring has been declared a protected endangered snail habitat.