The Florida Geographer

Hurricanes from 1885-1980
The Florida Geographer is the official publication of the Florida Society of Geographers, and is distributed without cost to members of the Society. One number per year will be published, pending receipt of an adequate number of acceptable manuscripts.

The Florida Geographer is a state-wide journal, with broad coverage of geographical topics relating to the state and its several regions. No restrictions are placed on the content of articles, providing that they deal with some aspect of the geography of Florida, i.e., local studies within the state, matters of the state generally, or studies of the U.S. South, of which Florida is a part.

Manuscripts are solicited from all who feel they have research worthy of dissemination. No specific format requirements are presently in force, although the editor would prefer manuscripts to be typed double-spaced following the general format of the articles in the present number. However, authors should not be dissuaded from submitting manuscripts because of format considerations; the editor is willing to undertake extensive revisions. As this number demonstrates, we are able to reproduce maps, charts, and tables.

We would like to publish an original map on the cover of each number, so a special request is made to all who have maps of the state or regions of the state which would be of interest to the Society's membership.

David Lee
Editor, The Florida Geographer
Department of Geography
Florida Atlantic University
Boca Raton, FL 33431

About the Cover...

A significant amount of Florida's total rainfall comes in the form of hurricanes. Between 1885 and 1980 hurricanes struck all parts of the state, although southern Florida and the Panhandle were hit more often than the northeast. The cover map, which illustrates this, comes from Water Resource Atlas of Florida, a beautiful piece of cartographic production which is the subject of two Florida Geographer articles in this number. Elizabeth D. Purdum, Associate Editor of the book, describes the problems associated with the production, and Alan Craig provides a review article in which he confesses that he finds this atlas "Simply Splendid." The cover map and figures in Dr. Purdum's article were reprinted from Water Resources Atlas of Florida edited by Edward A. Fernald and Donald J. Patton by permission of the Institute of Science and Public Affairs of Florida State University, copyright ©1984 by Institute of Science and Public Affairs.
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THE FLORIDA GEOGRAPHER

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THE MEANING AND IMPORTANCE OF GEOGRAPHIC KNOWLEDGE

Ronald R. Schultz

Over the past several years national attention has periodically focused on the lack of basic geographic knowledge and world awareness among American college students. Studies by individual faculty, by major educational organizations, and even by the national pollsters, all report that among U.S. college students there exists a glaring inadequacy or weakness in place identification and associated geographic knowledge.

Geographical Illiteracy

Recently, the results of a simple place name identification exercise at a nearby university (University of Miami) were catapulted from an instructor's memo to his colleagues, to the student newspaper, to the Miami Herald and local papers, to local radio and television news shows, and finally to live and taped appearances on "Good Morning America" and the NBC "Nightly News." This in turn spawned even more national and international coverage. The astonishingly poor performance of that introductory geography class even made Johnny Carson's "monologue" (Belgrih 1983). At the least, one can conclude that geographic ignorance is news-worthy.

A survey of American college students by one of the nation's leading educational testing services also concluded that our students' knowledge of geography, or global awareness as it was called, was appallingly low. The director of the survey was quoted as saying that students "don't seem to have [the] basic knowledge that would be required to understand in any meaningful way what is going on in the world" (Eisen 1982, p. 8-4).

Geographic Knowledge and Global Systems

These events have helped bring to national attention what geographers and many others already knew. The American educational system does not place significant emphasis on modern geographic knowledge and understanding. Among the developed nations of the world we are weak in this respect. This lack of emphasis on world geography, on the similarities and differences among nations and peoples, on the interrelationships of social, political, economic, and physical resource systems, can be attributed to the relatively low level of communication and contact among the businesses and people of the United States and the economics and cultures of the rest of the globe. One can, in fact, suggest that our relatively low level of communication and contact with the rest of the world is a result of our size, our location, and the rich diversity of the physical and human resources within our country. That is, the lack of emphasis on world geography can be said to be a result of the geography of the United States itself.

In any event, there remains the glaring fact of the paucity of American students' geographic knowledge, standing in sharp contrast to such knowledge among students in other developed countries. These nations are characterized by relatively high volumes of international trade and a corresponding need for information about and comprehension of other places.

With the continuing and very significant growth of multinational enterprise and the increasing importance of international trade, both in terms of markets for our products and sources of essential raw materials (particularly oil), and other imports, the need for a better understanding of the diversity in the world should be obvious. Awareness of the national character and interrelatedness of the social, political, economic, and physical resource systems, and an understanding of the linkages of these systems with corresponding systems elsewhere, is essential in an age of global interdependence. Such knowledge, geographical in context, expression, and interpretation, can foster a greater awareness of and sensitivity to other societies and cultures; and such geographic knowledge can encourage economic development and potential opportunities for trade are recognized and acted upon. The strengthening of our
economic and social well-being, and the economic and social well-being of our trading partners is a worthy goal in this increasingly competitive and, we hope, cooperative world.

Geographic Knowledge and Public Policy

The lack of geographic knowledge and understanding is also apparent at other scales of analysis. I draw the following example from some of my own research, research that has public policy implications. As an urban geographer, I study metropolitan areas. Metropolitan areas are dynamic regions. People and businesses do not remain where they were indefinitely. Characteristics of places change over time, often in complex but usually in explainable ways. Geographic change is typically orderly and thus, in principle, predictable. However, without an understanding of the forces and processes that underlie geographic change the observer will often misread forest for trees.

The Changing Social Geography of Broward County

Several years ago many western Broward County parents disagreed with a proposed revision of school district boundaries. Opposition to the plan centered on the boundaries proposed for two new high schools opening the following fall. Parents were dismayed when, according to the plan, students within close walking distance of the new schools were to continue to be sent long distances to central and eastern Broward schools. Racial desegregation issues were loudly debated among the interested and affectected parties. Yet, the real source of the dilemma was not racial balance, but a severe mismatch between school locations and the location of students.

This geographic imbalance in schools and students was a result of the orderly and predictable geographic behavior of households. In Broward County, as in many other Florida communities, the economy is largely shaped by tourism and retirement, both desires of coastal or near-coastal locations. In addition to the preferences of retirees and tourists for locations close to the ocean, the trade and service industries that meet these sector-demands also have had a strong incentive to locate in that part of the county. The result has been a competition for scarce ocean front land; consequently, land values diminish as distance from the ocean increases. Not only is land more expensive in the eastern regions of the county, but because of rapid growth in the retirement and tourist sectors, land values in the east have been escalating at a faster pace than land farther west. As land increased in value near the ocean, extensive users of land were driven westward, and intensive users of land increased their share of the eastern part of the county. Hotels, motels, and commercial users, multifamily and condominium housing, all greatly increased their share of eastern land; single-family households, particularly those with children, were driven westward in their search for suitable housing.

Planning for Broward’s Future

The implications and consequences of this changing geography were not clearly understood by the citizens of Broward County. The pervasiveness and extent of the spatial change taking place in the county created significant excess capacity in the schools of the eastern and central regions. These seats had to be filled by students brought in from the west, where there was an overabundance of students relative to school capacity. Even in the absence of racial balance issues, such transportation would be required. A greater awareness of local geography and an understanding of geographic change could have led to earlier public discussion of the problem and the formulation of appropriate solutions. Public rhetoric, however, tended to focus on racial balance issues, rather than on the underlying problem of geographic change and locational obsolescence.

I have argued here that a geographic perspective, like many others, can give important and useful information to those who employ it. Whether this perspective is focused on world regions or local areas, or for that matter, at some scale in between, the study of locational similarities and differences,
their causes and their consequences, and the study of the process of geographic change are worthy tasks. I have also argued that there is a clear need for improved understanding of the meaning and importance of geographic knowledge. The American people, we can only hope, are awakening to this need.

* * *

1. On 15 September 1983, Ronald Schultz was honored at the Florida Atlantic University Honors Convocation as the F.A.U. Distinguished Teacher of 1983-84. This article, with minor editorial revisions, is his acceptance address. The Florida Society of Geographers extends hearty congratulations to him for this honor.

references


Pupils can’t find Europe with a globe

MIAMI (AP) — Is France a country or a city? On which continent is Germany located, South Africa or South America?

These are the kind of questions that worry educators. But the students in Elaine Fargharry's 10th-grade class who recently asked them clearly do not know their geography.

The lack of familiarity with maps and geographical locations is "incredible," but not unusual, admits Fargharry, who teaches at Plantation High School.

She and several other teachers and professional geographers traded examples of geographic ignorance over the weekend at a meeting of the Florida Society of Geographers.

Many concluded that the inability to read maps is a particularly American affliction.

For instance, Suzanne Heal, a Dade County schools administration, found her Cuban students who immigrated to the Miami boomtown recalled in her global history class. Cuba. Like many other countries, has a long tradition of emphasizing geography at all levels of education, she noted.

Other teachers told of Vietnamese and South American students who arrived in Florida with geography skills far surpassing their U.S. classmates.

But many teachers said the problem isn't as much student ignorance — a lot of students are "infatuated" with the Soviet Union and Central America — but one of money and policy.

"Geography has been pretty much left out of the new curriculum," said Saturday.

Of the 1,192 specific skills Florida students were required to learn in third, fifth, eighth and 12th grades under the new K-12 program, only 20 concern geography. Only 185 are in social studies topics. But more than half the skills, 642 of them, are science related.

"Only one geography course can now be taught in Florida high schools, and ... only as an elective, which does not count toward graduation credits," Borwell said.

"My students are the unfortunate few who couldn't get economics," Fargharry added.

But at the largest high school in Florida, Miami High School in southern Dade County, there isn't a geography course that year. Michael Krynitz, who will teach a geography elective next year, said the level of knowledge is abysmal.

"At the beginning of the year, the only states these 11th and 12-graders knew to find on a map were Florida, Texas, California and Maine. Krynitz said.

Geography used to be a required course in schools until the 70s, when that subject, along with history, political and civic, were combined into social studies.

To help improve the current state of geography education in Florida, teachers have asked geographers and geography professors to lobby legislators for more emphasis on the subject in the state curriculum.

Also, they decided Saturday to pool efforts to produce more interesting tests and study guides to attract more students to elective courses.

The article was originally printed in the Boca Raton News, 15 November 1983, and is reprinted with permission of the Boca Raton News, November 15, 1983.
"Simply splendid." There are no other words that more accurately describe this magnificent book, *Water Resources Atlas of Florida*, edited by Edward A. Fernald and Donald J. Patton (Tallahassee: Florida State University, Institute of Science and Public Affairs; 1982, xvi, 231 pp., 15 color and 56 b&w illustrations; $29.50, plus $2.50 postage and handling). In view of its outstanding qualities, I have asked the editor of the *Florida Geographer* for permission to prepare an extraordinary review, in greater detail than those that have appeared in the past.

Fernald and Patton revive my hope that something can be done to save Florida from the utter destruction I see at the end of its present development path. This book says very clearly we must do something soon to conserve our endangered water resource. Make no mistake, this is not a simple pictorial atlas—it is in fact a tightly written, gorgeously illustrated, and thoroughly documented textbook on the complex subject of ground water and all of its ramifications in Florida. I hope that it will be widely read for this purpose as well as becoming a reference and source of data for researchers. For that matter, it should be made mandatory reading for all real estate developers before they are allowed to begin the permit application process.

In addition to the co-editors, there is an associate editor, Elizabeth D. Padian, and a team of cartographers (James R. Anderson, Peter A. Krafft, and Craig A. Remington) who deserve separate mention. The cartographers have outdone themselves, producing an even more impactful and artistic representation of diverse data than we saw in their earlier effort, *Atlas of Florida* (Fernald 1981; see also Anderson et al. 1982). In the present atlas they display additional techniques with the same good taste in colors, contrasts, and compositions. Realistic sketching using water colors to offset and balance their more conventional two-dimensional maps is a refreshing touch, but they have scarcely left any cartographic technique unused. Here we see the synergistic effects of superb cartography coupled to lucid prose.

In content, the atlas could not be more logical. From a global perspective, the focus is quickly sharpened to the United States as a whole, and then to Florida where they begin a detailed inspection of the factors controlling our ground water. Subsequent sections introduce various theoretical concepts from the molecular nature of water, through the hydrologic cycle, evapotranspiration, and into water budgets for the state. For every section (chapter) there are succinct summaries and an ample list of references. However, some lists (Ecosystems of Surface Waters) are much better than others (Drainage, Flood Control, and Navigation, Water Regulations and Policies). Some studies of the South Florida Water Management District and St. Johns River Water Management District are exceptionally useful and well done. The remaining water management districts receive somewhat more perfunctory treatment, but still equally informative in terms of the basic data.

Sections on the economics, legal issues, user conflicts, and management decision-making processes follow and they are noticeably less well illustrated, tending to depend (as does that " dismal science"—economics) on statistics and conclusions based on them that are, perhaps, a bit idiosyncratic and provincial. An example is found on p. 238 where we learn that "...Florida's surface and ground water resources are not infinite, (but) they are abundant to the point that careful resource management should be able to insure adequate supplies for the state's anticipated rapid growth." A further plug for unabashed boosterism is dispensed in the next sentence: "The administrative and regulatory structure to manage this resource is in place and, during its ten years of operation, it has proved eminently workable and at the same time flexible enough to meet future demands." While this may be an accurate analysis for some parts of the state, in this reviewer's opinion it is widely inaccurate for southeastern Florida, at this writing under water shortage alerts and threat of potential rationing.
Some similar criticisms of the final section titled Summary and Recommendations could be made but in what constitutes a masterpiece on the subject of water, I would not want to be accused of carping. In this section our governor and his leadership are invoked several times, and indeed he introduces the whole book. Coincidentally, we do not find anything among the recommendations that would cause embarrassment to our political leadership and the announced concern for our environment. By the way, have you ever seen an atlas with recommendations? Of course not, this is actually an environmental manifesto, one that will show the rest of this nation that Florida can be a pacemaker in planning resource management.

As a last remark, let me assure you that atlas-makers are made, not born. Let you think this reviewer's quiver is empty, his voice part of a clique, and his pen only capable of panegyrics, please refer to an earlier review (Craig 1975) of an effort by one of the present editors. It is a happy task to write about high professional achievements; they generally come step-wise as has been the case with our present set of atlases of Florida. But all good things come to an end, and I do not believe it will be possible to improve on this one. May I say it just one more time?

It is simply splendid.

References


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CEDAR KEY, FLORIDA--A STUDY OF TIME AND PLACE, BOOM AND BUST

Harry J. Schalman, Jr.

Cedar Key, one of the numerous barrier islands that fringe the upper Gulf coast of West Florida, has had its periods of growth, decline, and (perhaps) revival. Site, situation, and timing combined to nurture and later stifle the development of this small port. Romance, legend, lore, and fiction cloud the search for authenticity (Thompson 1975). During the boom decade of 1875-1885, Cedar Key expanded in population, prosperity, and prestige until, as a city of nearly 2,000 people, it had important sea links with Havana, Key West, Mobile, and New Orleans (Fishburne 1982b, p. 19). It also served as a terminus for the only trans-peninsular railroad in Florida. By the turn of the century, however, the town's fortunes had reversed, and the community assumed the role of a small fishing village of approximately 700 people—a status relatively unchanged today (Fishburne 1982b, p. 52).

The area is a submergent, irregular coastal lowland fringed by approximately one hundred small islands known collectively as the Cedar Keys. Extensive marshes and sand dunes are inland at low elevations. Today the area is noted for wildlife, especially birds, with three of the islands comprising Cedar Key's National Wildlife Refuge. Forests with extensive stands of red cedar were once plentiful and gave the name to the island group.

The contemporary community of Cedar Key, located in Levy County on the 640 acre sand island of Key Key, less than three miles offshore, bridges and causeways provide links to the mainland. Tallahassee and the Tampa-St. Petersburg area lie approximately 140 miles north and south, respectively (Fig. 1). Gainesville is the nearest sizable urban area, sixty miles to the northeast. Cedar Key is not on the way to anywhere, is divorced from the mainstream of transportation. Yet, tranquil and secluded today, Cedar Key was a boom town a hundred years ago.

The Rise

The earliest known inhabitants were pre-Columbian Timucuan Indians, followed in the late 12th and 13th centuries by Creeks and later by others known as Seminoles, a term used loosely today to refer to all Florida Indians (Fishburne 1982b). Burial mounds and shell middens, some containing tools and artifacts, have been found on Way Key and West Key. Unfortunately, most of the recovery has been done by amateurs; consequently, attribution, damage, and misinformation have been common.

The exact site of the first European settlement is undetermined. Fortifications were erected and shipbuilding occurred near the present town site during the First Spanish Period (1565-1763). Spanish pirates sailed the area and the notorious Gasparilla allegedly buried treasure ten miles up the coast near the mouth of the Suwanee (WPA guide to Florida 1934, p. 384). Little is known of the area during British Rule (1763-1783) however, in 1771 the Dutch engineer Bernard Romans, employed by the British as a surveyor, mapped the Florida coast. His book gave Florida wide exposure to the English-speaking world (Romans 1775). During the Second Spanish Period, 1784-1821, Cedar Key served as the center for trading activity between local Indians and British agents. As trinkets and guns were exchanged for Indian support against the Spanish, Outlaws exploited the area until Florida (East and West) was ceded to the United States in 1821.
By 1838, the potential of the islands as a military base against the Indians was well recognized. General Zachary Taylor envisioned a major role for Fort Marion, as one of the many defensive centers established during the Second Seminole War, 1835-1842. Consequently, in 1840 he asked the Secretary of War to have Cedar Key reserved for military purposes (Carter 1962, pp. 54-55). Sea Horse Key, three miles to the southwest, was used as a confinement camp for Indian prisoners, and in 1854 became the site for a lighthouse, later used as a Federal prison during the Civil War. Today Sea Horse Key is uninhabited, accessible only by private boat, and the lighthouse lies abandoned. The key, a mile long and a mile wide, rises forty-seven feet above sea level and is covered with live and blackjack oaks and mangrove thickets.

Artesa Ocie Key, a half-mile south of Way Key (Fig. 2) served during the Second Seminole War as a site for an Army Headquarters, a supply depot, and, because of its salubrious malaria-free climate, a general hospital, all of which were destroyed by hurricane winds and tides in 1846, as twenty-seven-foot waters inundated the island (Sprague 1843 [1854, p. 497]). The area was abandoned until Judge Augustus Steele, called by some the "Father of Cedar Key," received permission from the United States government to purchase the remains of the Army structures and facilities for $270, thereby establishing the military settlement later known as Cedar Key (Johnson 1969, p. 4). Initially a summer resort, the community helped to advance the Florida citrus tradition. Judge Steele brought further recognition to Artesa Ocie when he was appointed U.S. Collector of Customs for the Ports of Tampa and Cedar Key in 1844, and Postmaster for the Cedar Keys in 1845, establishing both offices on the island (Fishburne 1962d, p. 7). Steele worked closely with his friend and cofounder of the Cedar Key Railroad, Florida's first Senator when statehood was achieved in 1845. The two men, with unshakable dedication, orchestrated the construction of a cross-peninsular railroad to serve the Cedar Keys.

The Yulee railroad, originally incorporated as the Florida Railroad and changed later to the Atlantic, Gulf and West Indies Transit Company, provided a major impetus for later growth in the Cedar Key (Johnson 1969) (Fig. 3). Of the five railroads built in Florida prior to the War between the States, this 155.3-mile stretch from Fernandina Beach on the east to Cedar Key on the west was the most important (Cedar Key State Museum). Yulee lobbied vigorously before the Florida legislature, arguing that Cedar Key was the logical selection for the Gulf Coast terminus. In comparison with the competing possibilities, Cedar Key had a better harbor, the shortest rail connection between coasts, less expensive shipping costs to New Orleans, and proximity to the 5,100-acre sugar plantation on Tiger Island on the Homosassa River (which, incidentally, Yulee owned) (Fishburne 1962d, p. 8).

Fig. 2 Cedar Key and Environs

Fig. 3 The Florida Railroad

As the canal craze in the United States subsided, geography and politics combined to enhance the selection of Cedar Key as the rail-port hub. In anticipation of the railroad's arrival, P. W. C. Koerner, a civil engineer, platted the town of Cedar Key in 1859 for the Florida Tour Improvement Company (Cedar Key Historical Society Museum). The new community, located on the south side of Way Key, faced Judge Steele's growing resort and port settlement, a half mile distant on Artesa Ocie. Unfortunately, completion of the railroad coincided with the beginning of the War between the States, which proved a major setback for the area. Florida seceded from the Union in June 1861. Shortly thereafter, rail service was suspended as both Fernandina and Cedar Key were seized by federal forces. Yulee himself was captured, though later pardoned by...
U. S. Grant. Wartime population of the area was approximately 100 people, most of whom lived on Atsena Otie and Way Keys (Fishburne 1982b, p. 3). The area was raided by Union Naval forces, buildings were burned, ships were sunk, and a Federal Military Post was established. With the restoration of rail service to Way Key in 1866, Atsena Otie, lacking a link to the mainland, was soon eclipsed by the newer community of Cedar Key; the political, economic, and social center had shifted.

Prosperity blessed the area in the post Civil War era. A timber boom, which had begun in 1855, resulted from Ebenhard Faber acquiring land to supply cedar for his pencil factories. The company produced more than 500 kinds of pencils out of graphite from Siberia and cedar acquired locally (Cedar Key State Museum). The felled cedar for which the area was named became the major resource of the area. The Eagle Pencil Company and F. A. Wolfe & Co. set up operations, and the industry reached peak prosperity from 1885 to 1886 (Cedar Key State Museum). A modest shipbuilding operation also developed. Some twenty-eight registered vessels were constructed between 1870 and 1885 (Cedar Key State Museum). In addition, many small boats built for the Greek sponge divers at Tarpon Springs had most of their repair work and fittings done at Cedar Key. A good supply of fish, oysters, and turtles provided the base for additional water-oriented activity (Fullman-Richards and Richards 1978). Mullet, pompano, redfish, and sea trout were exploited commercially. Cedar Key's role as a producer of fish products was enhanced by the cross-peninsula railroad which minimized shipment time of seafood to eastern markets, thereby reducing spoilage. Many of the local green turtles were shipped north and were sold in the Fulton Fish Market in New York City. In 1886 alone, this cargo approximated $10,400, a suitable figure for the times. In addition, fish were shipped from Clearwater fisheries to Cedar Key for reshipment to Fernandina and other Atlantic ports. Cedar Key had a large sponge field only ten miles away, and sponges also were marketed commercially in northern cities. Cotton and other products from Gulf ports were brought to Cedar Key for transshipment. All rail booms for Havana came to Cedar Key, as coasts and trains converged on this rapidly-growing center (Cedar Key State Museum).

The "Town of Cedar Key" assumed the status of the "City of Cedar Key" as the corporation limits expanded in 1881 and again in 1884 (Fishburne 1982f, p. 84). The population swelled from approximately 100 two decades earlier to nearly 1,000 by 1885. Several hotels, businesses, and homes appeared, along with street improvements, a fire department, and street lights. One of the older landmarks, the 135-year-old Island Hotel on Second Street, is undergoing restoration today and is a candidate for placement on the National Register of Historic Places (Stetzel 1984).

Cedar Key enjoyed the trade and prosperity that earlier had made it one of the most important towns in Florida. It competed favorably with the ports of Jacksonville, Fernandina, Pensacola, and Key West. Its geographic advantages were many—good harbor, favorable climate, an abundance of natural resources such as fish, turtles, oysters, sponges and cedar, and, of course, the all-important trans-peninsula railroad.

The Decline

The decline came as these pillars of viability collapsed. The completion of Henry Plant's railroad from the northern part of the state to Tampa in 1884 provoked a major check on Cedar Key's prosperity and a critical factor contributing to decline (Varney 1963, p. 5; Varney 1965). Within a decade the timber resources were largely exhausted, primarily the result of over-cutting and lack of an adequate conservation policy for reforestation. Natural ecological changes and over-exploitation depleted the oyster and sponge beds. As industries failed, traffic on the railroad declined substantially. The larger port of Tampa with its associated railroad emerged as the leading commercial center of Florida's Gulf Coast.

The coup de grace proved to be the devastating hurricane of 1886 in which more than 100 died and hundreds were left homeless. More than 75 percent of the timber was blown down, the community on Atsena Otie was completely leveled, and homes and structures burned and collapsed on Cedar Key. Moreover, three-and-a-half miles of railroad track and trestles were washed away, and the local industries were destroyed (Fishburne 1982b, pp. 28-39). Cedar Key lay in shambles.
And the Revival?

Failing in the 20th century to recapture her former economic base, Cedar Key has remained fairly stable in size with a population today of around 700, a figure that approximately that of 1900. "Old Cedar Key" on Atalona Ore was abandoned after the hurricane and is today an unpopulated, snake-infested, overgrown island accessible only by private or charter boat. Remnants of a few former structures still stand, including a water tower and cemetery.

The contemporary town of Cedar Key is a noted weekend retreat, famous for sport and commercial fishing, wood seafood, oysters, and sponges. Recent construction of waterfront condominiums attests to the fact that Cedar Key is in the process of discovery. The local pier and adjacent Marine Bay road loop, site of the old railroad trestle, serve as a focus for the community's waterfront. Still structures house four excellent seafood restaurants, several offices and shops, and some new apartments. Second Street is the chief commercial center and resembles a ghost town or movie set with numerous unpainted two-story 19th century frame structures.

. Cedar Key has two annual events that attract many Floridians and out-of-state tourists. The Cedar Key Seafood Festival is held during the third weekend in October, and the Cedar Key Art Festival is scheduled for the third weekend of April. The latter, much to the joy of local residents, attracted some 15,000 people in 1978 and overwhelmed the community (Gainesville Sun 1978, p. 6-3). Subsequent art festivals have been restricted in size to avoid such successes and excesses. Today Cedar Key, in its relative geographic isolation, is small, tranquil, and friendly. The past is well documented and on display in two museums, the Cedar Key Historical Society Museum and the Cedar Key State Museum. The presence of these museums is appropriate; the geography and history of Cedar Key had thrust the community into prominence in the 19th century and now help to ease her progress in the 20th century.

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Cedar Key Historical Society Museum: display.

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. 1982d. The end of the line at the Cedar Keys 1861-1861 Cedar Key, Florida: Sea Hawk Publications.


1. Source: After Fillman-Richards and Richards 1978, Fig. 1.

2. The trans-paninsula railroad was the vision of David Levy Yulee for transport to by-pass the long trip around the Florida peninsula. For some his dream lives today in the form of the now partially completed and abandoned, but still highly controversial Florida Cross Barge Canal.


Romana, B. 1775. A concise natural history of East and West Florida... New York.


CONTRIBUTORS TO THIS ISSUE

Dr. Mike teaches the course on the geography of Florida at Florida Atlantic University. His Ph.D. is from Louisiana State University.

Carol L. Berube is Director of the Social Science Research Laboratory at Florida Atlantic University and Associate Director of the FAU/FL Joint Center for Environmental and Urban Problems.

Lynn who is a cartographer who works for the City of Deerfield Beach in the Planning Department.

Lucas is a native Floridian, is a professor of political science at Florida Atlantic University.

Michael L. is an assistant professor at the University of South Florida. His Ph.D. is from University of California, Los Angeles.

Linda is an adjunct instructor in the Department of Geography at the University of South Florida.

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URBANIZATION AND HYDROLOGIC CHANGE IN NORTHWEST
HILLSBOROUGH COUNTY, FLORIDA

Harold F. Gilman and Philip D. Jolly

Hillsborough County, located in west-central Florida on the shores of Tampa Bay, has long been among the most rapidly urbanizing areas of the United States (Fig. 1). Examination of aerial photography reveals that recent urban growth is proceeding towards areas of increasing environmental sensitivity. This is especially true of the hydrologic environment. In 1938, the data of the earliest photography available, northern Hillsborough County was rural. Economic activities for the area were based on agriculture. Well drained areas contained citrus, and poorly drained areas were used as pasture. Cypress sloughs were evident throughout the region.

Beginning in the immediate postwar era, urban development began to spread north from the city of Tampa. During the late 1950s, construction of the University of South Florida resulted in increased pressure for development in the north of the county. Citrus groves, the easiest land upon which to build, began to disappear. During the 1960s and 1970s, construction of Tampa International Airport and the extension and widening of Dale Mabry Highway caused the focus of development to move to the west side of the county. Later photography reveals that from 1960 to 1980, the major trend of development has been northward from west Tampa along Dale Mabry Highway. Much of this development had been poorly planned and even less well regulated. It seemed as though officials had been either unwilling or unable to exercise any meaningful degree of restraint or control over development or developers.

Northwest Hillsborough Study Area

The study area is 12.4 sq mi (32.1 km²) part of northwest Hillsborough County (Fig. 2). Busch Boulevard (SR 580) forms the southern boundary of the study area. Gunn Highway (SR 567) is the western boundary, Armenia Avenue marks the east, and Lake Magdalene Boulevard and Ehrlich Road form the northern boundary. Typical of a karst landscape, the region contains numerous lakes and sinkholes. Although much of the area's drainage is underground, two streams, Sweetwater Creek and Rocky Creek, do provide surface drainage. Man-made ditches and canals augment the natural drainage. Prior to its conversion to urban use, drainage was mostly underground. Surface streams were important primarily in providing for storm runoff (Hillsborough County Planning Commission 1974). As conditions changed, surface streams and man-made drainage networks came to play an increasing role in the local hydrology. Further changes in land use will place additional burdens upon surface drainage.

The study area is significant in many ways. It is located just north of Carrollwood, a prestigious subdivision. New developments will benefit from the use of the Carrollwood name. Building sites, especially residential lots, command high prices. The area has access to the airport and Tampa's fast growing Westshore business complex. Planned realignments of Fletcher and Nebraska Avenues will provide improved access to the central and eastern parts of the county, including the University area. Prestige, access, and long-term urban growth have led to intense pressure for development. Many feel that this portion of northwest Hillsborough County represents a last opportunity for quick profit on high-priced real estate in the area (Wagner 1983). Developers, it seems, are intent on building on every piece of open land, or at least every piece of land for which a permit may be obtained.
Development and Water

Development in the area relies on local groundwater supplies. Several existing wells are no longer productive, yet because population is on the increase, a new well field in the area is being developed. This new field, located near the intersection of Dale Mabry and Ehrlich Roads, is intended to augment present supplies and replace non-productive wells. Plans for water yield are based on projected needs for the year 1990, but even before the new wells begin producing, it is likely that they will be inadequate to meet demands.

In 1983, approximately 43,000 people were served by local wells, consuming an average of 6.3 million gallons per day (MGD). Projections for 1990 call for a population of 59,000 within average consumption of 6.8 MGD. However, developments already planned and at various stages of approval call for an additional 6,500 dwelling units and a consumption of an additional 2.5 MGD by 1988. Obviously there is a problem. If current (1983) consumption rates are added to proposed 1986 rates, a figure of 8.9 MGD results. This exceeds the projected use for 1990 by some 100,000 gallons a day. Apparently there is a lack of communication if not cooperation among the various agencies charged with the management of local land use and water supplies. Moreover, the city of Saint Petersburg in neighboring Pinellas County also draws water from the local aquifer. Changes in consumption in that jurisdiction profoundly affect local water supplies.

Another problem is the lack of attention paid to the historical record. The new well field which is intended to meet local demands will have a maximum yield of 18.4 MGD. This figure has been exceeded in the past when population was much lower. As recently as 1973, pumping rates as high as 18.4 MGD were reported. Also, water yield projections are based upon current recharge rates and normal to above normal precipitation. As will be discussed later, this could lead to additional problems.

Ground Water Recharge

Summer thunderstorms provide the bulk of local precipitation. These convective storms normally develop in the late afternoon during the summer
months (June through September). In a normal year, about 32 inches (76 cm) of rainfall is received from these storms. This amounts to slightly less than 60 percent of the area's total. Spring and fall tend to be relatively dry, April being the driest month. Frontal storms, concentrated in the winter months, account for most of the remaining rainfall bringing the annual average to 52.5 inches (133 cm). However, if the last twenty years are considered, the area average drops to about 30 inches (125 cm). Since 1960, Hillsborough County has experienced a mean annual rainfall deficit of 5.91 inches (15 cm). Only four years of the last twenty exceeded or met the norm for precipitation. If the trend continues, the U.S. Weather Service will most likely revise its regional norms downward.

Over the past thirty years, 1916, with 28.89 inches (73.4 cm), was the driest, and 1959, which received 76.85 inches (194.5 cm), was the wettest. Part of the apparent decline in local precipitation may be that the Tampa Bay area has not experienced a hurricane since Donna in 1960. Tropical cyclones are a major contributor to monthly and yearly averages, but they are not regularly occurring phenomena. A single storm, especially if it occurs very early or late in the season, will distort averages. The average for both the month in which it occurred and the annual average will be skewed. Certain freak or anomalous meteorological events can also distort averages. The storm of May 6, 1979 provided an example of this. Within a single 24 hour period 11.9 inches (29.0 cm) of rainfall was recorded at Tampa International Airport. This figure represents the total which can normally be expected during May in three years (Strom and Levesque 1960). The average figure for May is unrealistically high if short term trends are considered. Largey because of that storm, 1979 was the wettest year in recent memory. This leads to another problem. When recharge rates are calculated on the basis of precipitation averages, the type of storm is seldom considered. Most of the rainfall received from the May 8 storm became runoff. It did not contribute greatly to local water reserves.

Urban Development and Runoff

Because so much local precipitation comes from violent storms, a large amount of rainfall enters overland flow. Where construction interferes with that flow, flooding results. Pressure is placed upon the water management officials to provide better drainage. Water is diverted from natural recharge areas to Old Tampa Bay. It no longer is available for groundwater recharge. This leads to the diminution of groundwater reserves. In the Tampa Bay area, only the city of Tampa uses surface water to help meet its demands. All other jurisdictions rely on groundwater.

Recent and proposed changes in surface conditions also profoundly affect the area's ability to handle runoff and to provide for groundwater recharge. Even small changes in flow magnitude may produce surges along which may in excess of the capacity of the local drainage system. Prior to 1963, when the study area was still a primarily rural region, groves, pastures and woods graced the landscape. Soil maps of the period indicate that porous sands covered about one-third of the study area (Soil Conservation Service 1958). Rain which would fall on those sands would percolate almost immediately into the ground. Pasture and cypress areas tended to collect water. Due to the area's low relief, runoff was minimal. Except for losses from evapotranspiration, most of their rainfall was available for recharge.

Using published tables (U.S. Water Resources Council 1977, sp. 811) and existing soils data, an area-wide runoff coefficient of 0.10 was estimated for the pre-development era. This meant that approximately 90 percent of all rainfall received in the area was available for groundwater recharge or evaportranspiration. Potential evapotranspiration for the region has been estimated at between 35 and 40 inches (87-100 cm) per year. This left some 10 to 15 inches (25-38 cm) of rainfall for recharge.

Under pre-development conditions the local hydrologic system was adequate to meet all but the most severe runoff demands and provide for recharge. Urbanization has profoundly reduced the ability of the system to perform in both areas. Since the runoff problems causing the highest concern to area residents, those changes will be addressed first.

Computing Discharge

In estimating runoff characteristics for the pre-urban era, the coefficient 0.10 was adopted. Total discharge is arrived at from the formula
where \( Q = \text{total discharge in ft}^3/\text{sec}; \) \( A = \text{total area in acres}; \) \( C = \text{coefficient of runoff}; \) \( I = \text{rainfall intensity in inches/hour}. \) Based upon the five-year, one hour storm, runoff was computed to be 251.4 ft\(^3\)/sec. A rainfall intensity of 1.2 inches (3.0 cm) per hour was used in calculation (March 1983). Runoff coefficients change with land use. By 1980, much of the area was already given over to urban uses. If developments planned through 1985 are taken into consideration (Fig. 3) it is conceivable that a runoff coefficient as high as 0.50 may be reached. This figure was estimated from examination of both present and projected land use. If all plans for development are implemented, 75 percent of the study area will either be under pavement or in buildings. For these areas a coefficient approaching 1.0 was assumed. No porous sands will be at the surface. Porous and almost one-half of the cypress sloughs will be filled. Fill dirt for the most part is obtained from borrow pits located in eastern Hillsborough and southern Pasco Counties. Both areas contain soils which are relatively high in clay. None of the borrow pit operators would cooperate by providing information regarding the proportions of clay in their pits, and estimates of drainage characteristics were made using the county soils map cited earlier and simply estimating the portion of land to be filled with that material. Unless there are profound changes of land use plans and borrow pit regulations in the immediate future, an area-wide runoff coefficient for the northwest Hillsborough study of 0.60 would seem to be a reasonable projection. The figure would be higher, but designated retention areas have been considered.

Adopting the 0.60 coefficient and using the same storm described above, a rate of runoff of 10.40 ft\(^3\)/second may be experienced. The natural drainage system, which by this time will be so changed as to be unrecognizable, will simply be inadequate to provide for this amount of runoff.

Problem of Flooding

The additional runoff represents water which would have been absorbed by the subterranean system. Flooding will become an ever present danger to area residents. Adding to the problem is the reduction in water available for recharge of the aquifer. While it may be argued that runoff does not present a threat to residents, as each developer must include plans to provide drainage before the development may begin, planning only considers what has gone on in the past, and does not address changed requirements. Furthermore, the threat of flood is the paramount concern of developers and many officials. Yet the
Impact of Development on Recharge Rates has received but scant attention from developers, the public, and the various local media.

Groundwater Misconception

Lack of concern regarding groundwater supplies rests in part on a popularly held misconception. Florida, especially coastal Florida, has long been viewed as floating upon an inexhaustible reserve of groundwater. The problem facing developers was to divert surface flow from areas of development, not trying to provide a potable water supply. Historically, groundwater in west-central Florida has been perceived as an extralocal phenomenon. An early study held that Florida’s groundwater supplies were derived from a huge aquifer which extended as far north as West Virginia (Hoy, Simmons, and Czajkowski 1980). The Florida Aquifer, it was believed, could meet any possible demand and placed no limit on consumption. Concerns over groundwater depletion were not even considered, let alone encouraged.

By the 1950s that view was being held in question. It has since been determined that the largest body of fresh water supplies is in the flat coastal areas from Daytona Beach on the Atlantic to Cedar Keys on the Gulf. Surface supplies (both surface and ground) are nearly derived from local precipitation (Hoy, Simmons, and Czajkowski 1980). A more realistic view has been presented that water supplies for Hillsborough County are the result of local precipitation and that urbanization diminishes both the quantity and quality of these supplies (Segretto 1975).

In west-central Florida in general, and northwest Hillsborough County in particular, surface and sub-surface drainage comprise a single system. As long as system unity is maintained, the system will function. Current trends and practices tend to bifurcate this system. Major impact of that bifurcation include both the reduction of potable water supply and increased potential for flood. In the 1960s that in the future, a lack of potable water will become more important than hazard from flooding limiting the spread of an urban landscape in northwest Hillsborough County.

Administration of Water Resources: SWFWMD

Responsibility for administering local water resources rests primarily with the Southwest Florida Water Management District (SWFWMD). Despite its charge, SWFWMD has until recently been unable to exert its full authority. Funding and political exigencies have hampered its effectiveness. Formed in 1961 in response to demands for improved flood control, SWFWMD is concerned with all areas of water management. Using the water drop concept, the amount of precipitation received in a water year (July-June), SWFWMD attempts to allocate regional water supplies on an availability basis while providing for flood control. A major failing of the allocation and flood control system is its inability to assimilate proposed land use changes in its current state. It is a policy decision and does not reflect upon the agency’s professional staff. Because of administrative decisions, programs may be implemented over the objections of staff, or may be implemented based on inaccurate or erroneous data. Thus, sovereignty disputes, tend to reduce the agency’s effectiveness.

The area-wide rainfall deficits (mentioned earlier) and increased runoff due to the conversion of land to urban uses have led to a severe reduction in groundwater supplies. These same forces have led to an increased demand for groundwater. Increased pumping is usual during dry seasons. The longer the dry season, the lower the reserve, and the greater the pressure to withdraw water. The city of Saint Petersburg was recently granted permission to withdraw an additional 26 MGD from its field which is adjacent to the present study area (Huer 1982). This was not considered in the projection used in determining the yield of the field mentioned earlier, but both the northwest Hillsborough area and the city of Saint Petersburg are drawing from the same aquifer. The permit was granted over strong opposition from northwest Hillsborough residents and development interests. Developers expressed the fear that their allotted 6.6 MGD would be reduced, and some residents felt that increased pumping would result in lake drawdowns. Although: SWFWMD has gone on record stating that no new drilling permits will be issued, as the aquifer is already being utilized to its maximum extent (Huer 1982), the fears of residents are not unfounded.
Problems -- Lake Magdalene

During the 1973-74 water year, Lake Magdalene went dry. Although this was a dry year, it was not the driest on record. During the 1950s, several years produced less rainfall than 1973-74, and while lake levels dropped, Lake Magdalene always had water. By the early 1970s, urbanization had increased such that Lake Magdalene went dry primarily from excess pumping. Today, Lake Magdalene is maintained from groundwater supplies.

Problems associated with Lake Magdalene are illustrative of many of the barriers to efficient, effective, and rational water management which SWFWMD and other regulatory agencies must overcome. During these years when lake levels were low, and before the formation of SWFWMD or any other area-wide regulatory agency, the Hillsborough County Commission changed zoning and granted building permits for land which in most years would be under the lake. In order to reduce flood hazard for residents of lakeside homes, SWFWMD has to maintain Lake Magdalene at its low management level. The result of this legacy from past practices is that SWFWMD is forced to pump from ground water during dry years to maintain both lake habitat and property values, and when it does, it must pump water out of the lake to avoid flooding. Under present circumstances this cannot be viewed as a receptor for any amount of storm runoff. As rapidly as water accumulates in the lake it is pumped into Sweetwater Creek, which flows through the heart of the area which today is under the residential and commercial interests. The present stream slowly works its way from slough to slough toward the bay. When the area is fully converted, the stream will be sanitized. When a severe storm strikes the Tampa Bay area in the future, SWFWMD will be placed in the inenviable position of deciding whom to inundate. Meanwhile, recharge declines.

Problems -- Cypress Sloughs

Among the more alarming trends is the propensity to build in the cypress sloughs. As mentioned earlier, cypress sloughs are important as discharge areas for overland flow, but recent research by USGS shows that the sloughs play a much larger role in the hydrologic system than was previously realized (Hillsborough County Planning Commission 1974). Water tends to accumulate in the slough, making them important discharge areas. From the slough, water tends to move slowly into the surface drainage system. Thus they are effective regulators of stream flow. However, while the water is in the slough, it also moves slowly into the subsurface system where flows along the potentiometric gradient and thus sloughs are a major contributor to groundwater recharge. In order to compensate for the ex-option of the slough, developers are required to provide retention areas for their projects. Usually these are ponds strategically placed throughout the area. Unlike the slough, which is shaded, the pond is exposed to direct sunlight. Evaporation rates are high. Potential evapotranspiration rates for the area are estimated at about 50 inches (125 cm per year) (Fernand 1961). Excessive losses from evaporation and increased runoff leave virtually no water for local recharge. Each year --- and each new subdivision --- sees a shrinking water deficit.

Retention ponds, because they are intended to collect runoff from urban areas, tend to be sources of pollution. They collect runoff from streets and lawns. Golf courses are sometimes used to provide flood control, recharge, and recreational space. But watering, often from wells on the course itself, means that evaporation will be high, and the copious use of pesticides and herbicides leads to more pollution and a further reduction of water quality. Unfortunately, golf courses and parks represent the best that can be done given present technology to address problems of flood control and recharge. Thus far, nothing, no scheme or artifice devised by human ingenuity, is as effective or efficient as the cypress slough in controlling surface runoff and providing for groundwater recharge.

Floodling and groundwater represent problems of great magnitude. Floods receive the most attention, yet even those are often played down when other considerations come to the fore. Flooding which occurred in February, 1981, for instance, was relegated to the back pages of the Tampa Tribune when any type of story less than positive would have interfered with the local Gasparilla Festival (Bamquard 1981). In fact, the story of the flood contained several references to the festival and assured readers that the parade would go on as scheduled.
It is most difficult to sustain public opinion about any issue when the news media tend to ignore it, but the 1980-81 water year was important for another reason. While the passage of a winter cold front could produce enough precipitation to cause localized flooding in northwestern Hillsborough County, there was insufficient rainfall that year to provide for the water needs of the population. By May, reservoirs had become so depleted that it was necessary for local officials to call for water rationing. Saint Petersburg and Hillsborough County, which rely upon groundwater, were most severely affected. Tampa, which uses the Hillsborough River was not rationed. Clearly, however, as demands on the local water supply increase, and demands for increased flood control do likewise, the events of 1981 will no doubt be repeated.

Northwest Hillsborough County suffers from a legacy of lack of concern and understanding. This legacy includes a new hydrologic system which reflects cultural and economic pressures, not the laws of nature. The most significant feature of this system is its bifurcation which places area residents at increasing peril from flood and drought simultaneously.

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Wagner, C. 1981. Interview with Charles ("Chuck") Wagner, Merrill Lynch Realty, 31 October.
The Water Resources Atlas of Florida (Fernald and Patton 1984), published by the Institute of Science and Public Affairs, Florida State University, was the culmination of three years of work by staff members of the Florida Resources and Environmental Analysis Center within the Institute and experts on fresh water from throughout the state. Edited by Edward A. Fernald and Donald J. Patton, the atlas cost an estimated $450,000 to produce and was funded by a state appropriation through the Florida Department of Environmental Regulation and from sales of the Atlas of Florida (Fernald 1981). The project assumed it to be valid and desirable for a public organization—in this case a university—to present the vast amount of information that government agencies collect and to return it to the public in an accessible and attractive way.

Inspiration and Purpose

Several events conspired to make the Water Resources Atlas of Florida a reality. In 1981 the Florida Resources and Environmental Analysis Center had completed the Atlas of Florida under the editorship of Edward A. Fernald and was thus geared up in terms of people, equipment, and experience to begin another atlas. The editors and cartographers were also inspired by the artistically striking and tremendously successful California Water Atlas (Karhl 1978). But most importantly the editors sensed the time was right for a Florida water atlas. Many issues related to fresh water—notably contamination of water by hazardous waste, protection of wetlands and ground water, and restoration of natural water systems—came to the forefront of legislative and citizen concerns in Florida in the early 1980s.

The major purpose of the water atlas was to compile in a single volume discussions of fresh water in Florida from the perspectives of various disciplines. Included were descriptions of the physical nature of water and the importance of water for ecosystem maintenance. The atlas was intended to be a basic reference for legislators, businessmen, state officials, planners, and non-professionals—and a useful reference for students and planners in other states who face similar problems.

The atlas was conceived as more than a technical document containing facts and figures. These are important, but the editors believed that technical details are best understood when they are placed in their historical, economic, social, political, and legal contexts. The atlas should help, for example, water resource lawyers better understand the physical properties of water, or geologists appreciate the legal and regulatory constraints on water use. Therefore, each chapter was written to be understood by people who are not experts, while at the same time providing useful information to those who are.

Management and Organization

Production of any type of atlas requires the cooperation of people with different talents and different points of view. They must be carefully selected and organized, or project members may find themselves spending much time dividing the labor and becoming involved in needless conflicts. The editors' greatest management problems were with authors who were scattered throughout the state and who found it difficult to translate ideas into atlas chapters. The editors requested that authors gather data for graphics first, and then write text—the typical sequence for atlas production. Many found this request to be peculiar, they were accustomed to developing ideas, writing text, and then thinking of illustrations.

Barbara Petchenik (1977), cartographic director for the Atlas of Early American History (Cappon 1976), encountered a similar problem. She had assumed a division of labor would arise between the cartographers and the researchers and writers—in this case historians. She originally thought historians
would "do research" and cartographers would then compile maps from the historians' notes, but the historians, like some of our authors, had little concept of cartographic requirements. Map data has to meet different and more rigorous standards than data described in text. One can generalize in text, even if some of the data are missing. But on a map "nothing can be left ambiguous, vague or undecided" (Pettenkofer 1977, p. 22).

Other conflicts arose because of differences between cartographic production and research and writing. Cartographers are accustomed to scheduling their work in a predictable fashion -- one can estimate relatively accurately how long it will take to produce a map, but frequently one cannot reliably estimate the time needed to find data for a map or to develop an idea or to write a chapter. Such differences are particularly difficult for cartographers who find themselves and other members of their production team waiting for work.

The problems between cartographers and authors can only be overcome if all participants in an atlas project learn patience and appreciation for the variety of skills needed to create the book. Cartographers and contributors need to work closely from the beginning, although researchers and writers need to start their work well in advance of the cartographic staff. Contributors, often working part-time for no pay in various locations, need staff people to assist them.

Data Collection and Display

The first step in data gathering for a water atlas is to identify specific organizations and agencies that are responsible for collecting and maintaining data related to water. Federal, state, and local agencies collect a great deal of such data, but a surprising amount of this information is inaccurate, incomplete, or inconsistent. There may be substantial disagreement among agencies on methods of reporting, means of calculation, and even names of places or facilities. For the Water Resources Atlas of Florida, we relied heavily on data from the U.S. Geological Survey. USGS is responsible for basic research on water quantity and quality (both for surface and ground water) and disseminates this information through its many publications. Data on weather and climate were obtained from the National Oceanographic and Atmospheric Administration. The U.S. Census contains a wealth of information on water, although this information is not always collected in a compatible form from decade to decade. The Census of Agriculture contains information by state and county on number of acres irrigated, acre feet of water used, acres of drained land used for agriculture, and crop production on irrigated land. The Census of Housing provides information on source and type of household water, and the Census of Manufacturing contains information on industrial water use.

Clyde Conover, a retired USGS geologist, served as technical reviewer for the atlas and was enormously helpful in detecting errors in data and in picking up inconsistencies in data from chapter to chapter. One of the greatest difficulties was maintaining consistency in data and data presentation among the chapters written by the state's five water management districts. Each district was initially given the flexibility to develop its chapter independent of other districts. With flexibility unfortunately came inconsistency. The atlas would have been more internally coherent if there had been a uniformity in the order of topics, level of detail, and method of presentation of data among the district chapters.

Another difficulty was how to depict a wide range of values in a single graphic. In many cases there was a difference of several thousands between the smallest and largest values. This problem is common in any mapping project. Large or small, water atlas cartographers used four techniques to show wide value ranges within a graphic: breaking the scale, converting a linear comparison to a logarithmic scale, converting a linear to a volumetric comparison, and bending the scale.

[Fig. 1: New River Stream Flow Variation Yearly Discharge, Maximum, Mean, Minimum (Fernald and Fatton 1984, p. 205).]
The break-in-scale solution is illustrated in Figure 1, the graphic of the yearly flow of the New River. Values range from 0.0 cubic feet per second (CFS) to 8,340 CFS. The break in scale was necessary to accommodate the large number of values between 0.0 CFS and 1.0 CFS. The set of data for the New River also contained one extreme value (8,340 CFS), which was accommodated by breaking the bar.

Logarithmic scales were used for stream flow maps of each of the state's five water management districts. Figure 2 is the stream flow map for the Suwannee River Water Management District. Logarithmic scales are useful, and necessary for depiction of certain types of data, but they do remove distinctions at the upper end of the scale. To alert the reader that the scale used in these maps is not an arithmetic scale, a horizontal component was added. The length of the horizontal component does not represent a direct measure but an implied value.

Space may be saved and interest may also be added by converting a linear comparison to a volumetric comparison. This technique was used for the graphic comparing Florida rivers and major world rivers (Fig. 3). In this instance the data range in value from 6,000 CFS for the St. Johns River to 6,200,000 CFS for the Amazon.

To fit a linear scale in a short space without breaking the scale or using a logarithmic scale, the scale may be bent, as was done in Figure 4. Bending the scale also adds interest to the graphic.

Order of Production

Establishing a reasonable and workable order for the required tasks is crucial. Atlas production is different from production of other types of books. Most books are processed by the chapter, with text taking precedence over illustrations. Atlases are typically processed by the page, with illustrations taking precedence over text. Typically in an atlas each page is allotted a topic before any work is begun. Once work is begun, one should not
then decide that there is not enough data for a particular topic or that a topic is ill-conceived or that the associated text is poorly written.

Below is one logical order for tasks that must be completed for an atlas, assuming decisions on staffing, facilities, and equipment have already been made. We did not follow all these steps, but I believe if we had we would have been able to avoid some of the problems we encountered at the production stage.

1. Initial Planning - Decide what topics are to be included. Formulate a tentative table of contents.

2. Research - Determine whether data are available on the chosen topics. If not, develop alternative topics for which data are available.

3. Staff and Advisory Committee Meetings - Make the final decisions on what topics are to be included and in what order.

4. Data Collection - Obtain the necessary data for text and maps.

5. Production of Page Drafts - Construct drafts, either by hand or with the aid of a computer. As much detail as possible should be shown on these drafts, including placement of maps, map titles, legends, and text blocks. As much as possible, maps should look like the envisioned final product. Cartographers should resist temptations to abandon this step. The time saved by not producing drafts in the first place will be lost by the time needed to correct and adjust finished graphics.

6. Reviewing Page Drafts and Writing Text - Review the maps and the text. This will be done by major staff members as well as by authors or contributors. Text contributors should be given, in addition to draft graphics, the exact number of words of text needed to fill allotted space.

7. Production of Final Graphics and Text Editing - In some cases the production of graphics will be first, in others the text will come first. It may not be possible to perform these tasks in the same order for every chapter. For some chapters whose subjects do not easily lend themselves to graphical display it may be necessary to write and edit the text before proceeding with the graphics.

For production of the Water Resources Atlas of Florida, we developed several means of increasing productivity and reducing errors which we had not had for the Atlas of Florida. First, we wrote a detailed style guide and used style sheets for maps and chapter text. We also developed a means of interfacing the word processor and typesetter, which meant that text no longer had to be typed twice. A "spell-check" program on the word processor was used to help reduce typographical errors, although it did not obviate the need for careful editing and proofreading.

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Fig. 1. Comparison of Selected Florida Rivers and Major World Rivers (Fernald and Patton 1984, p. 59).

Fig. 4. (Fernald and Patton 1984, p. 61).
The descriptions given here on the inspiration and purpose of the Water Resources Atlas of Florida, and on its production, indicate the many complexities inherent in a project of this scope. Some of the lessons we learned working on the atlas will apply, we hope, to other major cartography projects.

References


CONTRIBUTORS TO THIS ISSUE

(Continued from p. 10)

Fitzgerald, A. Brian is a research associate for the Florida Resources and Environmental Analysis Center at Florida State University. She received her Ph.D. in anthropology from the University of Florida in 1981. She has a B.A. in English and an M.S. in anthropology.

Harry J. Belford, Jr. is an associate professor of geography at the Bayboro Campus of the University of South Florida. His interests include cultural and regional geography. He has studied at Miami University (Ohio), University of Cincinnati, and Columbia University.

Donald P. W. is chair of the geography department at Florida Atlantic University. Among other interests, he is concerned to find solutions to contemporary problems using geographical methodology.

Gar McMillin is an assistant professor of geography at Saint Bonaventure University in New York. His interests are in cultural and historical geography. He received his Ph.D. from Louisiana State University.
Florida is often depicted as having deep regional political cleavages. The
northern part of the state is thought of as largely rural and traditional,
still rooted in the culture of the Old South. The central and southern parts
are seen as urban and increasingly liberal, particularly on social and environ-
mental issues. Florida politics, especially during annual sessions of the State
Legislature, is interpreted as a struggle between the rural north and the urban
south over the direction of public policy. This article presents a preliminary
analysis of data from a statewide survey of Florida voters on a number of
issues.

Figure 1. INTRASTATE REGIONS

Sampling Procedures

The survey was conducted by the Social Science Research Laboratory at
Florida Atlantic University. Funding was provided by the Florida Institute of
Government and the Florida Atlantic University/Florida International University
Joint Center for Environmental and Urban Problems. Computer assisted telephone
interviews were conducted with 890 residents whose phone numbers were selected
at random. The sample was constructed so that three regions within the state—
the Panhandle, the Peninsula, and the Gold Coast—had roughly the same number
of respondents. Regional boundaries were chosen by the authors and reflect
historical regional divisions in the state (Fig. 1). The distribution of public
opinion for the state as a whole was calculated by weighting the regional distributions according to each region's share of the state's population. The interval of error for statewide distributions is 3.5 percent at a 95 level of confidence. The interval of error for distributions by regions is 6 percent, again at a 95 level of confidence. The survey was run between October and December 1984. (For further details on the sampling procedure, see deHever-Smith and Catlan 1985, p. 15.)

Table 1. VOTING BEHAVIOR AND ATTITUDES

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All percentages are percentages. Columns may not add to 100% because undecided, don't know, and similar responses are not shown.

Voting Behavior

The strongest regional difference in the political orientation of Florida voters is in their attachments to the political parties, but even these differences are much more complex than the prevailing view of Florida politics suggests. Table 1 shows the distribution of responses on a number of questions about voting behavior. The important point here is that attachments to the political parties vary depending on the level of government in question. Although the majority of Florida voters (55 percent of the sample) are registered Democrats, this orientation applies mainly to voting behavior in elections for the U.S. Congress. Forty-seven percent of the respondents voted for the Democratic candidate for Congress in the 1984 election. In contrast, Florida voters are decidedly Republican in Presidential elections and Independent in state and local elections. Hence, while often registered as Democrats, Florida voters frequently identify themselves as Independents.

Because party attachments vary by level of government, partisan cleavages between regions also vary by level. In voting for the U.S. Congress, the Panhandle and Gold Coast coalesced in support of the Democratic Party while the Peninsula stood alone behind the Republicans. However, in state and local elections, the Gold Coast switched sides. Voters in the Peninsula and Gold Coast were more likely than voters in the Panhandle to vote mainly for Republicans, and voters in the Panhandle were more likely than voters in the other regions to vote mainly for Democrats. Finally, in the most recent Presidential election, the state was united. About two-thirds of the voters in each of the three regions supported President Reagan.
Table 2. PERCEPTIONS OF STATE AND NATIONAL GOVERNMENT

<table>
<thead>
<tr>
<th></th>
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<th>STATE</th>
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</tr>
<tr>
<td>ALWAYS</td>
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<td>9%</td>
<td>5%</td>
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</tr>
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<td>35%</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>SOME/MORE</td>
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<td>54%</td>
<td>5%</td>
<td>5%</td>
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<tr>
<td><strong>TRUST THE STATE GOVT</strong></td>
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<td></td>
</tr>
<tr>
<td>ALWAYS</td>
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<td>6%</td>
<td>5%</td>
<td>7</td>
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<tr>
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<td>47%</td>
<td>43%</td>
<td>43%</td>
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<tr>
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<td>58%</td>
<td>46%</td>
<td>46%</td>
</tr>
<tr>
<td><strong>NATIONAL GOVT IS RUN FOR A FEW BIG INTERESTS</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALL OF THE PEOPLE</td>
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<td>64%</td>
<td>62%</td>
<td>62%</td>
</tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>ALL OF THE PEOPLE</td>
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<td>19%</td>
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All figures are in percentages. Columns may not add to 100% because of undecided, don't know, and similar responses are not shown.

Table 3. ATTITUDES ON SOCIAL ISSUES

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</tbody>
</table>

All figures are in percentages. Columns may not add to 100% because of undecided, don’t know, and similar responses are not shown.

Overall, the Panhandle is more solidly Democratic than the other regions, the Peninsula is more Republican, and the Gold Coast falls in the middle, siding with the Panhandle in Congressional elections and with the Peninsula in state and local elections.

Perceptions of Government

Florida voters have a much more favorable impression of the state government than the national government regardless of the region in which they live. Table 2 shows the distribution of public opinion on questions designed to measure perceptions of government. Respondents had greater trust in the state government than in the national government, were more likely to think that the state government is run for all of the people rather than a few big interests, and less often thought that the state government wastes a lot of money.
Regional variation in perceptions is focused on the first two issues and only at the state level. Respondents in the Gold Coast were slightly more likely than those in the Peninsula and Panhandle to distrust the state government and to think that it is run for a few interests rather than for the Florida public generally.

Social Issues

Attitudes on social issues are similar in all of the regions. Table 3 displays the distribution of opinion on state policy towards welfare, education, the Equal Rights Amendment (ERA), busing and taxes. Respondents overwhelmingly support expenditure increases for education and oppose tax cuts if they would require reductions in social programs. By a smaller margin they support the ERA and welfare for the unemployed. Respondents were divided on the issue of busing black and white children to the same schools. The only regional difference that stands out is on the ERA; support increases steadily as one moves south.

Growth Management

If there is one area of public opinion where stark regional differences would be expected, it is the area of growth management. After all, most of the state's rapid population growth is concentrated in the Peninsula and Gold Coast. Table 4 shows the distribution of opinion on a number of growth management questions.

| Table 4: ATTITUDES ON GROWTH MANAGEMENT ISSUES |
|-----------------------------------------------|-------|-------|------|-----|
| FLA'S ENVIRONMENT IS                          |       |       |      |     |
| GETTING BETTER                                | 28%   | 18%   | 18%  | 10% |
| GETTING WORSE                                 | 43%   | 77%   | 64%  | 53% |
| NOT CHANGING                                  | 31%   | 21%   | 21%  | 23% |
| LAND-USE REGULATION                           |       |       |      |     |
| SHOULDN'T BE RELAXED                         | 5     | 5     | 7    | 6   |
| STRENGTHENED                                  | 51%   | 57%   | 59%  | 55% |
| BE AS IS                                      | 31%   | 27%   | 29%  | 24% |
| FLA NEEDS STRONGER LAWS TO PREVENT POLLUTION|       |       |      |     |
| AGREE                                          | 54%   | 52%   | 54%  | 54% |
| DISAGREE                                      | 46%   | 48%   | 46%  | 46% |
| FLA NEEDS STRONGER LAWS TO PROTECT FISH AND   |       |       |      |     |
| WILDLIFE                                      | 87%   | 91%   | 89%  | 90% |
| AGREE                                          | 4     | 3     | 6    | 4   |
| DISAGREE                                      | 96%   | 97%   | 94%  | 96% |
| WATER CONSERVATION IS NOT NEEDED IN FLA      |       |       |      |     |
| AGREE                                          | 9     | 7     | 6    | 6   |
| DISAGREE                                      | 91%   | 93%   | 94%  | 94% |
| WE NEED ECONOMIC GROWTH                      |       |       |      |     |
| EVEN IF IT HURTS THE ENVIRONMENT              | 11%   | 12%   | 11%  | 11% |
| AGREE                                          | 89%   | 88%   | 89%  | 89% |
| DISAGREE                                      | 12%   | 18%   | 19%  | 19% |

Overall, the Florida public is strongly supportive of the state's efforts to protect the environment and quality of life. The majority of respondents said that the natural environment is deteriorating and that land-use regulations should be strengthened. Respondents overwhelmingly supported stronger laws to prevent pollution and protect fish and wildlife from the hazards of construction, said that regulations for water conservation are needed, and opposed economic growth if it means the environment will suffer.

The only regional variation in attitudes on these growth management issues is of degree, not direction. Respondents in the Gold Coast and Peninsula were more likely than those in the Panhandle to believe that Florida's environment is getting worse, that land-use regulation should be strengthened, and that water needs to be conserved. However, as shown in Table 4, support for land-
use controls and environmental protection is also very strong in the Panhandle, certainly much, much stronger than prevailing analyses of the Florida public assure.

Conclusion

Given that there is little evidence of regional divisions in Florida public opinion, it is worth asking why the State Legislature seems so often embroiled in conflicts between the urban south and rural north. The plausible answer is that regional conflicts in the Legislature have less to do with the substance of policy than with the geographic distribution of public goods. For example, the Legislature may agree fully that increases are needed in spending for higher education but disagree about whether monies should go to universities in the south rather than in the north.

Whatever the reason for regional cleavages in the State Legislature, the policy implications of this survey are clear. The Florida public wants stronger laws for managing growth and protecting the environment, supports increased spending for education, and opposes tax cuts if they require reductions in social services.

1. This article was reprinted, with minor revisions, from deHaven-Smith and Gatlin (1985) with the permission of the Florida Atlantic University-Florida International University Joint Center for Environmental and Urban Problems.

References

ENVIRONMENTAL IMAGES AND FLORIDA'S INCIPENT SUGAR INDUSTRY

Sam Sheldon

"The way that men perceive or understand their environment is significant for explanations of human spatial activity" (Allen 1979, p. 14).

Sugar cane has long been a staple of Florida's agricultural landscape. Introduced to Florida shortly after the founding of St. Augustine, the sucrose-yielding grass became commercially significant during the nineteenth century and currently ranks as the leading commodity in dollar value of farm sales among the state's field crops (Farrell 1981, p. 153). Florida's contemporary cane growing region is located on lands bordering Lake Okeechobee. This area of rich, organic soils has remained the focus of the state's sugar industry throughout most of the present century, but earlier sugar enterprises flourished along both the Atlantic and Gulf Coasts and in central Florida. Economic and political forces are prominent in explaining the peripatetic nature of Florida's cane industry. Our spatial instability has also been engendered by disparities between the perceptions and realities of the state's sugar growing potential. Landscapes believed to be amenable to cane cultivation often proved wholly inappropriate, and sugar production subsequently relocated to more "ideal" locales.

This article examines the role of environmental perception in fostering a sugar industry in northeastern Florida during the eighteenth and nineteenth centuries. Contemporary materials are used to convey the positive impressions of the region which were held by residents and writers, impressions that encouraged cane cultivation in a physical milieu ill-suited to the crop.

Sugar in Northeast Florida, Sixteenth to Mid-Nineteenth Century

The Formative Years: 1663 - 1781

Although the Spanish introduced sugar cane to Florida during the middle of the sixteenth century, it was not until the abbreviated British occupation from 1663 and 1783 that commercial production commenced. Wherein Spain had viewed Florida as little more than a military outpost, the British settled with the intention of exploiting the region's agricultural potential. Since Florida's climate was perceived as being comparable to that of the West Indies, the British deemed the area suitable for the cultivation of semi-tropical commodities. Large land holdings were dispersed to planters, and bounties were provided to stimulate farm production. The plantation system that evolved after 1763 focused on the province of "East Florida," a British designation that included the peninsula and the mainland between the Atlantic Coast and the Apalachicola River. Rice and indigo quickly emerged as the staples of East Florida's estate economy, but a variety of other crops were commercially produced on a small scale. Despite some concern that it would compete with west Indian production, sugar cane was cultivated along the Atlantic coast as early as 1768. Lieutenant Governor John Moltrie navigated a crop on his plantation south of St. Augustine in 1770, and in the opinion of a Jamaican planter the cane was "as rich and produced as well as in most parts of the West Indies, and the sugar was allowed to be good" (Duggett 1919, p. 51).

Sugar cane was also grown in the vicinity of Dr. Andrew Turnbull's New Smyrna colony, located some sixty miles south of St. Augustine. The naturalist William Bartram visited a plantation near New Smyrna around 1776 and reported that a severe storm had destroyed the crops, among them "the Indigo...and several acres of very promising Sugar-cane." Commenting upon the fertility of the land in the New Smyrna region, Bartram concluded:

These rich low grounds when drained and ridged are as productive as the natural high land, and vastly more durable, especially for Sugar-cane, Corn and even
Sugar cane was produced on a number of estates between St. Augustine and New Smyrna during the 1770s. But the crop failed to achieve any notable commercial success. Planters quickly discovered that cold winter winds retarded cane's maturation and prevented it from filling with juice. Many growers avoided the plant because of the large capital investment required to initiate and sustain a viable sugar economy.

The limited production of sugar cane during the 1770s was further diminished by a change in Florida's political affiliation during the 1780s. With the retrocession of the territory to Spain in 1785, East Florida's plantations were abandoned by their British overseers and the province regressed into the economic stagnation that had prevailed prior to English occupation.

Great Britain's attempts to establish a plantation economy in East Florida occurred amid conflicting perceptions of the region's agricultural potential when England acquired Florida from Spain via the Treaty of Paris. British knowledge of the area was limited. Furthermore, under provisions of the 1763 treaty, Great Britain received Florida in exchange for Havana, a transaction strongly disapproved of by many Englishmen. Not surprisingly, late eighteenth century British literature often painted a bleak picture of Florida. In August, 1765, for example, an entry in the Gentleman's Magazine (1765, p. 180) referred to the southern and maritime regions of North America as poor and mean, "being little more than pine barrens, or sandy deserts." Another discordant note decried the British lands acquired through the Peace of Paris, particularly the "pestiferous sea-coasts... the sunken lagoons of East Florida," its coast was low, flat, and marshy, scoured with burning sand; inland were banks of sand, rocks and stones, with a few savannas, varied with swamps appropriately called "dismals." Epidemic fevers and diastemps were common, and if St. Augustine was somewhat more healthful it was only because of winter frosts which, however, killed off sugar or any other tropical products (Mitchell 1767).

Armed against the negative assessments of Florida's environment were pamphlets, books, and government reports that praised the area and its agricultural potential. Desiring effective settlement of its newly acquired domain, Great Britain launched a publicity campaign designed to attract prospective colonists to East Florida. Advertisements in British journals lauded the salubrious climate and fertile soils of the Florida peninsula. These positive government pronouncements were reinforced by gazetteer articles and books authored by settlers and travelers.

Such commentaries frequently elevated East Florida to the status of an eighteenth century Garden of Eden. Thus, Sonya Polle, a planter and enthusiastic Florida booster, wrote:

"Everything in nature seems to correspond towards the cultivation of the productions of the whole world, in some part or other of this happy province, the most precious jewel of his majesty's American dominions (Polle 1766)."

Eighteenth century observers of East Florida commonly cited sugar cane as one of the region's most potentially lucrative crops. Dr. William Stock, a botanist and a member of the Royal Society, assessed the region's resource base in the 1760s and concluded that sugar could be raised better in East Florida than anywhere else in the world (Stock 1766). The Dutch surveyor Bernard Romans traveled throughout Florida and noted that, "In time, by clearing the woods of Florida, that country may be brought to produce sugar to advantage..." Romans believed that sugar would eventually emerge as a major export of the province (Romans 1775, p. 113).

While East Florida's potential for producing sugar profitably was a recurring theme in the writings of Stock, Romans, and a number of their contemporaries, the cane grown on British estates between 1763 and 1783 was essentially experimental in nature. Even Lieutenant Governor Moultrie, one of the most enthusiastic proponents of sugar cultivation, commented in 1777 that the forthcoming year would "give a decisive experiment to the culture of sugar" (London, Public Records Office, Colonial Office 171, vol. 1, p. 19). Unfortunately, Moultrie's "experiment" failed to provide long-term conclusive results. The environmental, economic, and political factors cited earlier combined to stymie sugar cane cultivation and effectively terminate East Florida's plantation economy by the middle of the 1780s.
Although cane continued to be grown on a small scale after the British relinquished control of the territory in 1783, it was not until the early years of the nineteenth century that planters paid serious attention to sugar making in Florida. Threatened by United States territorial expansion, Spain adopted a policy that encouraged settlement of its Florida domain. The Crown rendered land grants to both Spanish subjects and foreigners, and a number of British planters residing in the Bahamas availed themselves of the Spanish offer and settled along the Matanzas, Tomoka, and Halifax Rivers in northeastern Florida. In 1819, the United States acquired Florida from Spain, but the change in political control did little to stem the flow of migrants to the region or alter its growing prosperity, a prosperity increasingly based on sugar. The perception that many early nineteenth century planters had of northeastern Florida as an ideal area for growing sugar cane was doubtless influenced by what they read. Most period pieces were written to stimulate interest and investment in Florida and attracted the migrants to the region. Florida's cane producing potential was publicized, and environmental short comings were rarely mentioned. Among the first to extoll the virtues of cane growing was James Grant Forbes, a native Floridian who in 1821 was appointed by President James Monroe to serve as marshal of East and West Florida. His publication described the climate, topography, and economy of the territory. In assessing agriculture Forbes (1821, p. 146) wrote:

"Various opinions have been formed as to the fertility of the lands of East Florida, which common report and geographers have too uniformly pronounced to be sand hills and marshes. Nothing but experience can confirm or remove the prejudices arising from such hasty conclusions."

Forbes' "experience" repudiates the negative opinions of Florida's lands and lauds its agricultural potential. He notes, for example, that the peninsula is "more genial" to the profitable cultivation of sugar and other tropical crops than its northern counterparts (e.g., the Carolinas), and that within East Florida, hilly and low hammock lands are "most esteemed" for growing sugar, cotton, and corn.

The hardwood dominated hammocks to which Forbes referred were well suited to sugar growing. Their heavier clay soils were more capable of supporting sustainable cane cultivation than the sandy soils of surrounding areas. Florida's several types of hammock lands in Florida, "low" hammocks were considered the best for sugar. A contributor to an 1849 issue ofDemou's Review noted that high hammock was "the best description of land for general purposes," but low hammock "when drained, (was) preferred for sugar" (Fairbanks 1848, p. 11).

Few turn of the century writers singled out sugar cane as being of paramount importance in the agricultural development of East Florida. However, as political unrest flared in the West Indies and overseas markets expanded, cane cultivation rapidly diffused along the Atlantic seaboard. By the mid-1820s many Florida observers were convinced that sugar cane was destined to become the backbone of the region's agrarian economy. Typical of the growing confidence of sugar cane's commercial potential was Charles Vignoles' observations upon the Floridas. Vignoles' self-proclaimed goal was to publicize Florida, and in some detailed matters of practical interest to individuals contemplating a move to the area. Regarding sugar, Vignoles wrote: "Since the manuscript of this work was completed, the accounts from East Florida, respecting the sugar cane, have been uncommonly favorable....it is a matter of infinite satisfaction, that the certainty of sugar becoming the staple of Florida is already established" (Vignoles 1823, p. 14.) He argued that East Florida's potential for growing cane was unparalleled in North America:

Respecting sugar, the recent successful trials that have been made upon it, have determined the curious fact, that it will grow in almost any of the soils in Florida, south of the mouth of the St. John's river; the great length of summer allows the cane to ripen much higher than in Louisiana (Vignoles 1823, p. 96).

Favorably comparing Florida to other cane producing regions was a recurring theme in the literature of the early 1800s. No one was more enthusiastic about pressing this comparison, and in the process promoting East Florida as the ideal cane growing milieu, than John C. Cleland. Cleland traveled throughout the province during the 1830s, and in 1834 he published a brief monograph...
entitled. The Superior Advantages to be Derived From the Culture of Sugar Cane in Florida. Cleland's main objective, as stated in the preface, was to "exhibit a delineation of the capabilities and resources of East Florida for the production of sugar-cane..." and to "point out the best method of cultivation together with the advantages to be derived and the cost of a sugar estate, compared with those of Louisiana and the West Indian Islands" (Cleland 1836, p. v). Cleland believed that East Florida was the only region in the United States where cane could be profitably grown with any degree of certainty because of its unique "capabilities and resources." Those capabilities and resources led Cleland to conclude that

when we look at the geography of our country, and discover the numerous local advantages and adaptations of both climate and soil for the various agricultural pursuits, we must, at a glance, unhesitatingly confess, that East-Florida is destined at no distant period, to become a great and profitable Sugar region (Cleland 1836, p. vi).

Cleland provided few specific insights regarding East Florida's resource base, but he favored the province as a cane growing area because he was convinced that it possessed inherent environmental advantages over sugar districts in Louisiana and the West Indies. He also asserted that East Florida sugar could be produced with labor and at a cost similar to the acreage of its North American counterparts if judicious management practices were adopted by local growers.

Cleland, like Forbes and Vignoles before him, focused on East Florida's Atlantic Coast region. Indeed, from the early 1830s until 1836, sugar estates were established between St. Augustine and New Smyrna, and the Atlantic coast emerged as Florida's first large-scale commercial cane producing district. Plantations along the Matanzas, Tomoka, and Halifax Rivers utilized state-of-the-art technology and employed hundreds of slaves to harvest and process thousands of acres of cane. Typical of the scale of operations was the St. Joseph's plantation of Joseph N. Hernandez. Located on the Matanzas River, St. Joseph's fields were scientifically drained by canals four, five, and seven feet wide, with identical depths. Each canal extended from one-half mile to one and one-half miles in length. Two hundred acres of cane land were crossed-ditched with ditches two feet wide and two feet deep. The accompanying physical infrastructure included causeways, bridges and roads, a curing house, boiling house, and engine house. St. Joseph's was considered "the most valuable plantation, as respects soil, in Florida" by a former Bahamian planter who described it in the Farmers' Register of July 1835.

In the judgment of this anonymous observer the "swamp lands of East Florida, and especially those lying on the branches of the Matanzas and Halifax Rivers, are superior in strength and character for the production of sugar, to the most valued lands of the West Indian Islands — only excepting the sandy loams of St. Kitts" (Macrae and Hanna 1850, pp. 60-61).

The success of Florida's Atlantic coast "sugar empire" encouraged farmers in other parts of the territory to experiment with the crop on a commercial basis. An entry in the June, 1836, Farmers' Register detailed the efforts of one planter to produce sugar in Florida's "Riddle District." 5 Farguhar Macrae was a former West Indian farmer who migrated to Waccissa (near Tallahassee) with the expectations of establishing a combined sugar and cotton estate. In detailing his experiences Macrae articulated both the promise and the problems of raising cane in southern Florida. Macrae initially sewed forty acres of sugar cane on a trial basis during March, 1834. The cane was planted in swamp lands adjacent to area waterways because Macrae believed that higher lands were too sandy to successfully support sugar cane. The cane had a "favorable" season, and at six months it was equal in sweetness to West Indian cane of nine months. Unfortunately, a late October frost destroyed much of the crop, and only maturing helped the remainder regain its "virility."

In analyzing his experiment Macrae concluded that "overcropping" and a shortage of laborers were the prime factors contributing to the failure of sugar. But he was also cognizant of northern Florida's environmental limitations vis-a-vis cane cultivation, and he cautioned against establishing a sugar monoculture because of the "liabilities of our climate." Macrae nevertheless averred that if cane was grown in combination with cotton it could be "shown not only practicable in this climate, but profitable. Indeed, the time must come, when, with all the fluctuations of climate, Florida will be the sugar-growing section of these United States" (Macrae 1836, p. 66).

Macrae's observation regarding the future of sugar cane in Florida is ironic because it coincided with the abrupt termination of the Atlantic coast sugar empire. In December, 1815, a long simmering dispute between the United
State Government and Seminole Indians over the latter's removal to lands west of the Mississippi erupted into armed conflict. Within weeks after the Second Seminole War commenced, a succession of Indian raids devastated East Florida's sugar industry. Buildings were looted, fields burned, planters abandoned their estates for the relative security of nearby towns and forts, and a once flourishing agricultural region was transformed into a landscape devoid of people and economic activity.

1836 to the 1850s

The Second Seminole War ended in 1842, and with the cessation of hostilities the East Florida countryside rapidly filled with new settlers. As local crop production increased many farmers anticipated that sugar and tobacco would emerge as the dominant cash commodities of the region's revived agrarian economy. Not surprisingly, glowing accounts of East Florida's cane growing potential reappeared in local and national print. Typical was an entry in the October 1847 issue of DeBow's Review. In discussing the "general productions" of Florida an anonymous contributor cited sugar cane as being of paramount importance:

Sugar, where the quality of the land will allow for its cultivation, is undoubtedly the most certain crop among the staples. Florida is superior to Louisians for the sugar cultivation in this respect - the season is longer, which allows the cane to ripen higher before the occurrence of frost. The rich swamps and hammocks, after having been properly prepared, will doubtless raise sugar crops in succession... (DeBow's Review 1847, p. 248).

Enthusiasm such as this fostered sugar cultivation throughout the state during the late 1840s and 1850s. Indeed, the 2,750,000 pounds of sugar produced by Florida farmers in 1850 represented a tenfold increase over the territorial output of 1840 (Sixth Census of the United States - 1840, and Seventh Census of the United States - 1850). By 1850, however, sugar output had experienced both a relative and absolute decline, and cotton was firmly entrenched as the state's leading money crop. Furthermore, relatively little sugar emanated from East Florida's Atlantic coast hearth. By the end of the ante-bellum period cane cultivation was concentrated in central and northwestern Florida, and in the Gulf Coast counties near Tampa Bay.

Demise of Sugar Production in East Florida

Prior to the Second Seminole War East Florida plantations produced most of the territory's sugar. Few of these estates survived the war with their elaborate and expensive sugar mills intact. George R. Fairbanks, a St. Augustine lawyer and political leader, commented in 1848 that the war had broken the back of the flourishing sugar industry (Fairbanks 1848, p. 12).

A changing land tenure situation also contributed to the decline of commercial cane growing. In an effort to attract settlers to Florida after the Second Seminole war, the U.S. Government enacted the "Armed Occupation Act" in 1842. Under its provisions 160 acres were allotted to any "head of family or single man over 18 who was able to bear arms and was willing to live on the land for five years and cultivate at least five acres" (Covington 1961, p. 45). Most of the pioneers who subsequently migrated to northeastern Florida were subsistence farmers who grew provision crops on small plots of land. As such, they lacked the capital to initiate and sustain large-scale sugar endeavors. Said the observer, "the sugar cane...is now cultivated for home consumption by almost every planter, small and great; but the expense of machinery, and the time required to get under way, has deterred many from abandoning their cotton to raise cane" (DeBow's Review 1848, p. 21).

The transition from sugar to cotton also reflected midcentury market demands and prices. During the 1850s, rising prices for cotton engendered a rapid expansion of cotton acreage throughout the state, and a cotton "belly" developed between the Apalachicola and Suwanee Rivers in Middle Florida. Sugar could still be successfully cultivated throughout northern Florida, but the comparative advantages of cotton and other crops made it unprofitable on a commercial basis.
A final factor that unquestionably contributed to East Florida's failed sugar industry was a growing cognizance of the region's environmental limitations vis-à-vis cane growing. The climatic and edaphic needs for sugar cane are relatively rigid. To attain maximum yields the plant requires ample moisture, well-drained soils, and a lengthy frost-free season. In northeastern Florida frost was the most serious environmental hazard. Seed cane was planted in early spring after the fields were plowed and prepared, and the first cane was cut in October. From October through March, slaves stripped, cut, and hauled the cane to the sugar mill where it was converted to sugar and molasses. Given this annual round, it became imperative that frost-free conditions persist at least through the end of the year, a situation that rarely occurs in northeastern Florida. Publications dating back to the middle of the eighteenth century noted the danger to sugar cane of the bitter northwest winds and winter freezes that periodically affected northern Florida. A French planter, of "considerable planting experience in the West Indies and in Florida," observed in 1826 that while sugar could be grown to advantage in Florida, inexperience, a lack of manpower, storms and cold were severe handicaps to its profitable cultivation (American Farmer 1826-1827, pp. 339-40). In fact, while parts of northern Florida could support a cane culture under ideal climatic conditions, there was always the risk of losing the crop to inclement weather.

The perception of East Florida in the eighteenth and nineteenth centuries with respect to the region's cane growing potential was invariably positive. However, a close inspection of the area's economic and physical realities shows that sugar production would be at best problematical, and subsequent sugar production moved elsewhere in the state. 10 Notwithstanding, East Florida benefited from its positive image, an image that helped establish and nurture the first large-scale commercial sugar producing district in the state.

* * *

1. Mowat (1943) provides an interesting and thorough account of the public relations campaign mounted by political and mercantile interests in Great Britain to overcome prevailing prejudices against Florida and attract British settlers to the region.

2. In describing the commerce of "East Florida" during the 1780s, Luis Patiño observed that the region's soils were suitable for a variety of crops, including sugar, and that sugar cane was already growing well in some parts of the province (Whitaker 1931, p. 131).

3. For a detailed account of the individual planters who moved to East Florida during the early years in the nineteenth century see Siebert (1957).

4. An 1845 issue of the Miles Register described hammock land soils as a "Black, loose, sandy loam from ten to twelve inches deep, resting on stiff compact clay."

5. By the fall of 1832, ten large riverine estates were each producing eighty to one hundred mowheads of sugar (Miles Register, 29 September, 1832).

6. Although the Royal Proclamation of 1763 officially defined the boundaries of "East" and "West" Florida, the same regions are occasionally divided into "West," "Middle," and "East" Florida. West Florida comprised the territory between the Perdido and Apalachicola Rivers. Middle Florida that land between the Apalachicola and Suwannee Rivers, and East Florida the land east of the Suwannee. These regional boundaries are shown in Miller and O'Sullivan 1980, Fig. 1 (cover) and Fig. 2.

7. "Mattressing" was the practice of laying cane in the fields with the leaves toward the south in beds about two feet in height in such a manner that the leaves of each layer covered the stalks of the preceding layer. This protected the cane from frost (Sitterson 1957, p. 185).

8. The location, history, and characteristics of Florida's antebellum cotton belt are well documented by Smith (1973).
9. Although the average monthly temperatures at St. Augustine from December through March are 58.6, 57.8, 59.4, and 63.1°F respectively, freeze data indicate that the mean date of the first fall occurrence of frost is December 18. During the period 1921-1950, St. Augustine experienced fifteen fall freezes (Bradley 1974, pp. 55, 57).


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Sixth Census of the United States - 1860, and Seventh Census of the United States - 1870


This volume is the latest addition to Facts on File's reference series. Previously published volumes include Maps on File, Historical Maps on File, and The Human Body on File (the content of the latter is not specified). The new publication is a loose-leaf collection of over 1,200 black-and-white maps from every state, organized by region. Each map is printed on crisp black ink on heavy weight paper which can easily be removed from its ring binder housing. The purpose is to provide teachers of state history with maps for making transparency masters and photocopies for classroom handouts.

The flyer advertising the set says "each section provides a general state map, outline map, congressional district map, county map, demographics, transportation and natural resource maps." Unfortunately, however, demographic maps, which are available as asymmetric population density maps and choropleth population change maps for other states, are missing for Florida. The Florida section does contain, in addition to those listed above, maps of topography, hydrology, precipitation, agricultural products, transport, Indians, exploring, and wars, eighteen maps in all.

The selection of the data to be mapped for the Florida section is puzzling. Why, for example, include an isohyet map but no isotherm map or general climate map? On the highway map, U.S. 27 is included but not Florida's Turnpike. Why map berries, grapes and tung nuts separately, but lump the state's citrus all together in "fruit?"

It is difficult to determine what level is to be reached. The map of congressional districts may be useful for high school and higher levels, but not the lower grades. On the other hand, the agricultural products map, with its collection of cute little symbols of cows, trees, chickens and the like, would be viewed as being too simplistic beyond elementary school.

Inaccuracies are disturbing. On the Indian map, the Suwanee River vanishes near the Georgia border (it reaches the Gulf on other maps). The map of "Average Annual Precipitation" ridiculously simplified with only three isohyets drawn, is nevertheless incorrect: a 76" isohyet shown in western Broward County is excessive by some ten inches (Fernald 1981, p. 49) Isaac and Brandes 1981, p. 12). The map of "Boundaries 1763-1821" reports incorrectly that Florida achieved statehood in 1821; it didn't, that was when Florida became a territory.

The quality of the cartography is fair. In general the line work is crisp and carefully drawn. However, Florida's northern border is wiggly, obviously hand drawn. (The map of Georgia, on the other hand, shows a nice straight line for the state's southern border.) Lettering for the most part is acceptable, but when applied over county boundaries it cannot be read. Some of the lettering in marginal information is small and may be lost in photocopying and surely will be lost if projected on an overhead.

Teachers of Florida courses who prepare classroom graphics may profit from this selection of removeable black-and-white maps. Better maps are found in the Atlas of Florida (Fernald 1981), but they are difficult to reproduce. Some of the maps will be useful to illustrate locations of specific topics, but inaccuracies, mediocre cartography, and a limited and unusual selection of topics nullify these advantages. At $3.06 per Florida map, it is questionable that teachers (or school boards) would get their money's worth from State Maps on File.

References


Debbie Eaton
The Florida Society of Geographers was chartered in 1964 as a non-profit organization for the purpose of furthering professionalism in geography through the application of geographic techniques in all areas of education, government, and business in Florida.

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