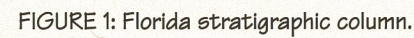
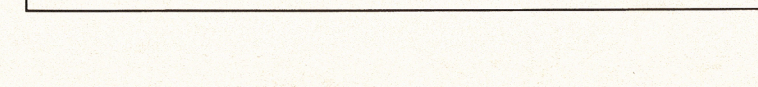


FLORIDA GEOLOGICAL SURVEY
1996

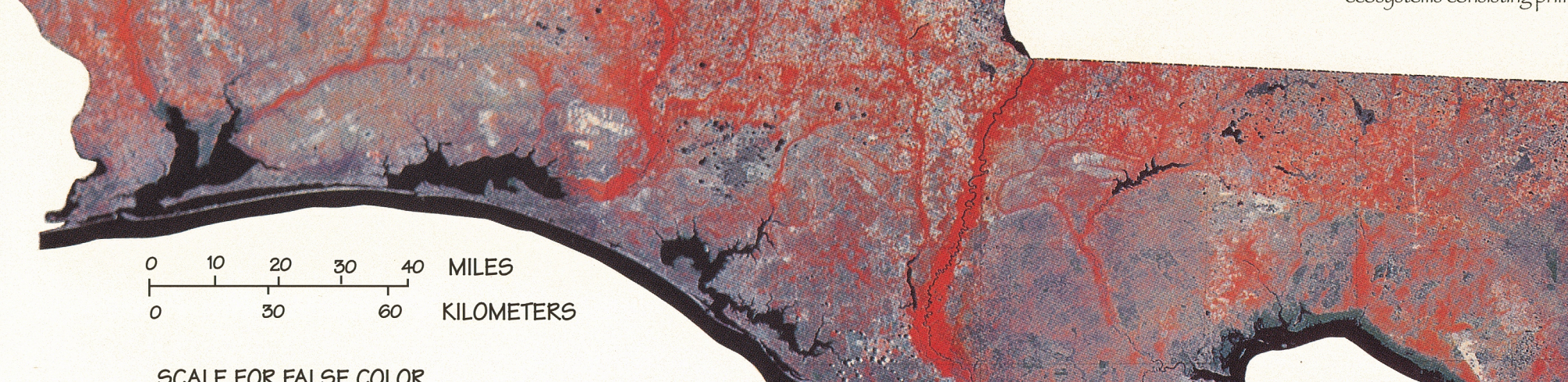
Florida's present landscape is the product of sea level fluctuations and associated marine related processes, erosion and depositional processes. Over the past 2 to 3 million years, as a result of repeated growth and melting of continental glaciers, sea levels have fluctuated from several hundred feet above present level to several hundred feet below present sea level. The most recent fluctuation is a slow rise in sea level, causing a retreat of shorelines in many parts of the state (Figure 3). The Apalachicola and Ocala Plateaus, and the Mountains to the north, blanketing the state, rivers, waves, and currents created ancient deltas, shorelines, estuaries, dunes and sand ridges. Subsequent mechanical and chemical erosion and re-deposition produced Florida's present geomorphology. The more prominent of the geomorphic features are shown on Figure 3.



The upland ecosystems are based on the plant communities that are supported by the nutrient-rich sediments, and are dependent on the local stratigraphy and hydrogeology. Important elements in these ecosystems are the mixed hardwood and conifer forests, containing both temperate and subtropical species. Extensive stands of large, mature hardwoods (oak, maple, beech, hickory, magnolia), conifers (pine, cedar, cypress), and palms form the foundation and protective canopy for lush undergrowth. Together, these elements create rich and varied ecosystems.

Along the Coastal Lowlands of the eastern panhandle, Big Bend area are underlain by thick sections of near-surface carbonate rocks of Oligocene age (Suwannee Limestone) and Miocene age (St. Marks Formation). These limestones have been deeply weathered by dissolution. These limestones also extend to the north under the Northern Highlands.

The Gulf Coastal Lowlands extend from the western boundary of the Desoto Plain approximately 25 miles to the Gulf shoreline. Most of this flat-lying region is less than 40 feet ASL. Relict marine quartz sands and shell beds, reworked and deposited by high-standing Pliocene and Pleistocene seas, comprise the near-surface sediments. The varying geology and hydrogeology of southwestern Florida



ecosystems, such as *cypripedium* stands. In places, the plain is crossed in an east-west direction by low, linear sand dunes, left behind by higher stands of ancient sea-level vegetation. These are whitish-grey, clean and bare, and have very few nutrients or minerals that are needed by plants. Consequently, the vegetation and the ecosystems of this area are less diverse than those of the Northern Highlands. The dominant plants of the karst plain are stunted *Calluna vulgaris* (heath) and *sparganium angustifolium* (water-tapes). Undergrowth is sparse, with scattered *myrica* grasses and *palmettos*. In contrast, there are many places throughout the karst plain where dis-

solution has lowered the land surface, intercepting the water table to form ponds. These perennially wet or boggy environments support dense growths of hardwoods, *cypripedium*, plants, and undergrowth, similar to ecosystems found on the uplands.

The coastal environment is very dynamic and subject to the ceaseless geologic processes of shoreline erosion and accretion. Ecosystems in this zone range from tidal to brackish-to-saltwater *tapes*, e.g., fresh-water streams discharge into brackish estuaries and tidal marshes, which interact with Gulf waters. The onshore dune

systems and the offshore ecosystems are important components of the special ecosystems of the coastal zone.

Patches of hardwood forest fringe the floodplains of the upper reaches of the Peace and Yagulka Rivers where clayey, phosphatic soils of the Hawthorn are shallow or exposed and mesic conditions exist. Salt marshes are developed where the rivers end and meet salt-water near the coast. These estuarine ecosystems typically support black needlerush, cordgrass, and sawgrass rooted in the Hawthorn clayey soils formed on top of the Hawthorn Group sediments.

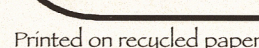
The shorelines of bays and lowland edges of the barrier islands in southeastern Florida are ringed with mangrove swamps. Red, black, and white mangroves and buttonwood flourish in the flat, sandy low-lying shallows of the region. The mangrove root clusters trap sand and mud sediments and organic cortices, commonly building new

REPRESENTATIVE PLANTS

1. Saw Pine
2. Oak
3. Saw Palmetto
4. Pines
5. Needlegrass
6. Sawgrass
7. Mangroves

from the Citronelle Formation and the undifferentiated, which have been leached of any contained iron (xeric) conditions, particularly on hill tops typically support upland sandhill or pine forest primarily of longleaf pine (*Pinus palustris*), once the

The map illustrates the topography of the Everglades region in Florida. At the top, the Caloosahatchee River flows into the Okeechobee. Below the river, the Immokalee Rise is shown, with elevations ranging from 20' to 40' ASL. To the right of the Immokalee Rise is the Big Cypress Swamp, with elevations ranging from 0' to 20' ASL. Further east, the Atlantic Coastal Ridge is shown, with elevations ranging from 10' to 25' ASL. The Pine Rocklands are located at the bottom of the map, with elevations ranging from 0' ASL. A cross-section line A-A' is marked, and a legend indicates ASL is above sea level. The map also shows the Florida Bay and the Florida Keys.



A series of east-parallel lagoons border the east coast, separating the sandy barrier islands from the mainland. Extensive coastal saltmarshes, comprised primarily of *Juncus* and *Spartina* grasses, are developed along the shores of these lagoons.

Along the coast, sandy barrier islands with large, well-developed dunes, face the Atlantic Ocean. These dunes support xeric beach dune flora, including sea oats, beach cordgrass, sandspur and morning glory.

They are made of Maam Limestone, the emergent fronds of a Pleistocene, oolitic limestone layer. Elevations over most of the Keys are less than 10 feet, although Key Largo and Key West have small areas that are slightly higher than 75 feet. The islands gradually slope down to the water, and the edges are usually rounded top. The water exceeds 2 feet. Soils are deep. Soils depressions are ubiquitous and usually filled with organic sediments, where vegetation preferentially takes root. Paradoxically, although the Keys have a tropical climate, they have a temperate environment. The temperature is usually in the 60s, and having practically no topsoil, and the continual salinization in the air, means that the Keys are a very stressful environment for plants. Any plant growing in the Keys must be salt-tolerant and be able to live with very little topsoil. The Keys are a very stressful environment, and although they are the most important biological conservationist agent through the Keys. Other important tropical trees include palms, gumbo-limbo, poinsettiae, West-Indies mahogany, nastic, pigon plum, Jamaica nut, mango, breadfruit, and the leguminates. During times of significant drought, strange things happen, and the leguminates, such as the water that float on top of brackish or salt water, but most water supplies on the islands now come from desalination plants.

Wirth, T., Maus, P., Lachowski, H., and Fallon, D., 1996, Mapping Ecosystems: Geotechnologies provide valuable tools for mapping ecological units: *Earth Observation Magazine*, January 1996, v. 5, n. 1, p. 14-18.

Computer Graphics by Pamela Clark