Chapter 4 FIGURES

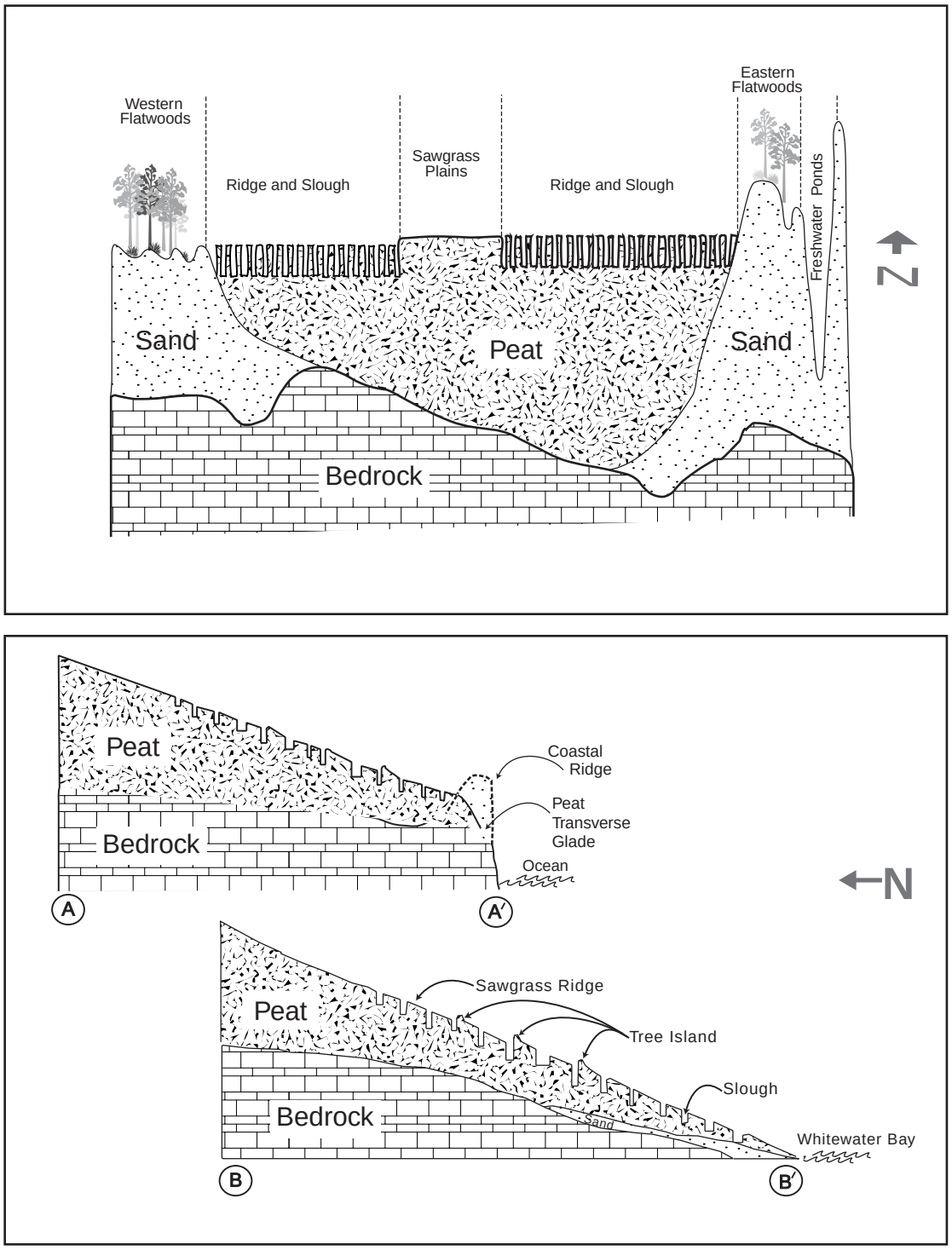


Figure 4.1 Bedrock and estimated soil elevations in the Everglades. Bedrock elevation data from Parker et al. 1955; eastern and western flatwoods from USGS topo quads; peat surface estimated from 1940 measured thicknesses (Jones et al. 1948) and Fla. Everglades Engineering Commission 1914.

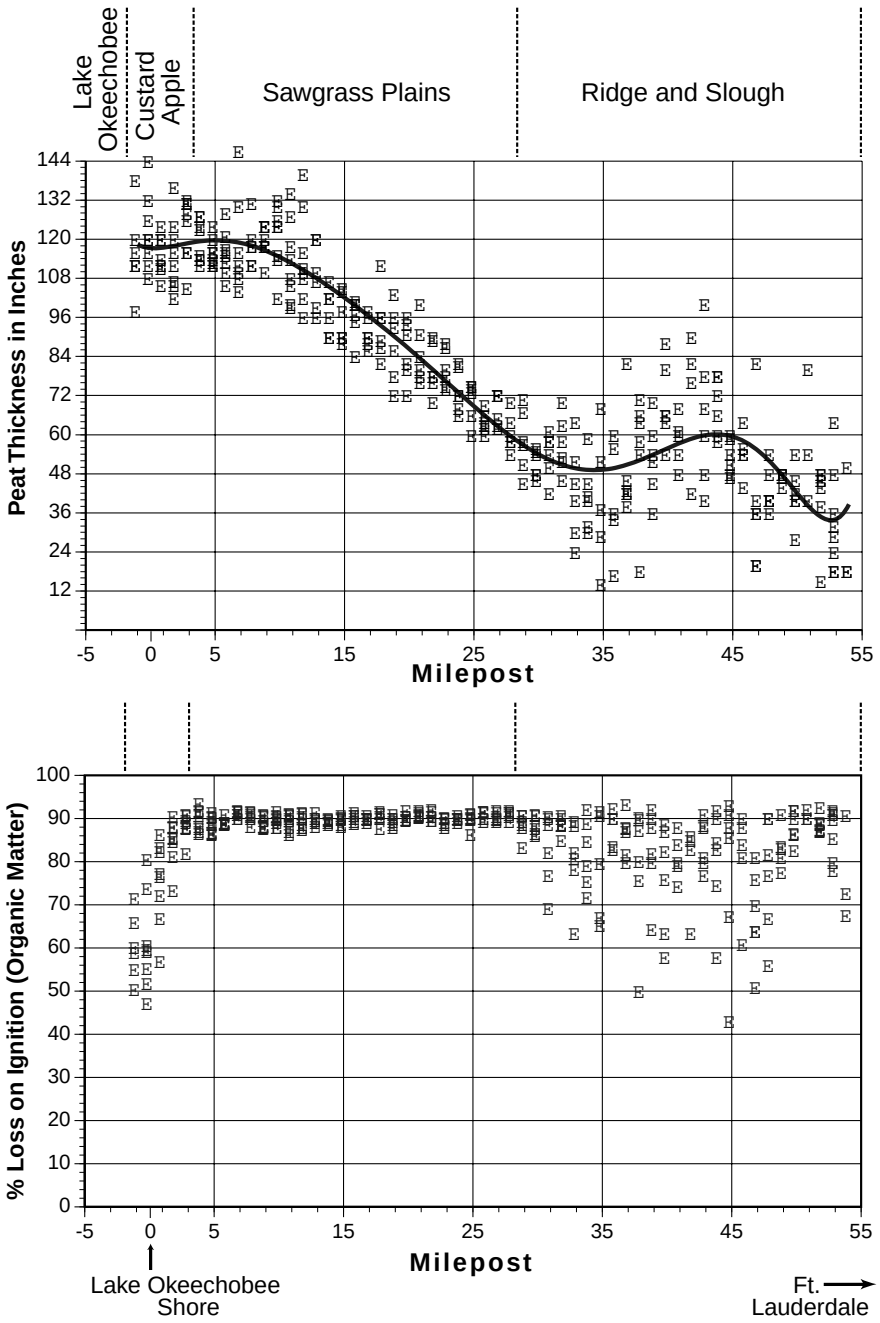


Figure 4.2 Soil thickness (top) and percent weight loss on ignition (bottom) measured in 1915 along the North New River Canal (c.f. **Figure 3.1**). Loss on ignition is a measure of soil organic matter content. Lower organic matter values in first three miles south of Lake Okeechobee reflect mineral content from silt washed in by lake overflows. Within Sawgrass Plains, note constancy of (1) peat thickness variance; and (2) organic matter content. In Ridge and Slough landscape, higher variability in thickness most likely reflects microtopography: ridge, slough, and tree island elevations; higher variance in org. matter content reflects variable presence of sand fraction. Data from Baldwin & Hawker (1915).

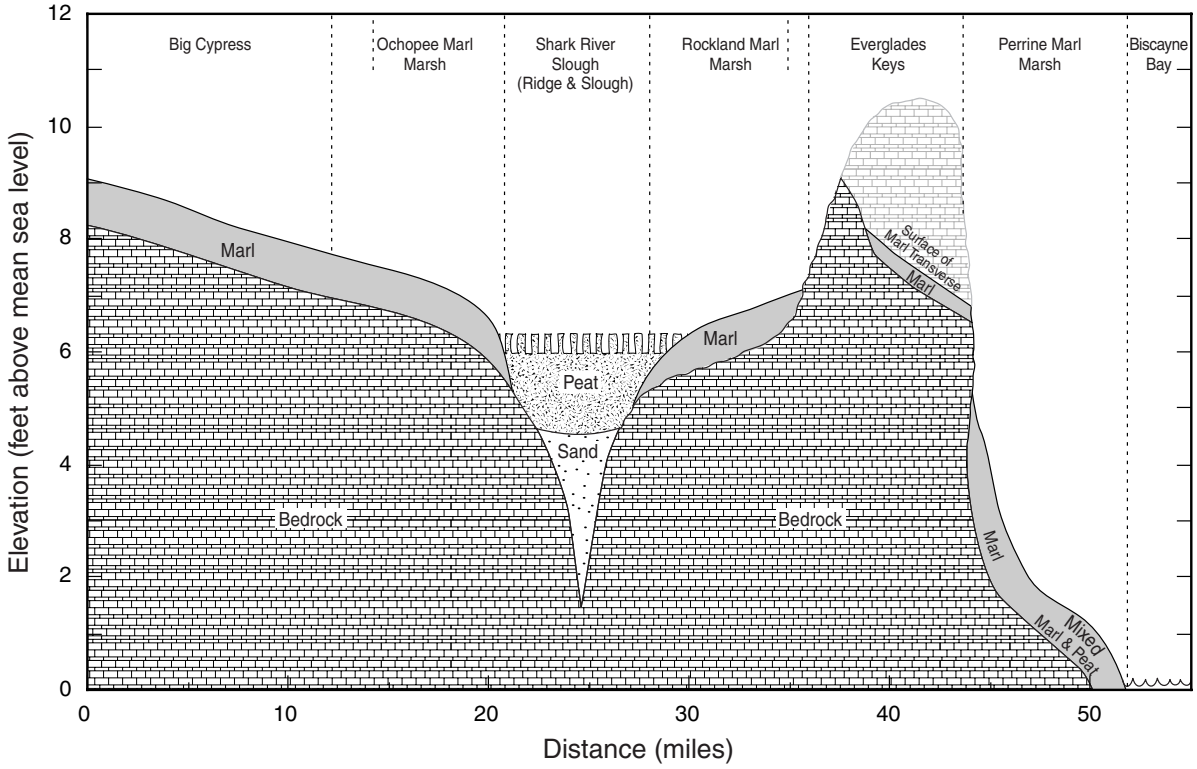


Figure 4.3 Cross-section K-K' through the southern Everglades and the Everglades Keys (**Plate 16**). Prior to drainage, the typical annual maximum water elevation in this area was about 9 feet; minimum about 7 feet. (C.f. post-prainage water depths measured along comparable transect. **Plate 15**).

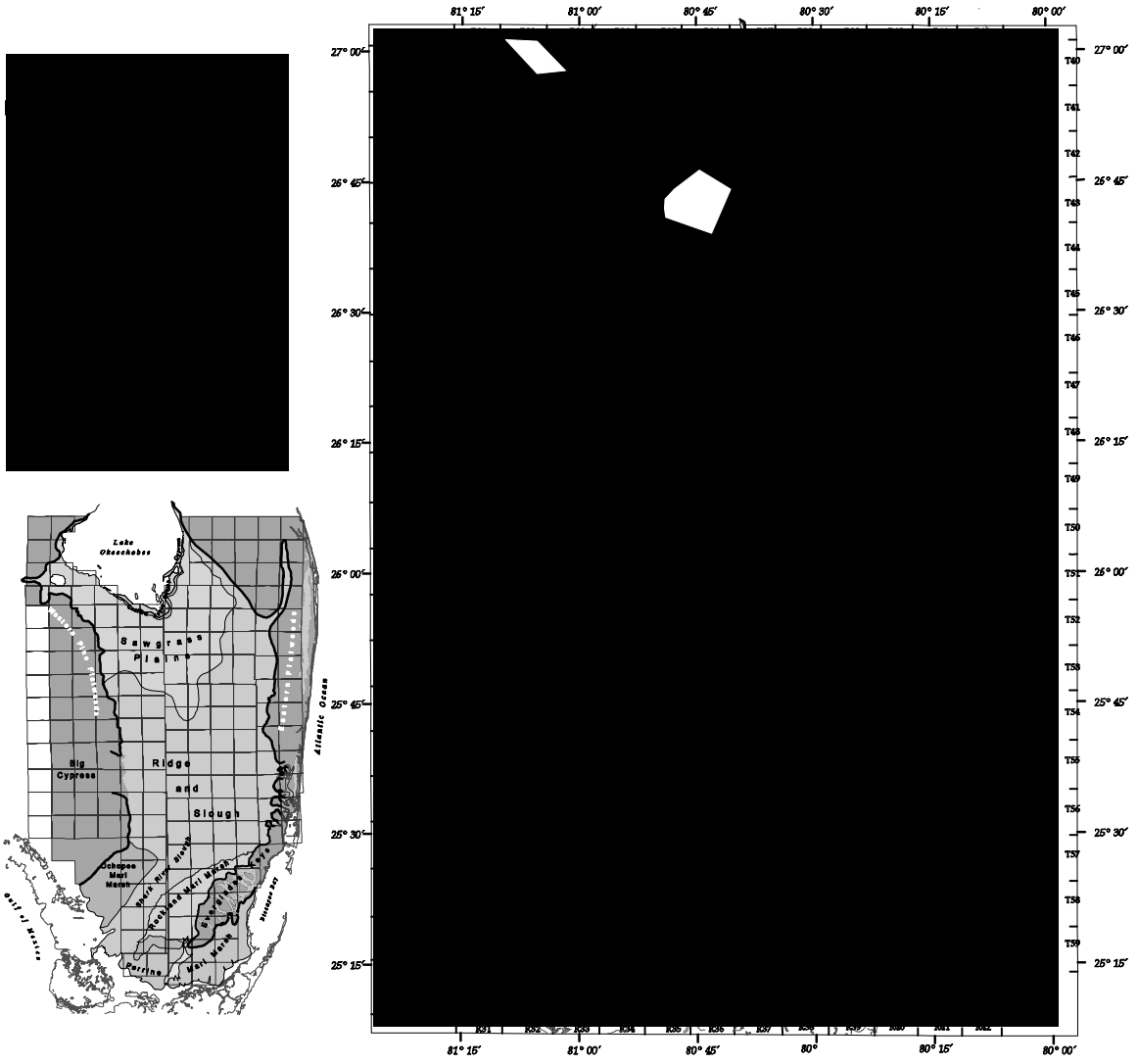


Figure 4.4 Comparison of 1940s observed landscapes ("physiographic divisions") present after 60 years of drainage (left top; Jones et al. 1948) with estimated pre-drainage Everglades landscapes (left bottom; this study). Labels correspond to first column in **Table 4.2.** Physiographic divisions (Jones et al. 1948): 1a, sawgrass plains; 1b, custard-apple; 1c, willow-and-elder; 1d, hammock-sawgrass; 2, ridge-and-slough; 3, hammock-and-glades; 4a, coastal ridge and sand prairies; 5, Miami rock rim; 6, coastal marsh.

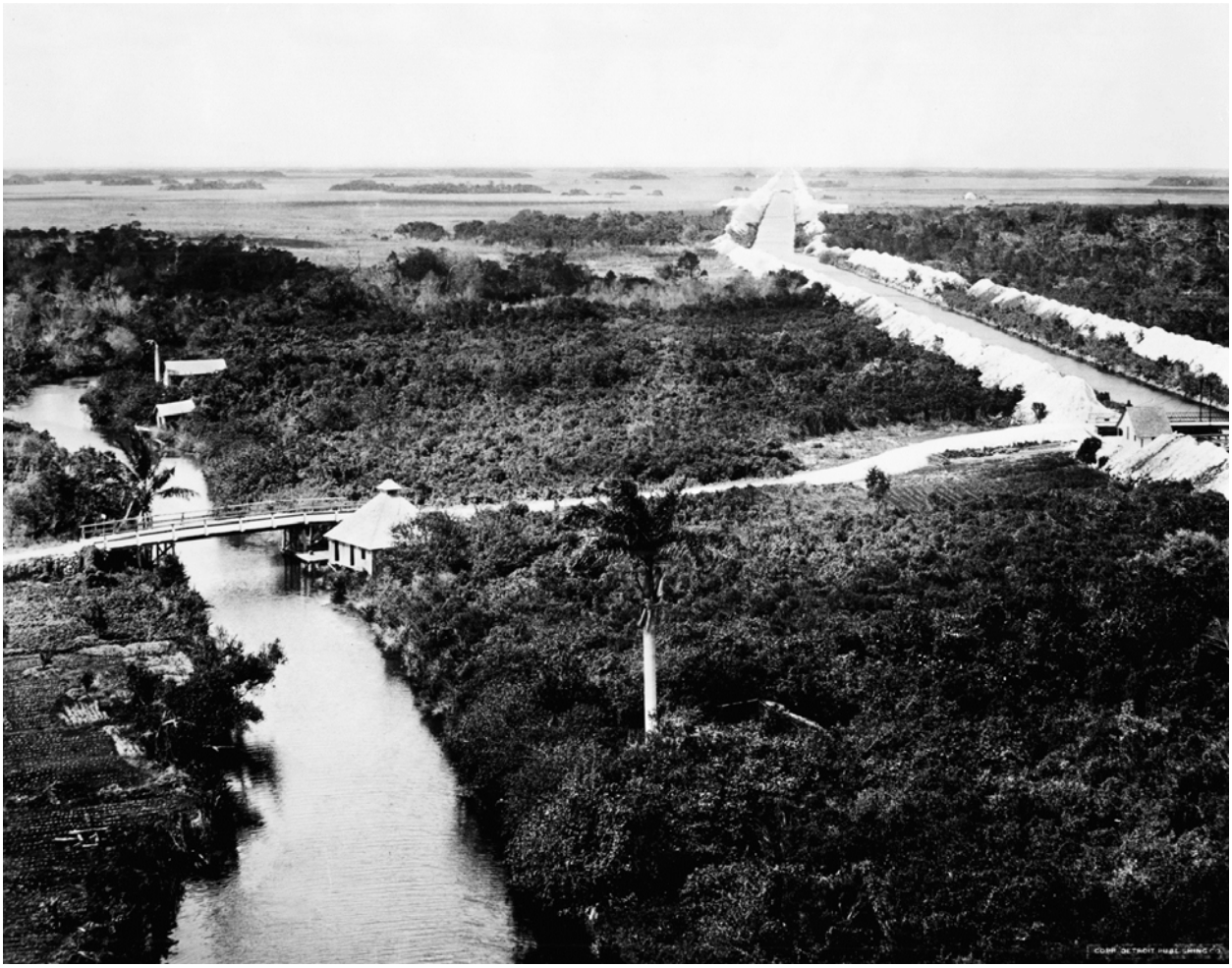


Figure 4.5 The Everglades at the head of the Miami River, North Fork, ca. 1913. View northwest from the former Cardale Tower is onto Ridge and Slough landscape in sections 28, 29, and 20 of Township 53 Range 41 (for location c.f. **Plate 34** and **Plate 35** North fork of Miami River is on left, newly excavated Miami Canal on right (compare similar widths). Falls (not visible; **Figure 4.7**) are just to right of the Burch Tower (Sallie Observatory) visible at edge of Everglades in the left half of the photograph. Road is NW 27th Avenue (W border section 34). Aerial photographs indicate that tree islands in background are actually oriented toward the viewer, approximately parallel to the Miami Canal. In April 1845, U.S. Surveyor George MacKay described sections 28, 29, and 20 as: "Everglades prairie small islands cocoa plum," "Open Everglades ... post in water 6 inches," "small clumps of myrtle + C[ocoa] plum all about" (MacKay 1845-T53 R41. By 1938 the Miami Springs Golf Course would have been visible in the center background of the photograph. (Photo used with permission of the Historical Museum of South Florida).

Figure 4.6 "Tall saw-grass of Everglades and everglade hammock [tree island] at head of the Miami River, August 12, 1912. Original" From Harshberger (1914); in text location is given as "a few kilometers west of the head of the Miami River." This figure can be thought of as a close-up of the Everglades seen in the background of **Figure 4.5.** Used by permission of the Wagner Free Institute of Science, Philadelphia, PA.

Figure 4.7 Falls of the Miami River. "These rapids fell about 6 feet in the course of some 450 feet." (Gaby, 1993). Though hidden in trees, location of these falls is included in the upper left of **Figure 4.5**. Photograph (upper left) dated 1896; courtesy of the Florida Photographic Collection. The rapids on the Miami River, ca. 1890 (lower right) photographed by Ralph M. Munroe. Used by permission of the South Florida Historical Association.

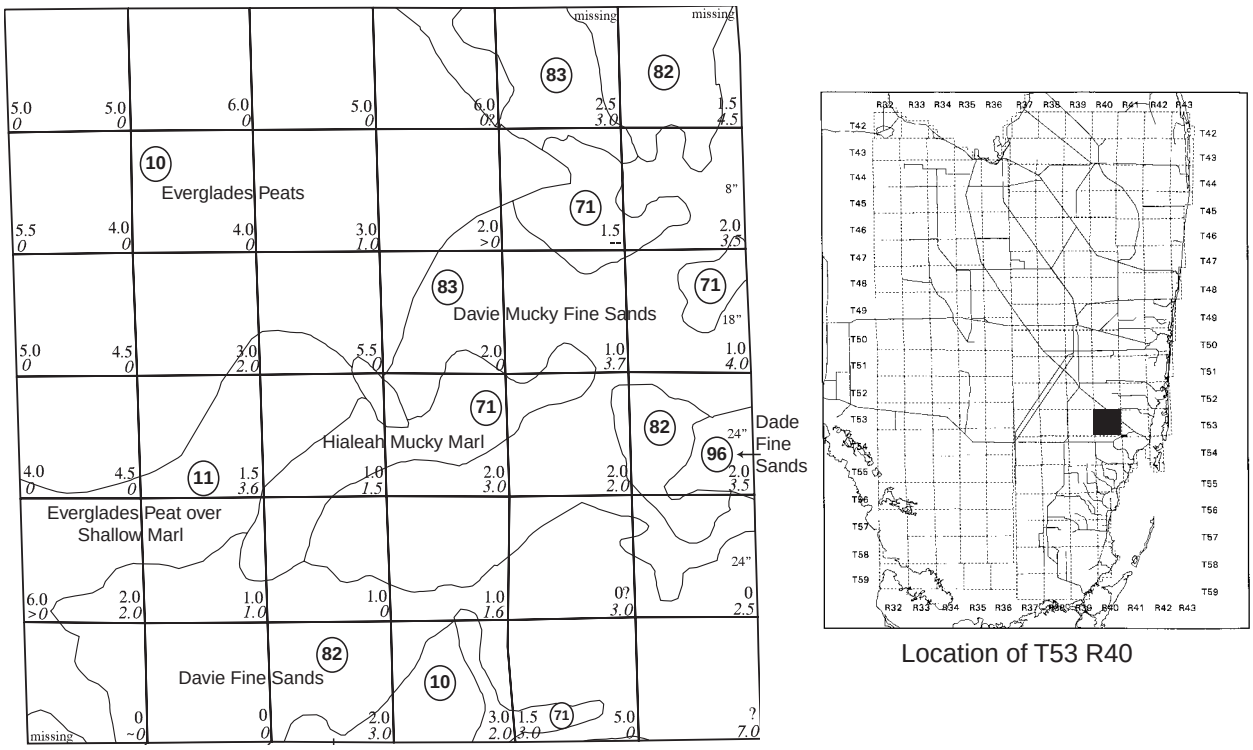


Figure 4.8 Substrate of Ridge and Slough landscape as measured in 1912 in Township 53 Range 40. Feet of organic soil ("muck;" upper number) and underlying sand (lower number) shown in section corners. Surface water depths (inches) shown in smaller type; most likely taken in July. Data from Frederick (1912-T53 R40). Polygon classifications (circled numbers) from Jones et al. (1948) soil map. Soil depth of 5.5 feet in center of township was probably on tree island shown. Same island visible in **Plate 13.** Comparison with **Figure 3.11** indicates that esentially all of the 1 to 2 feet of organic soil present in SE half of township in 1912 had been lost by by 1940. In the deeper soil of the NE half, losses between 1912 and 1940 were 1 to 3 feet.

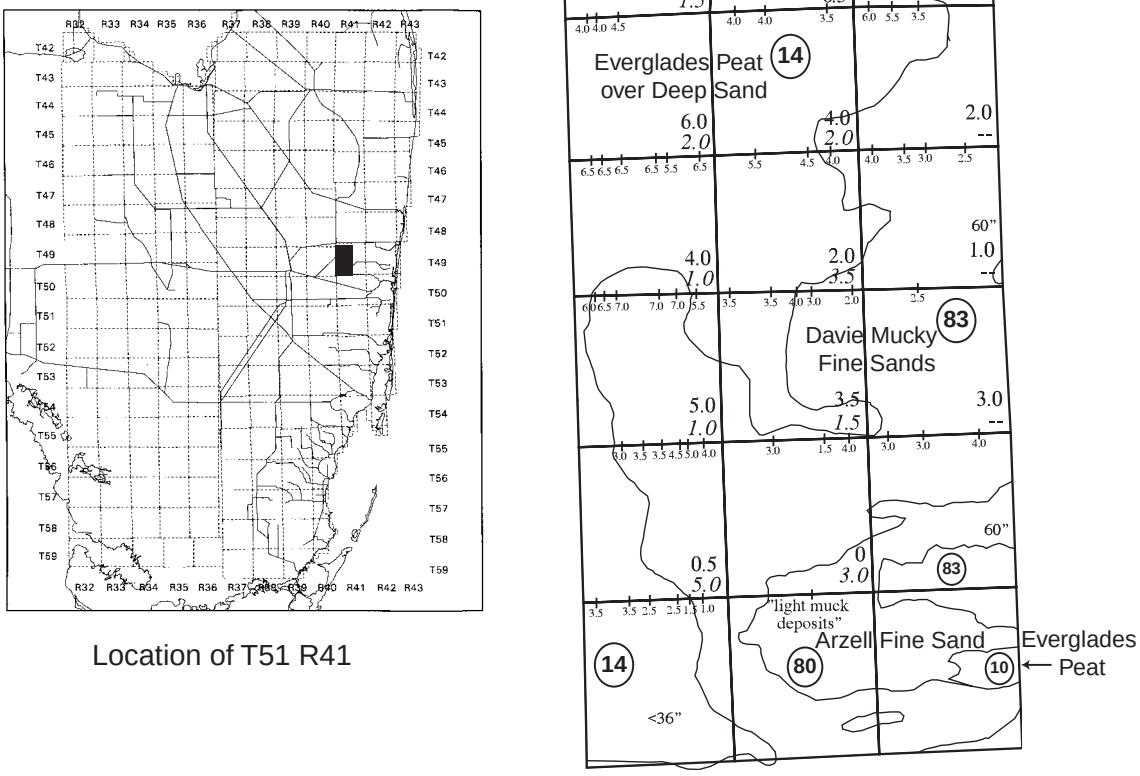


Figure 4.9 Substrate of the Ridge and Slough landscape, adjacent to coastal ridge, as measured in 1912 in Township 51 Range 41. Feet of organic soil ("muck;" upper number) and underlying sand (lower number) shown in section corners. Additional muck depths along section lines. Surface water depths (inches) shown in smaller type above corner muck depths. Polygon classifications (circled numbers) from Jones et al. (1948) soil map. Data from Kackley (1912-T51 R41). Comparison with **Figure 3.11** indicates that soil subsidence, 1912 to 1940, was between 1 and 5 feet, typically 3 ft in this area. Note also that soil type 83, Davie Mucky fine sand, was originally covered with 2 to 4 feet of peat. C.f. **Plate 35.**

Figure 4.10 Custard-apple forest: the transition between Lake Okeechobee and the Everglades. Top: "Onions on Muck. Custard Apple in Background. South Shore of Lake Okechobee [in 1915]." From Baldwin and Hawker (1915). Bottom: "Custard-apple forest, south shore of Lake Okeechobee, June 22, 1912. Original." From Harshberger (1914); used by permission of the Wagner Free Institute of Science, Philadelphia, PA.

Figure 4.11 Soil of the Custard Apple Zone, 1915. “Muck. The nonfibrous character and relatively firm mineral texture of the muck, due to the presence of fine sand, silt, and clay, characteristic of the ‘custard-apple’ region of the shores of Lake Okechobee, is indicated in the illustration.” Baldwin and Hawker 1915, Plate IV).

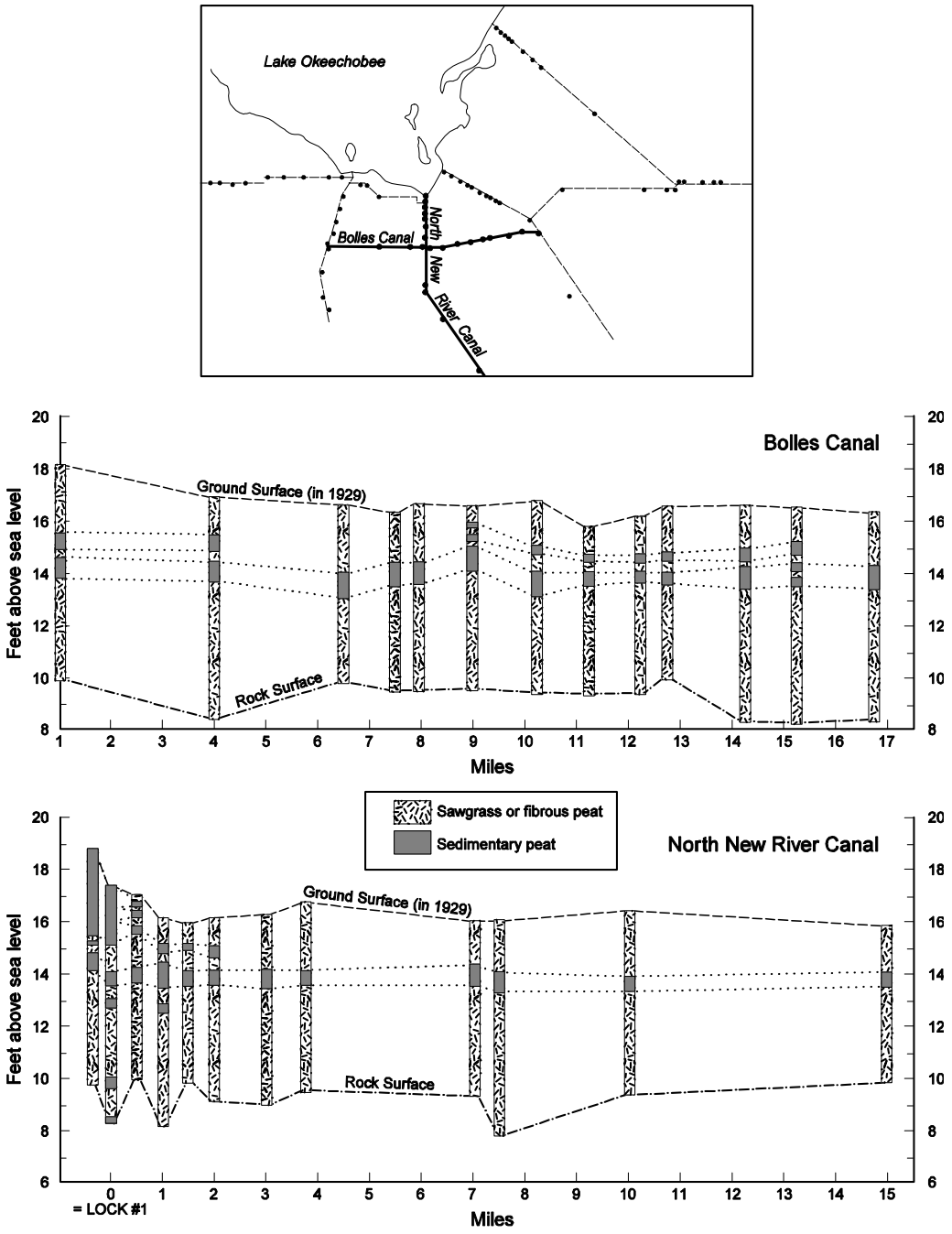


Figure 4.12 Soil profiles and elevations in the Sawgrass Plains, 1928-1929. Dachnowski-Stokes (1930) ascribes the widespread layer of blackish-brown sedimentary peat (ca. 14 feet elevation) to a period of persistent, Everglades-wide inundation. Black layers reported during canal dredging in the 1910s (Elliott in Davis 1943), and erroneously ascribed to peat fires, were most likely this layer of sedimentary peat. Redrawn from original figures for Dachnowski-Stokes (1930). Note that ground surface had already subsided 2 to 5 feet by 1929.

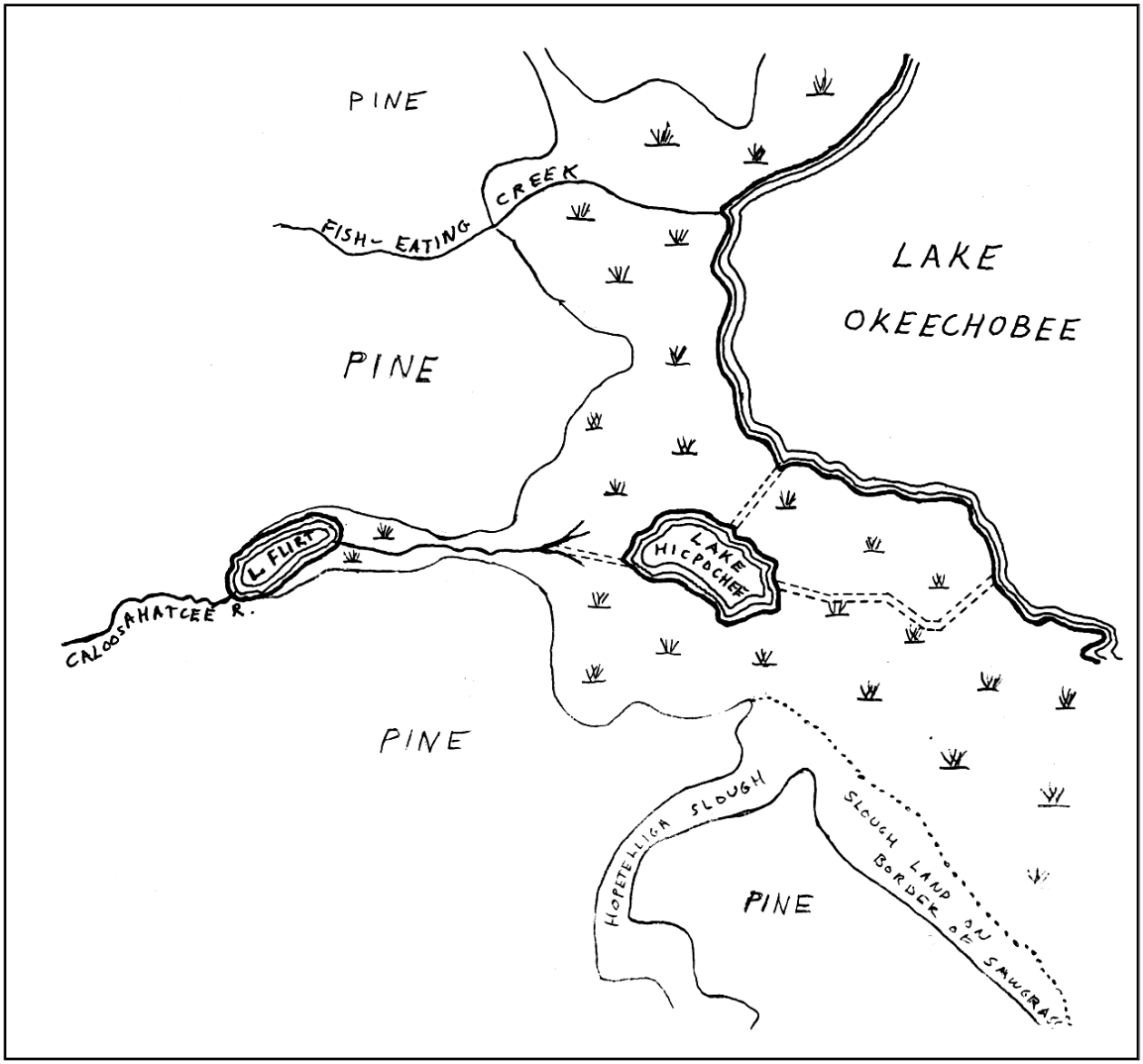
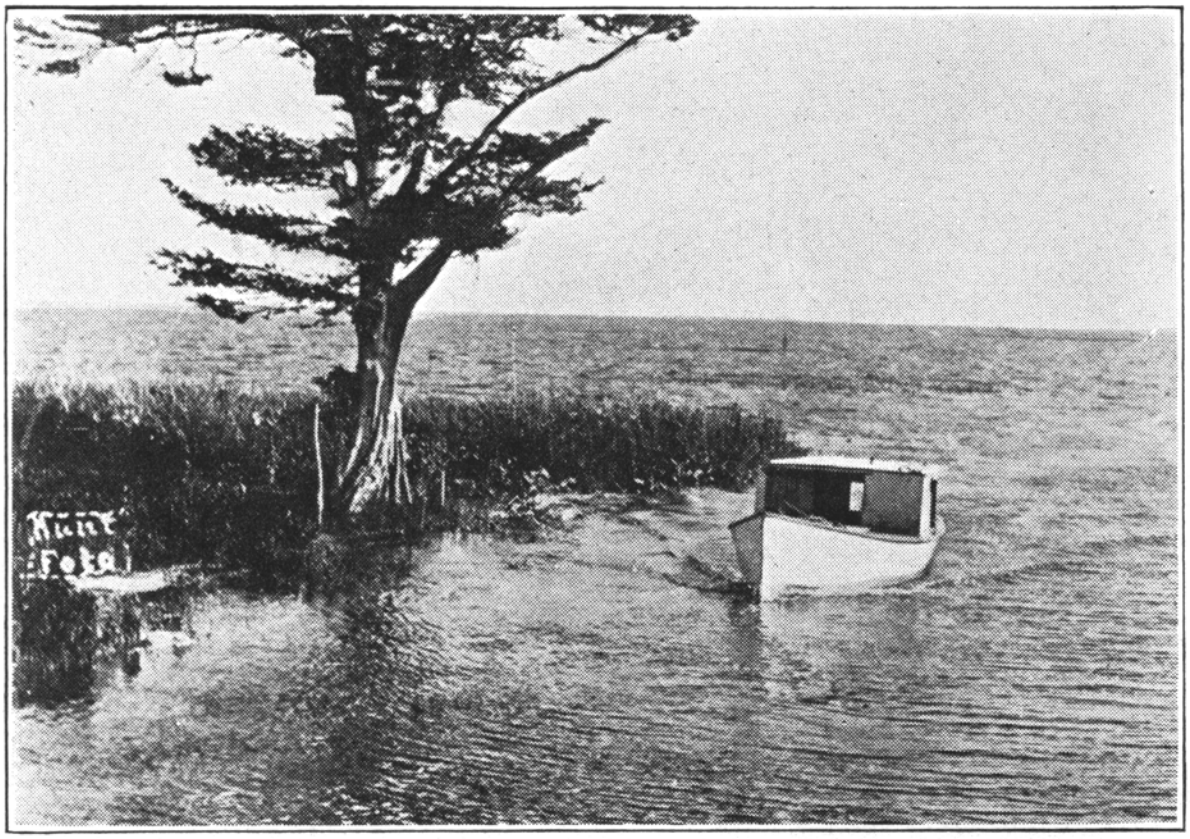


Figure 4.13 Map of Sawgrass Plains in the Lake Hicpochee area. Drawn from following maps: 1870 township surveys, Meigs (1879), Kreamer (1892), COE (1929). Like the township surveyors, Meigs found that the Caloosahatchee River did not extend as far as Lake Hicpochee or Lake Okeechobee, but instead "divide[d] into many prongs, running from the east with a slow but very perceptible current; these grew narrower and shallower as they were ascended, until the canoe could be forced no farther through the dense [saw]grass." By 1884, Disston's canals had connected the Caloosahatchee through Lake Flirt to Lake Hicpochee and Lake Okeechobee.



OUTLET OF LAKE OKEECHOBEE IN 1911.

The cypress tree was for years a landmark for mariners leaving the lake. This spot is now the site of Moore Haven, 12 miles inland from the present waters of the lake.

Figure 4.14 Southwest shore of Lake Okeechobee in 1911 (Northeast corner of Township 42 Range 32). As late as 1892, the Sawgrass Plains in this area near Lake Hicpochee formed a shallow, indistinct border with the lake, 20 miles long. Waters of the lake and of the Sawgrass Plains were distinguished only by a slight difference in elevation. C.f. Fig. 4.14. Reproduced from Blatchley (1932).

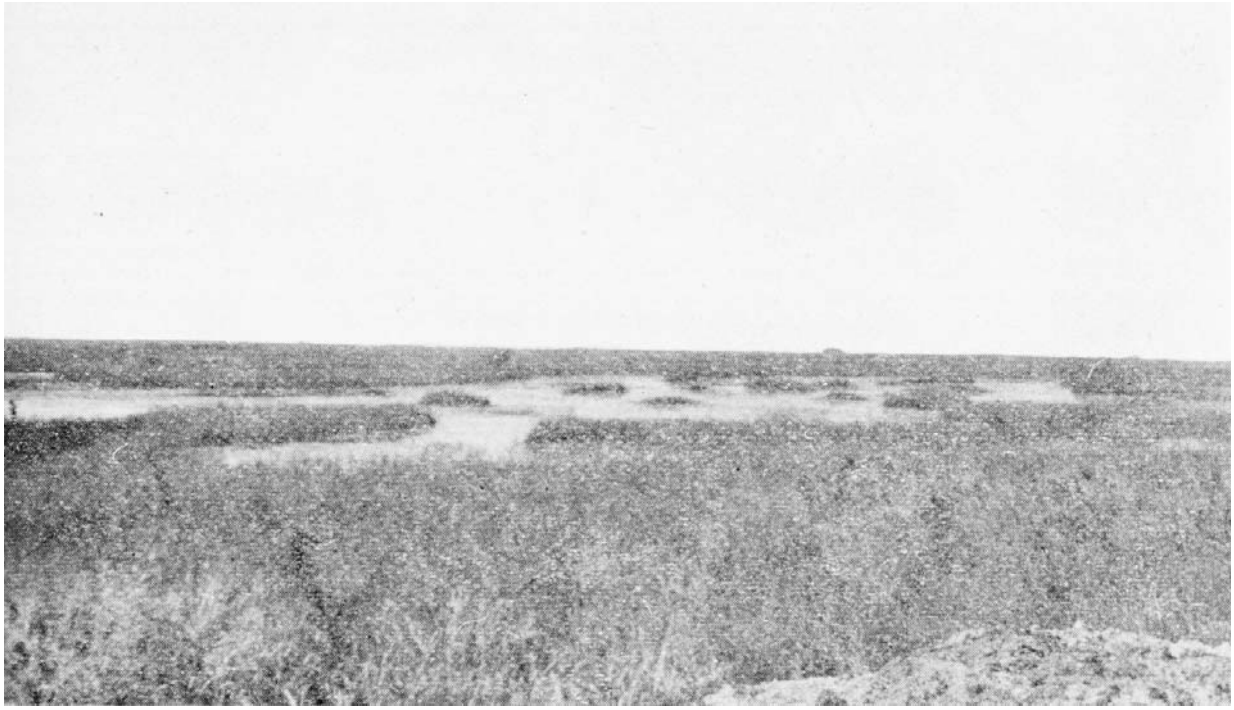


Figure 4.15 Ridge and Slough landscape, west of Fort Lauderdale, ca. 1911. Sawgrass ridges (dark gray) with distinct edges rise above open water of the sloughs (light gray). Location is likely T 50, R40 or R41. Landscape pattern appears to be similar to **Plates 23, 24, 25 , and 27**, taken further south. Photo by H. Gunther taken from dredge "Okeechobee." Reproduced from Sellards (1912).

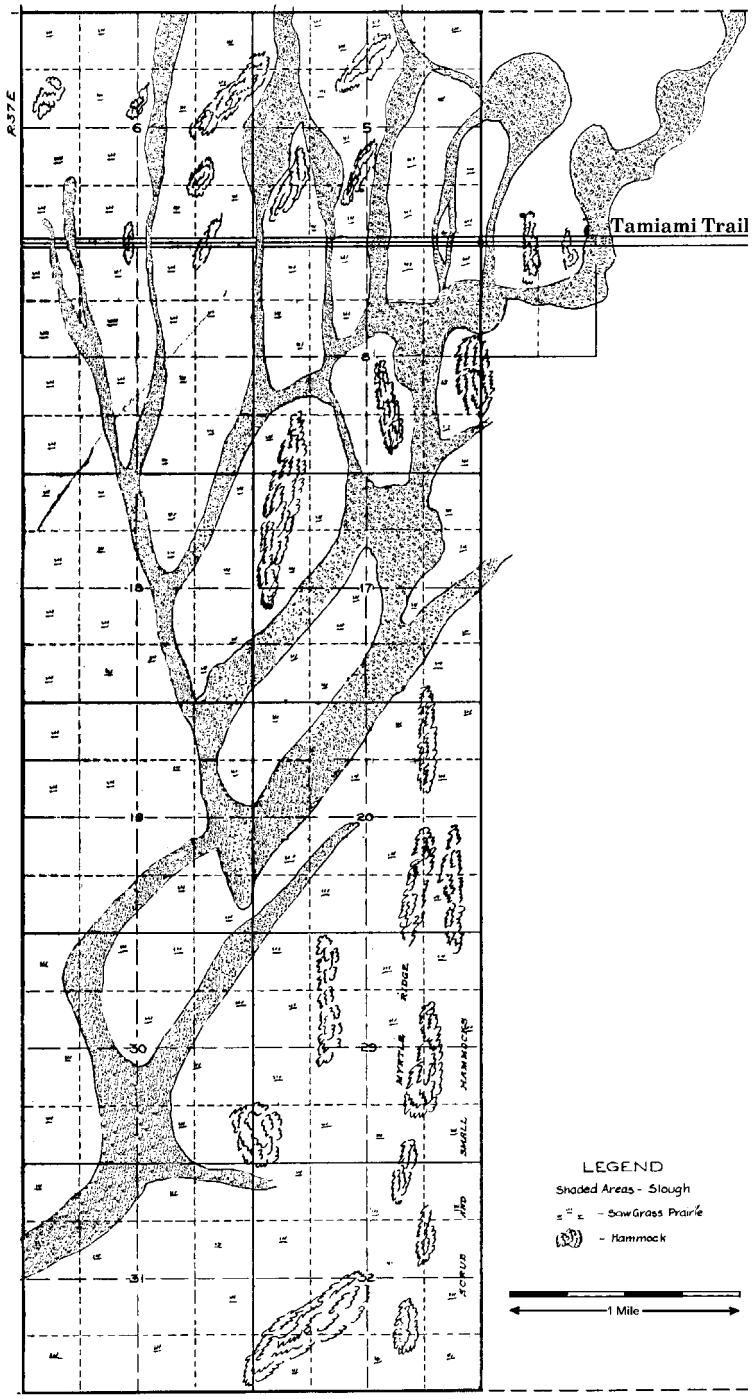


Figure 4.16 Plan view of 12 square mile portion of the Ridge and Slough landscape, 1917. NE Shark Slough area (T 53-54, R 37). Map elements correspond to sloughs, sawgrass ridges, and strand tree islands ("hammocks"). Dimensions approximate and overall orientation most likely inaccurate (see later, more accurate map by King, **Figure 2.8**), but pattern is representative. Drawn by John King for Miami developer Capt. F. Jaudon. (King 1917e).

Figure 4.17 Brown Fibrous Peat. The light, fibrous or felty character and corky texture of the Brown fibrous peat, representative of hundreds of square miles of the Everglades, can be seen in this illustration." (Baldwin and Hawker 1915, Plate V). In 1915, Brown fibrous peat was mapped across both the Ridge and Slough, as well as the Sawgrass Plains landscapes, from within a few miles south of Lake Okeechobee to a few miles west of the head of the New River. The separation into two different soils, Everglades and Loxahatchee Peats (Jones et al. 1948), did not occur until 1930-1940, when drainage had already oxidized the Brown fibrous peat of the Sawgrass Plains area (c.f. **Figure 3.19**).

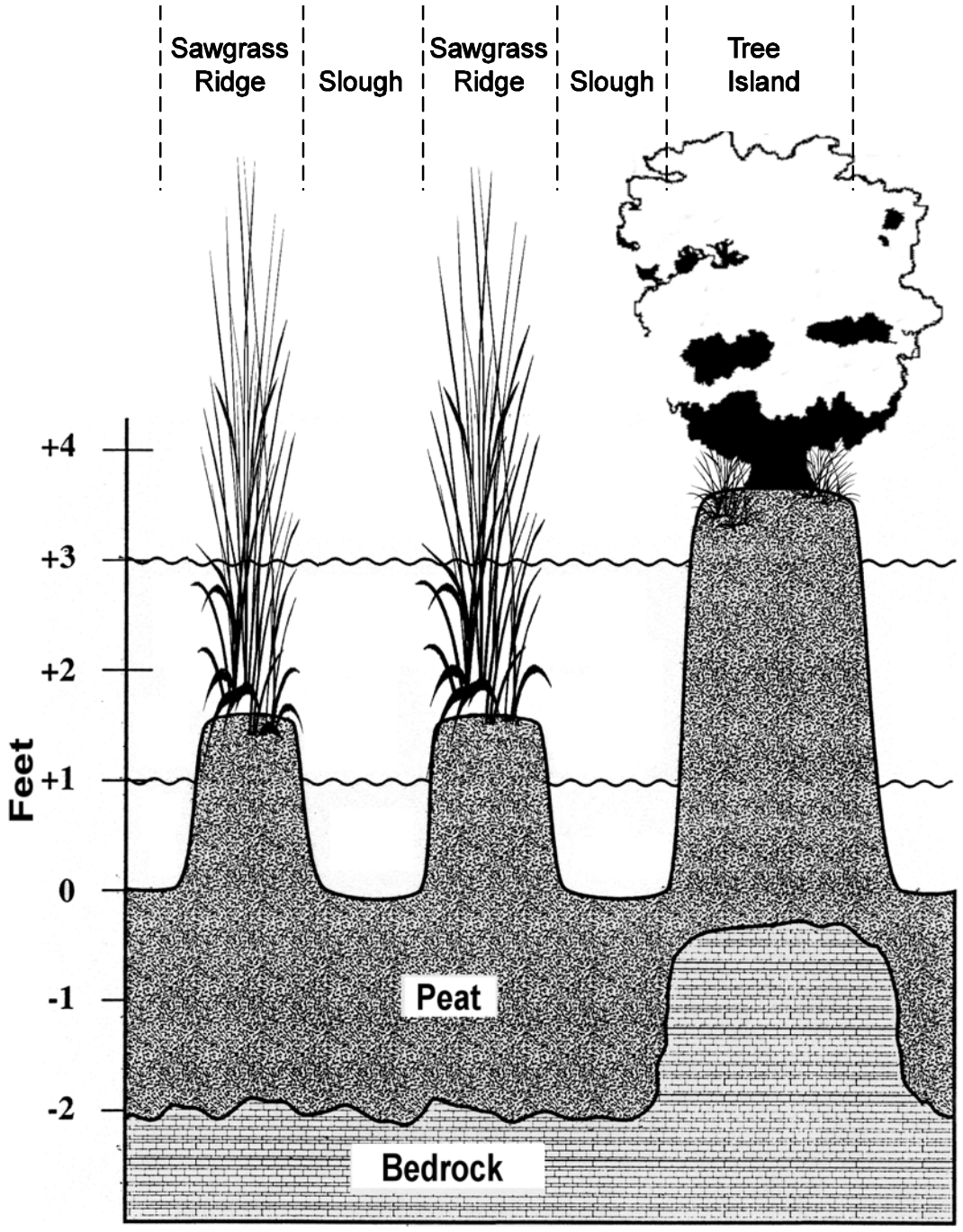


Figure 4.18 Estimated pre-drainage cross-section from the Ridge and Slough landscape. Dimensions based on **Table 4.3.** Vertical scale exaggerated for display-vegetation not to scale.

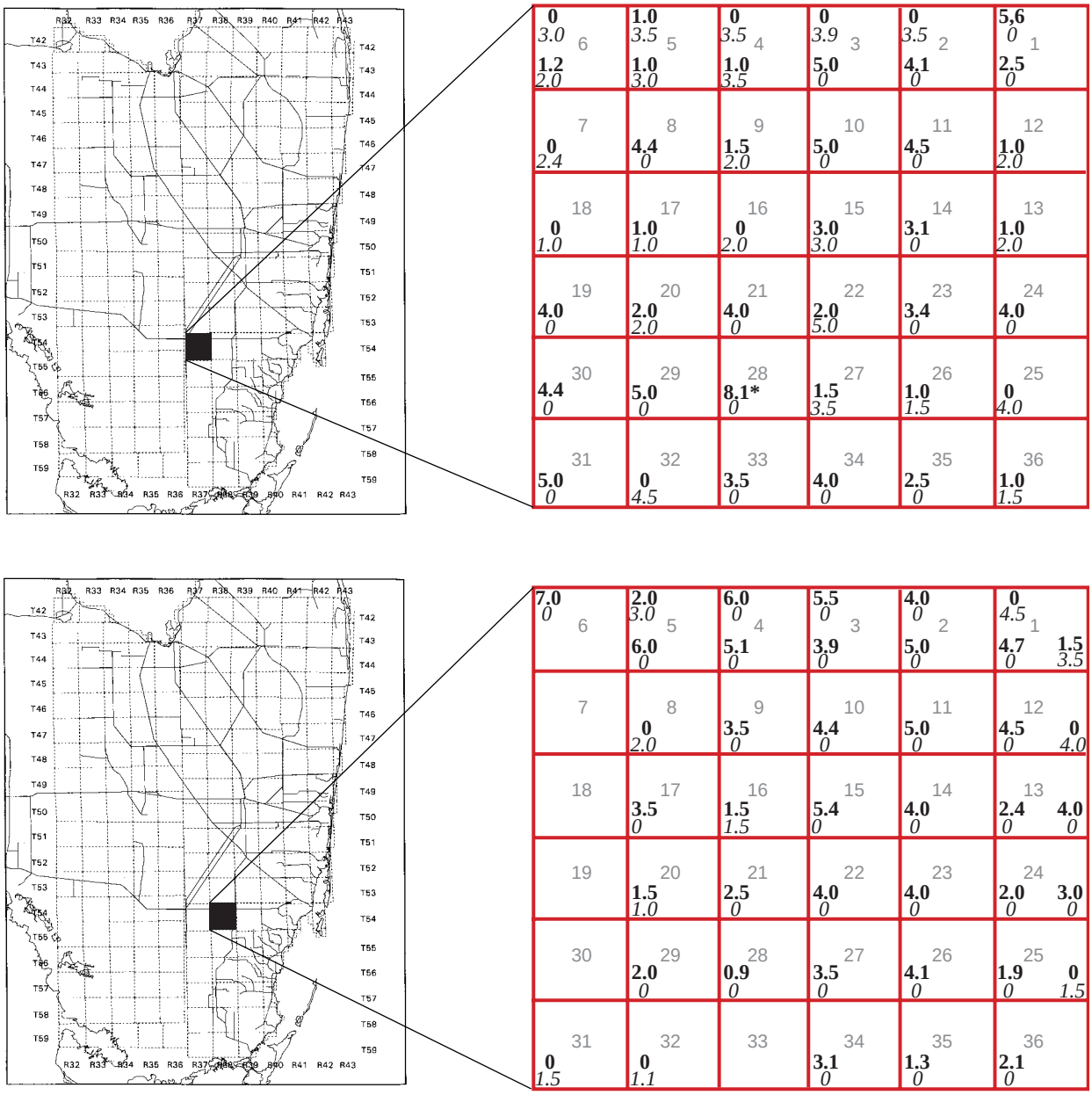


Figure. 4.19 Thickness of peat ("muck;" upper bold number; feet) and marl soil (lower italic no.; ft) within Shark Slough portion of the Ridge and Slough landscape, (present day "Northeast Shark Slough"). Measured in 1918 at section corners of Townships 54, Range 37 (top) and T 54, R 38 (bottom). Both townships near original center of Shark Slough, with T 57, R 37 possibly somewhat closer to the Ochopee Marl Marsh. See text for discussion of marl, peat balance. Comparison with **Figure 3.11** suggests subsidence of roughly 1 foot between 1918 and 1940. Note very thick peat soil (8.1 feet) on tree island in SW corner of Section 28, T 57 R 37. Labeled in 1918 field notes as "dense hammock."

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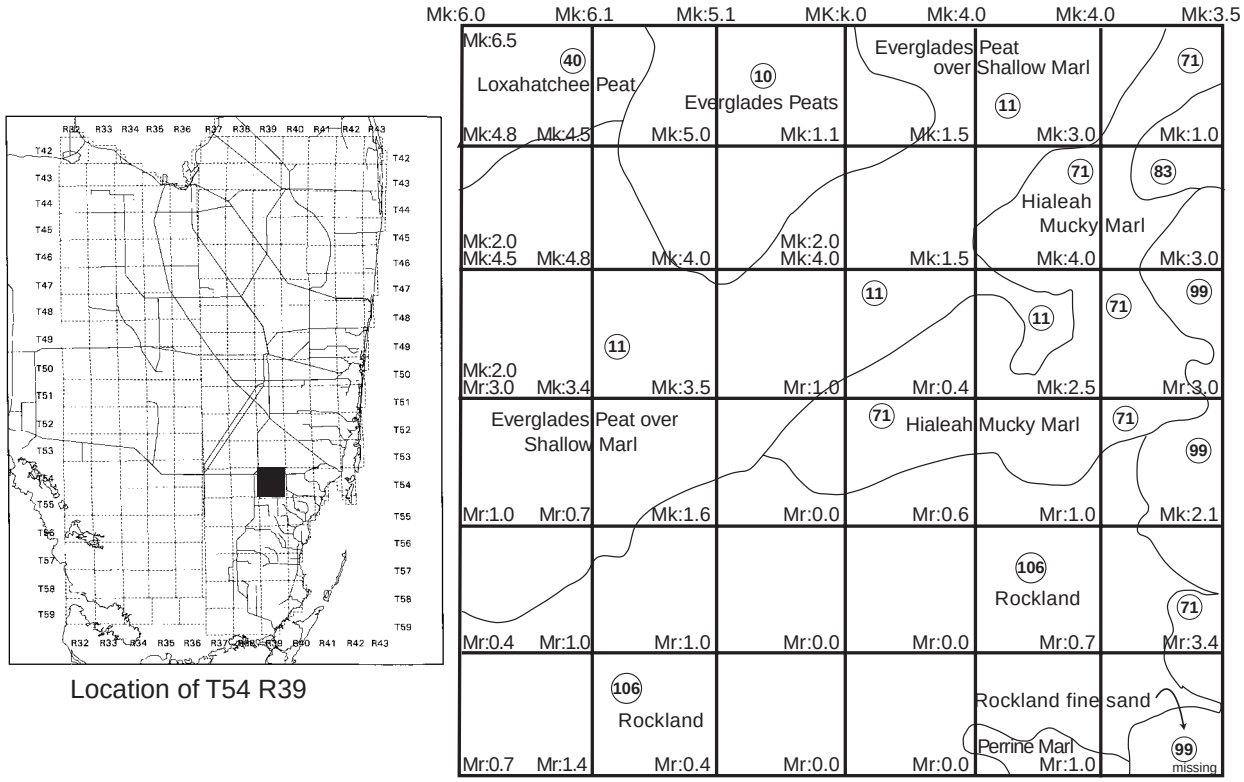

Figure 4.20 Substrate of Rockland Marl Marsh (south; soil type 106) and adjoining Ridge and Slough landscapes (north; soil types 10, 11, 40, and 71), measured 1918 in Township 54 Range 39. Soil depths ("Mk"=Muck=Peat; "Mr."=Marl) in feet. Peat thins from 5-6 feet deep in NW corner to zero in southern third of township, where shallow marl replaces muck. Comparison of soil depths with **Figure 3.11** suggests generally low subsidence (0-1 feet) in this township. Willoughby (1896) found sufficient water in late January to pass swiftly across the Ridge and Slough portion of this township (section 30 to section 1). His route here and in T55 R38 support the concept of the Rockland Marl Marsh as floodplain (**Figure 4.3**), with navigable water in the wet season. Soil depths from Southern Engineering (1918-T54 R39); polygons from Jones et al. (1948).

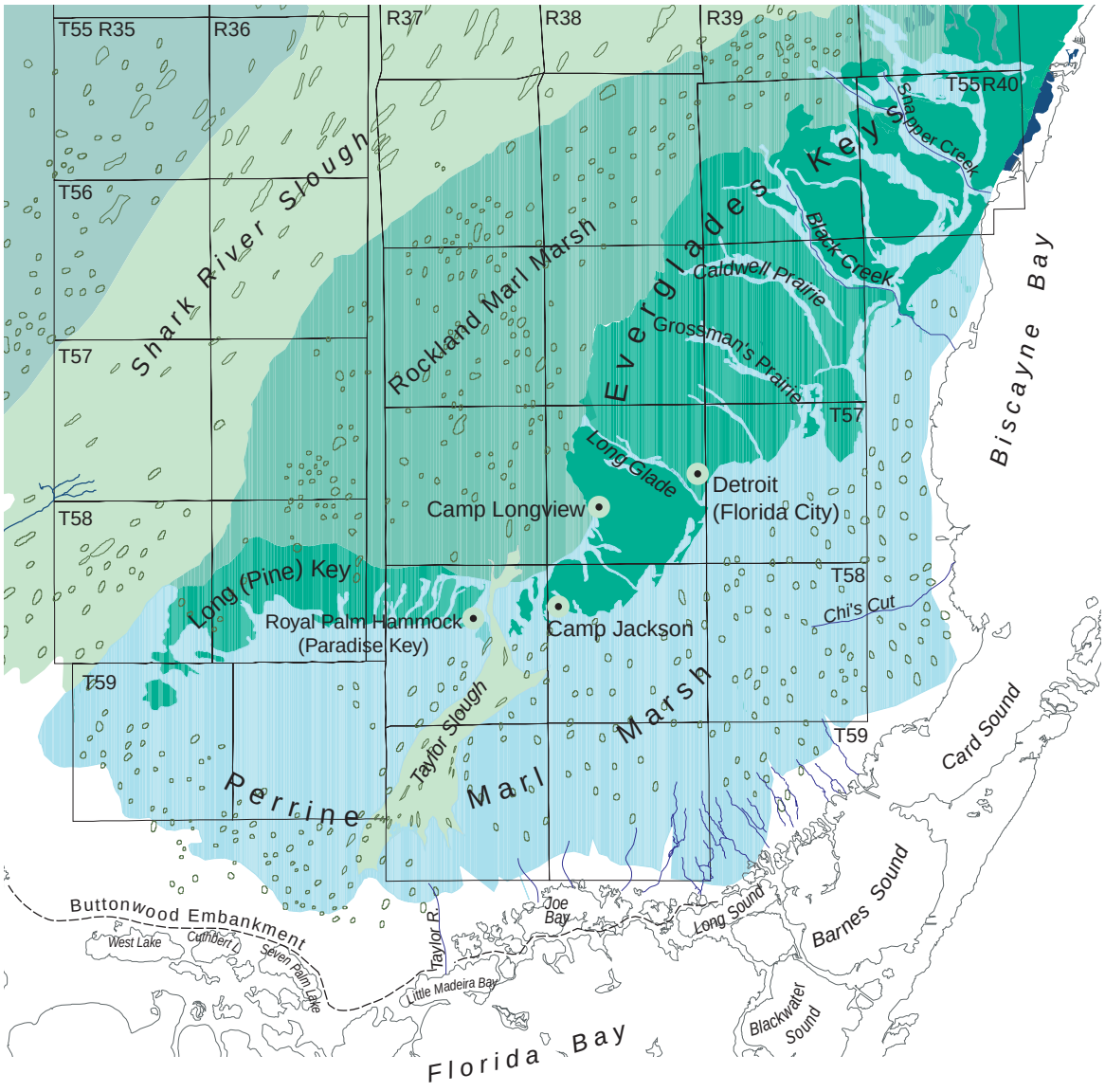

Figure 4.21 Perrine Marl Marsh landscape with township range grid overlay and reference features. Buttonwood emabankment location adapted from Craighead (1964). Shaded polygons represent estimated landscape boundaries from this study.

Figure 4.22 Everglade prairie with diminutive pond cypress. Photographed near Royal Palm Hammock, Florida. December 1919. Source: Florida Photographic Collection, J.K. Small Collection, courtesy of Florida State Archives.

Figure 4.23 Prairie and small hammocks. Photographed southwest of Royal Palm Hammock, Dade County, Florida. 1919. Source: Florida Photographic Collection, J.K. Small Collection, courtesy of Florida State Archives.

Figure 4.24 Everglade prairie. Diminutive mangroves in foreground and a hammock with *Paurotis wrightii* in the background. .Photographed near Royal Palm Hammock, Florida, December 1919. Source: Florida Photographic Collection, J.K. Small Collection, courtesy of Florida State Archives

Figure 4.25 A few young stalks of saw-grass (foreground), the dominant plant of the Everglades. Photographed 11 miles southwest of Royal Palm Hammock, Dade County, Florida. May 1918. Source: Florida Photographic Collection, J.K. Small Collection, courtesy of Florida State Archives

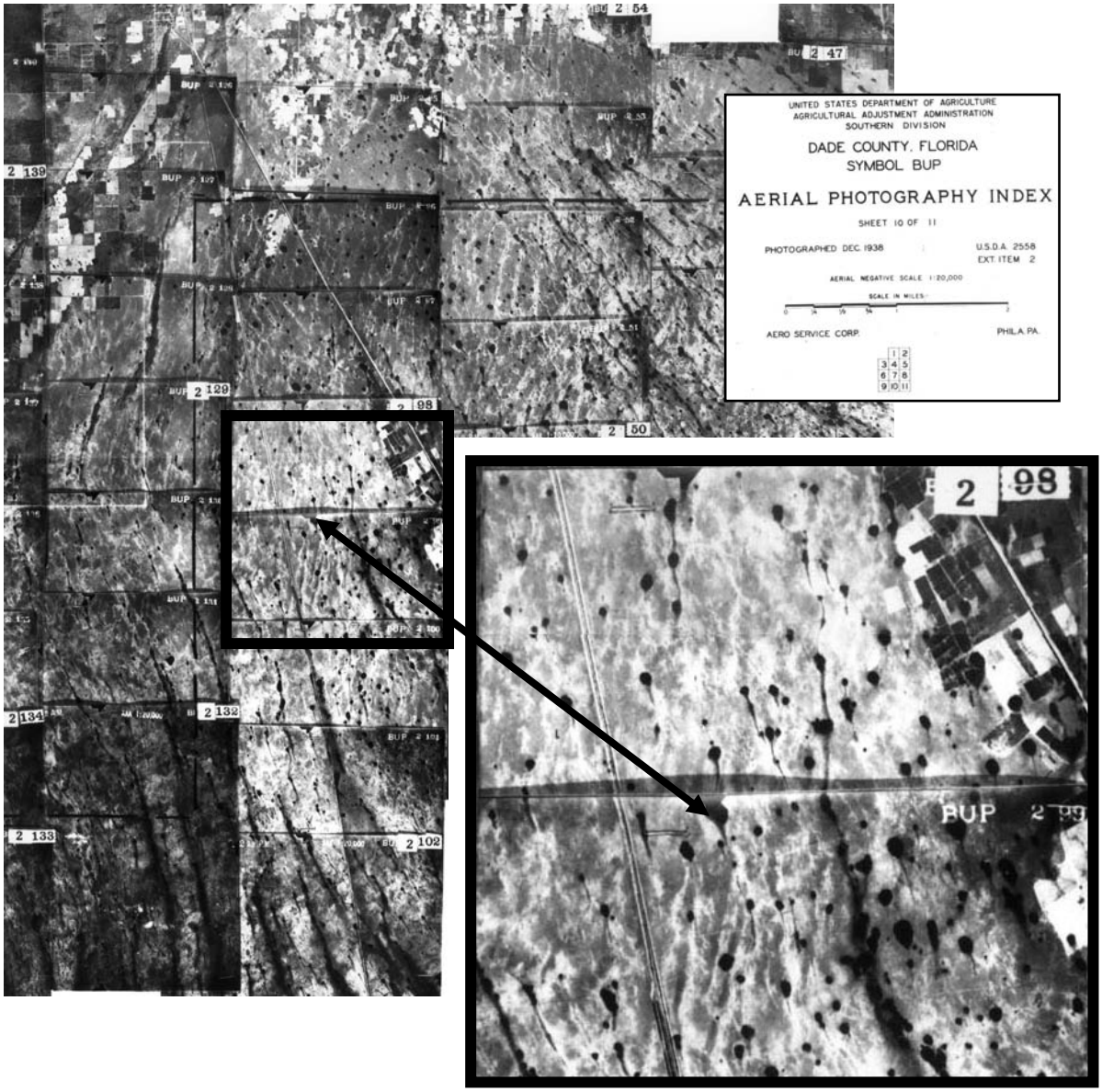

Figure 4.26 Aerial photomosaic of portion of the Perrine Marl Marsh showing directionality and distinct tree island shape. U.S. Dept. Agric., A. A. A., So. 1938. Aerial photography Index of Dade County, Symbol BUP.

Figure 4.27 "Cypress swamp and marsh vegetation with open lagoons covered with water lilies, August 11, 1911, west of West Palm Beach. Original." Photograph taken within the Eastern Flatwoods area, prior to formation of the Lake Worth Drainage District. Together with the West Palm Beach Canal, this District lowered regional water tables by ca. six feet (Austin et al. 1977). Source: From Harshberger (1914). Used by permission of the Wagner Free Institute of Science, Philadelphia, PA.

Figure 4.28 Little River in the 1890s. An expedition by canoe in January 1841 described a trip upstream: "After passing up the bay seven miles, they entered the mouth of Little River, a tortuous and extremely rapid outlet from the Everglades, where they struggled against the current until after midnight, when they reached their first resting-place-the site of an old plantation-where they landed." (Brooks 1880). Non-native coconut trees indicate a place of settlement. Photograph by Ralph M. Munroe. Source: Used by permission of the South Florida Historical Association.

Figure 4.29 Arch Creek in the 1890s. “The most romantic scene of all was the view from the natural bridge looking up the creek as it continued on to the Everglades, two miles beyond.” (Parks 1977). In 1858, Mr. George Lewis and Mr. Robert Fletcher spent a year attempting to construct a water-powered coontie mill using a ditch diverted from Arch Creek (Dietrich 1987). MacKay and Blake (1839) indicate “Rapids” at the head of Arch Creek. Photograph by Ralph M. Munroe. Used by permission of the South Florida Historical Association.

Figure 4.30 A Marl Transverse Glade in the Everglades Keys. "Transverse marl prairie bordered on both sides by tall pine forest [Everglades Keys] near Princeton, Fla. August 18, 1911. Original." Vegetation in glade still appears to be sawgrass in water, as it was 60 years earlier (Jackson 1847-T56 R39). From Harshberger (1914); Princeton was in section 23, Township 56 Range 39. Photo probably from section 10, T56 R39. Used by permission of the Wagner Free Institute of Science, Philadelphia, PA.

Figure 4.31 Vegetation of the Everglades Keys. “Pine forest of Pinus caribaea, saw-palmettos and coontie, one mile west of Miami, December 27, 1910. Original.” Note exposed limestone rock. Within the pine forest were also a number of dense tropical hammocks. From Harshberger (1914). Used by permission of the Wagner Free Institute of Science, Philadelphia, PA.

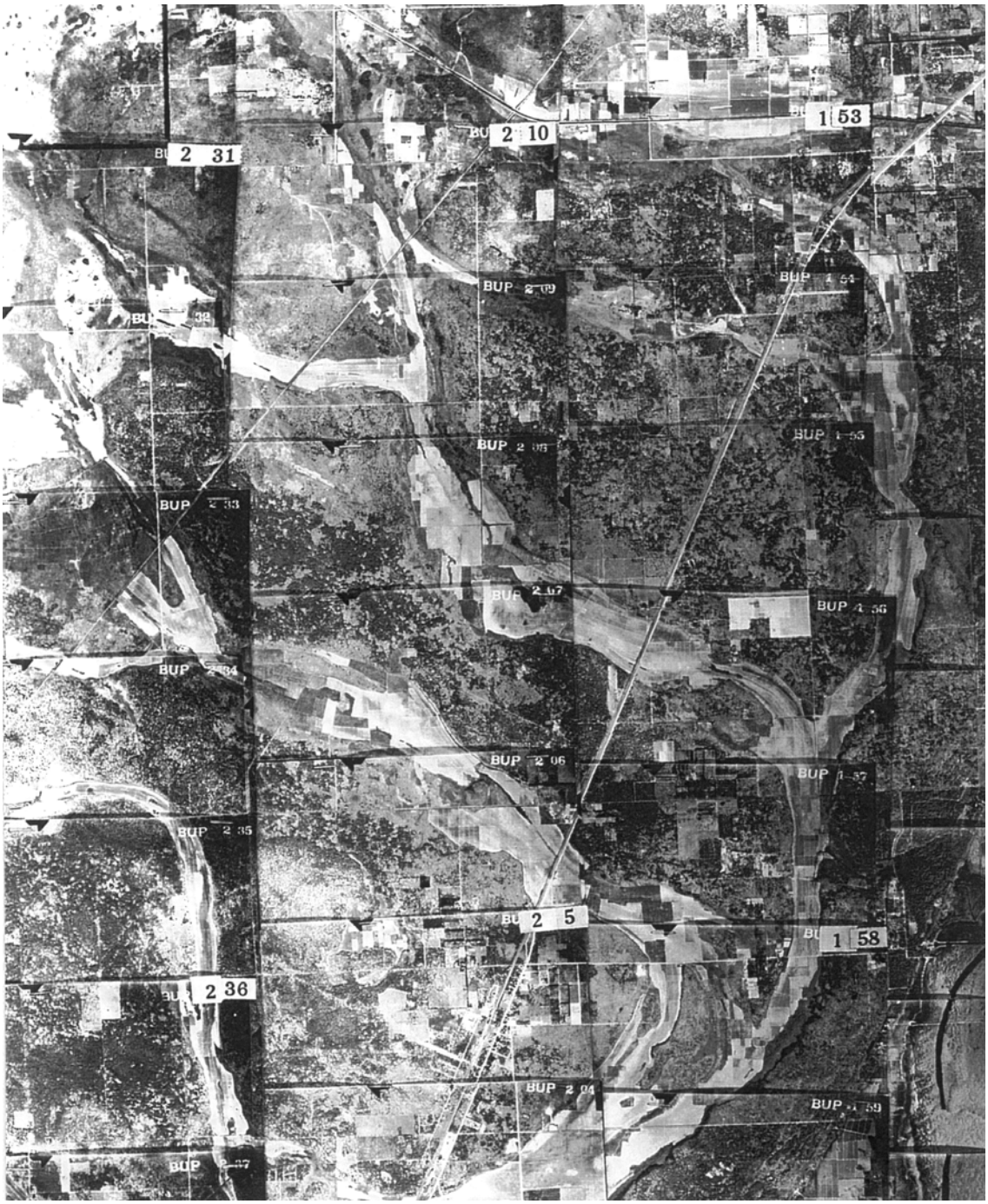

Figure 4.32 Aerial photomosaic of Marl Transverse Glades (lighter; divided into agricultural fields) separating the individual Everglades Keys (higher, darker ground with pine forest), 1938. C.f. Figs. 4.34 [4CG] and 4.35 [4P]. Elevation of most of the Marl Transverse Glades was about 8 feet above sea level, with a slightly higher ledge behind the headwaters (Pl. 16). Prior to anthropogenic lowering of Everglade water levels, water in the Marl Transverse Glades would rise sufficiently each year to support vegetation described as "wet sawgrass prairies" or "Sawgrass ponds."

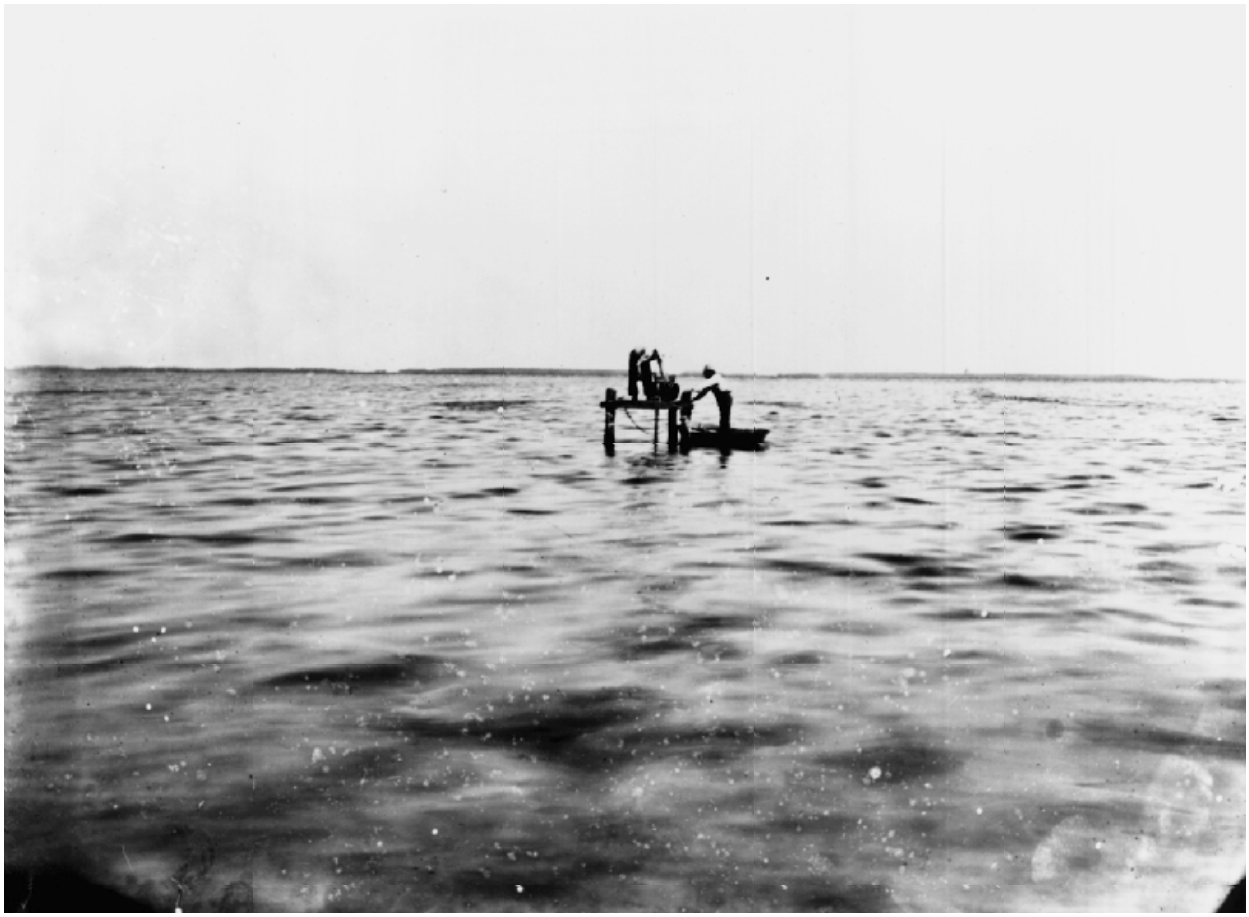

Figure 4.33 An offshore freshwater spring in Biscayne Bay. The platform and hand pump were installed sometime after 1871. “The abundant spring water off the shore, while organically pure, and beautifully clear and tasteless, was somewhat hard ...” (Munroe 1930, p. 118, p. 218). “All the [many freshwater springs in this part of South Florida] disappeared in the early twentieth century when the draining of the Everglades lowered the water table.” (Parks 1977). Photograph by Ralph M. Munroe. Used by permission of the South Florida Historical Association.

Figure 4.34 "Deep slough in the Everglades east of Royal Palm Hammock. One of several sloughs that have preserved the hammock from the prairie fires of the Everglades. This channel is seldom perfectly dry. It supports a dense growth of yellow water-lily, pickerel-weed, and maiden-cane. It, like similar places in the vicinity, is a rendezvous for the native amphibians in the dry season. Its edges are fringed with saw-grass, common-reed, and small hammocks of low trees and shrubs." Caption from Royal Palm Hammock Small, John Kunkel, 1869-1938. Reclaiming the Everglades. 8 p. Photographed east of Royal Palm Hammock, Florida. February 1916. Source: Florida Photographic Collection, J.K. Small Collection, courtesy of Florida State Archives.