APPENDIX E— PHYSIOGRAPHY OF THE LAKE BUTLER CHAIN VOLUSIA COUNTY, FLORIDA

PHYSIOGRAPHY

The physiography of Florida, as described by Brooks (1981), is broken up into districts and subdivisions based on soil taxonomy, geological structure of native rocks, geomorphic processes, and topography. Districts and subdivisions tend to have defining vegetative communities distinctive to each subdivision. Lake Butler is in the Crescent City-Deland Ridge subdivision of the Central Lakes District. Characteristics of the Central Lake District include undulating surficial sand depth overlying the Floridan Aquifer along with areas of rapid hydraulic conductivity caused by sinkhole formation connecting lakes to the aquifer system (Brooks, 1981).

The Crescent City-Deland Ridge subdivision is defined by thick sand soils with Plio-Pliostocene sand deposits of 80-100 ft thickness (Brooks, 1981). Typical soil series found within the ridge are Astatula and Candler. Unimpacted vegetation consists of longleaf pine, xerophytic oak forests, and sand pine scrub forests. Lakes of the Crescent City-Deland Ridge have clear, acidic, oligotrophic to ombrotrophic, low mineral content water (Griffith et al., 1997). Lake stage in the Crescent City-Deltona Ridge is largely influenced by connectivity to the aquifer (Brooks, 1981), making these systems potential sentinels for groundwater withdrawal and candidates for development of minimum flows and levels (Dunn et al, 2006).

SANDHILL LAKE SOILS

The high stage variability and transient wetland communities found in sandhill lakes lead to a lack of organic soils, soil organic matter, and inconsistent delineation of some hydric soil indictors. Much work has been done on attempting to correlate soil indicators with lake stage for MFL's determination on sandhill lakes (Kizza and Richardson, 2007; Richardson, 2006; Ellis, 2002; Jones Edmunds, 2006; Hurt et al., unpublished). The efficacy of using hydric indicators, other than organic soil, as MFL criteria is unsubstantiated. Using soil derived minimum average, frequent low, and frequent highs on sandhill lakes may not protect from significant harm. Out of 20 studied sandhill lakes only 2 had soil indicators present at the minimum average position (Hurt et al., unpublished data). The identification of soil indicators to locate the frequent high and frequent low was also "problematic" according to Hurt et al. (unpublished data) due to inconsistent results in pine-dominated communities and seepage slopes. While identification of soil morphology and hydric indicators is important to preserve these systems, additional metrics must be used to determine MFLs on sandhill lakes.

LITHOLOGY

The Lake Butler Chain's initial lithostratigraphic unit is the late Tertiary-late Pliocene Cypresshead Formation (Scott, 2001; Figure 1). The exposure of the Cypresshead formation in Deltona sits within the Penholoway Terrace (Figure 2). The Penholoway Terrace lays within an area high elevation relative to its boundaries. Most of Volusia County's lakes sit in this terrace. The lithology of the Penholoway Terrace (Figure 3) fosters groundwater recharge and sinkhole formation, with a thin layer of sand overlaying punctured limestone.

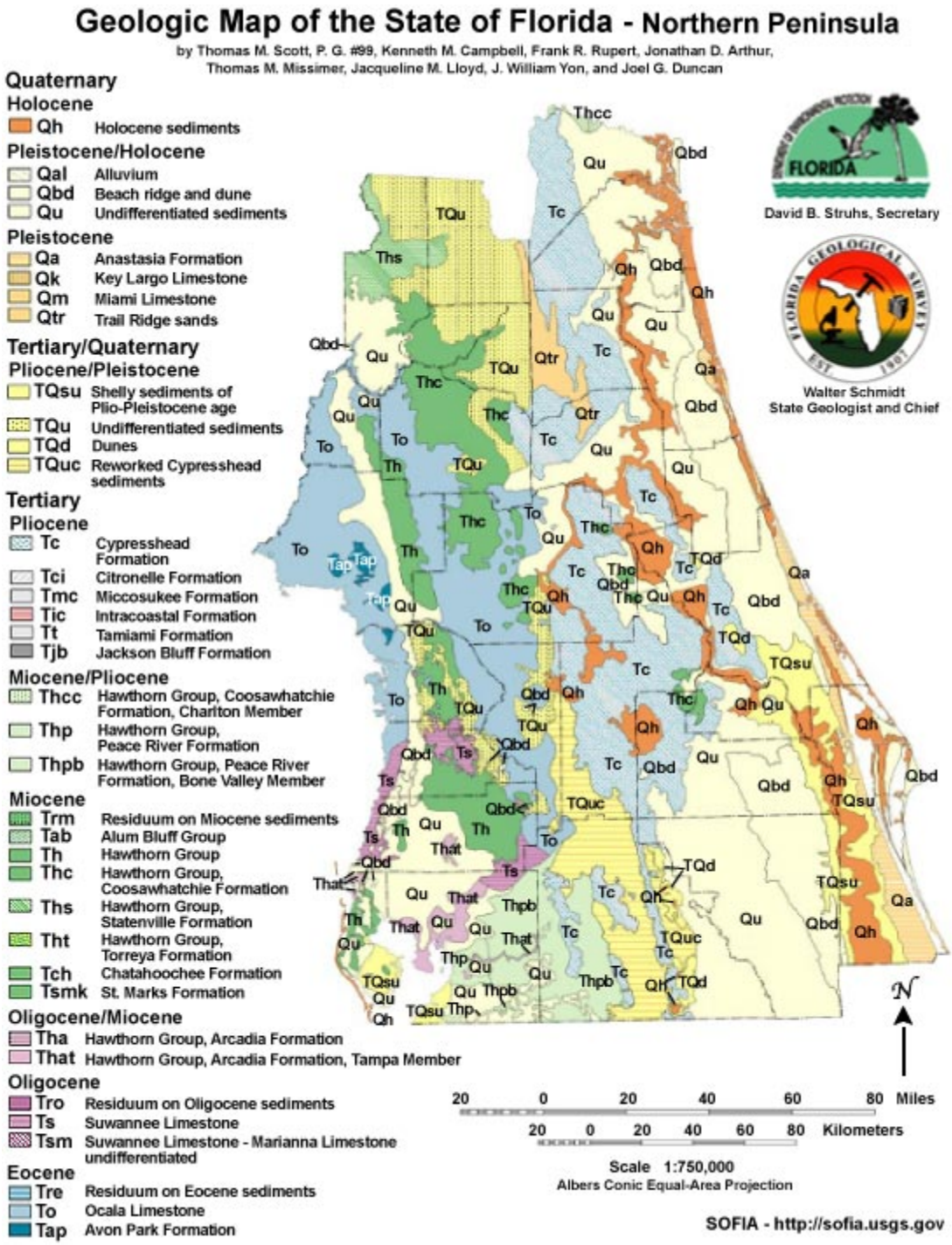

Figure 1. Surface layers found in the state of Florida (Scott, 2001).

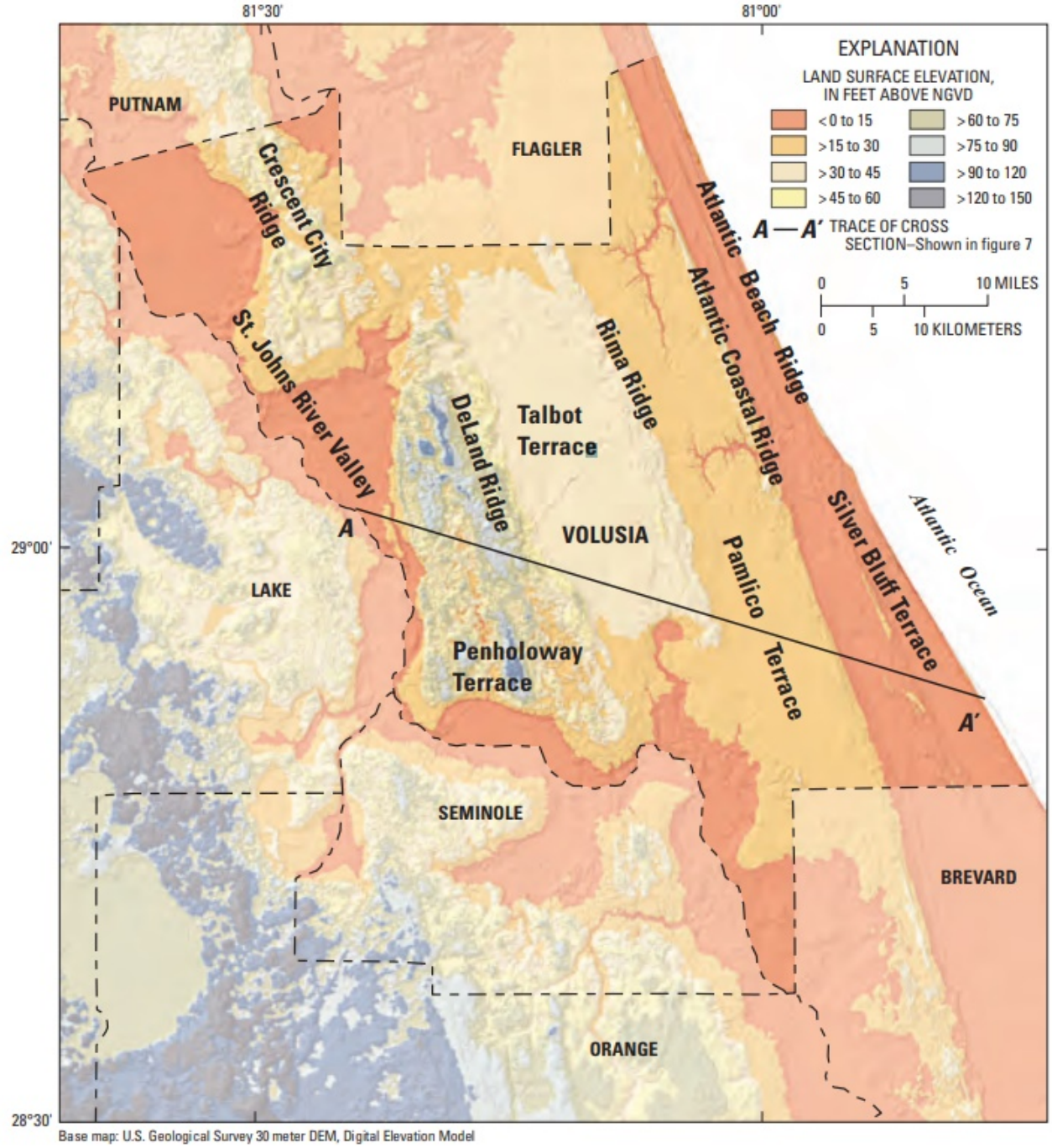

Figure 2. Land surface elevations and locations of physiographic features within Volusia County (German, 2009).

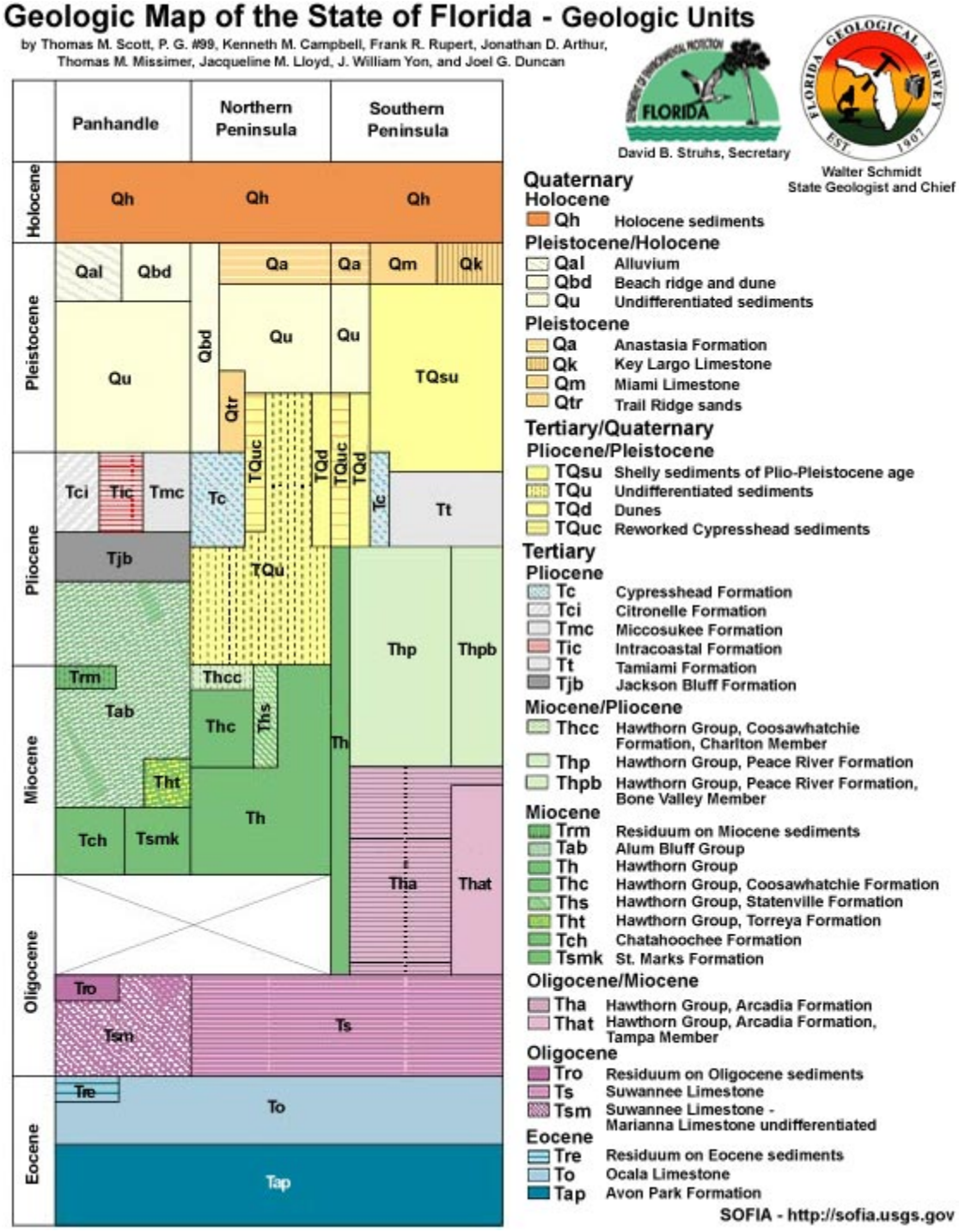

Figure 3 Lithography of the state of Florida (Scott, 2001).

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