U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with
ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
SOUTH FLORIDA WATER MANAGEMENT DISTRICT
SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

SCIENTIFIC INVESTIGATIONS MAP 3091

Sandra L. Kinnaman and Joann F. Dixon, 2009, Potentiometric surface of the Upper Floridan aquifer in the St. Johns River Water Management District and vicinity, Florida, May 2009

INTRODUCTION

This map depicts the potentiometric surface of the Upper Floridan aquifer in the St. Johns River Water Management District and vicinity for May 2009. Potentiometric contours are based on water-level measurements collected at 625 wells during the period May 14 – May 29, near the end of the dry season. Some contours are inferred from previous potentiometric-surface maps with larger well networks. The potentiometric surface of the carbonate Upper Floridan aquifer responds mainly to rainfall, and more locally, to ground-water withdrawals and spring flow. Potentiometric-surface highs generally correspond to topographic highs where the aquifer is recharged. Springs and areas of diffuse upward leakage naturally discharge water from the aquifer and are most prevalent along the St. Johns River. Areas of discharge are reflected by depressions in the potentiometric surface. Ground-water withdrawals locally have lowered the potentiometric surface. Ground water in the Upper Floridan aquifer generally flows from potentiometric highs to potentiometric lows in a direction perpendicular to the contours.

SUMMARY OF HYDROLOGIC CONDITIONS

Measured values of the potentiometric surface ranged from 8 feet below NGVD29 near Fernandina Beach, Florida, to 124 feet above NGVD29 in Polk County, Florida. The average water level of the network in May 2009 was about 4 feet lower than the average in September 2008 following below-average rainfall during the dry season of 2008-09. Seasonal differences in network average water levels generally range from 4 to 6 feet. For 575 wells with previous measurements, May 2009 levels ranged from about 19 feet below to about 10 feet above September 2008 water levels.

The observed near-average seasonal difference following such an extreme dry season could be the result of reduced pumping, and subsequent rebounding of the potentiometric surface, in response to a widespread and record setting rainfall event (May 18 – 22, 2009). During the time that the majority of water levels were measured, most of the study area received at least 4 inches of rainfall with 8-12 inches of rain falling across most of east-central and northeast Florida. Nearly 20 inches of rain was recorded at Daytona Beach. Prior to that event, rainfall deficits across the study area ranged from 20-80% below the 30-year average.

The average water level of the network in May 2009 was less than 1 foot higher than the average in May 2008. Water-levels in east-central and northeast Florida were about the same or higher than those measured in May 2008, whereas the water levels in west-central Florida tended to be lower (Figure 1). For 480 wells with previous measurements, May 2008 levels ranged from about 8 feet below to about 17 feet above May 2008 water levels.

ADDITIONAL REFERENCE

Long-term hydrographs of ground-water levels for continuous and periodic wells are available at internet site: http://waterdata.usgs.gov/fl/nwis/gw

EXPLANATION

50 — POTENTIOMETRIC CONTOUR -- Shows altitude at which water level would have stood in tightly cased wells. Hatchures indicate depressions. Contour intervals 10 feet. Vertical datum is NGVD29. Dashed where inferred

STATE WATER MANAGEMENT DISTRICT BOUNDARY
SJRWMD -- St. Johns River Water Management District
SRWMD -- Suwannee River Water Management District
SFWMD -- South Florida Water Management District
SWFWMD -- Southwest Florida Water Management District

37 — SURVEYED WELL WITH KNOWN OPEN-HOLE INTERVAL -- Measuring-point datum is referenced to benchmark datum. Number is altitude of water level in feet above or below NGVD29

31 — SURVEYED WELL WITH UNKNOWN OPEN-HOLE INTERVAL -- Measuring-point datum is referenced to benchmark datum. Number is altitude of water level in feet above or below NGVD29

40 — UNSURVEYED WELL WITH KNOWN OPEN-HOLE INTERVAL -- Measuring-point datum is estimated from topographic map. Number is altitude of water level in feet above or below NGVD29

38 — UNSURVEYED WELL WITH UNKNOWN OPEN-HOLE INTERVAL -- Measuring-point datum is estimated from topographic map. Number is altitude of water level in feet above or below NGVD29

SPRING -- Line indicates direction of spring outflow

FLOWING BOREHOLE

42 — SINKHOLE -- Surface collapse feature exposing the Upper Floridan aquifer. Where measured, number is altitude of water level in feet above NGVD29

NOTE: The potentiometric contours are generalized on a regional scale to portray water levels in a dynamic hydrolgic system taking due account of the variations in hydrogeologic conditions such as well-depth differences, non-simultaneous measurements of water levels, variable effects of pumping, and changing climatic infulence. The potentiometric contours, thus, may not conform exactly with individual measurements of water level.

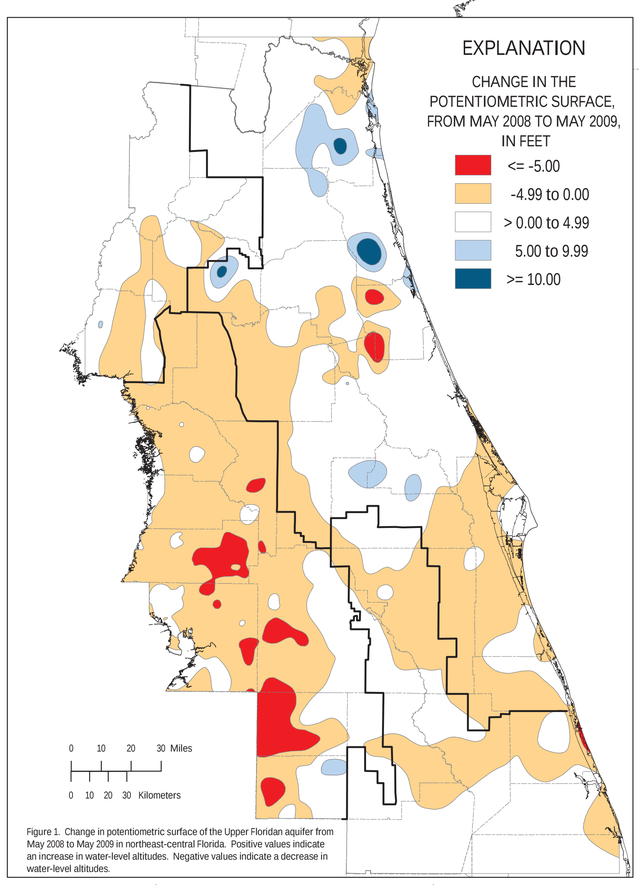
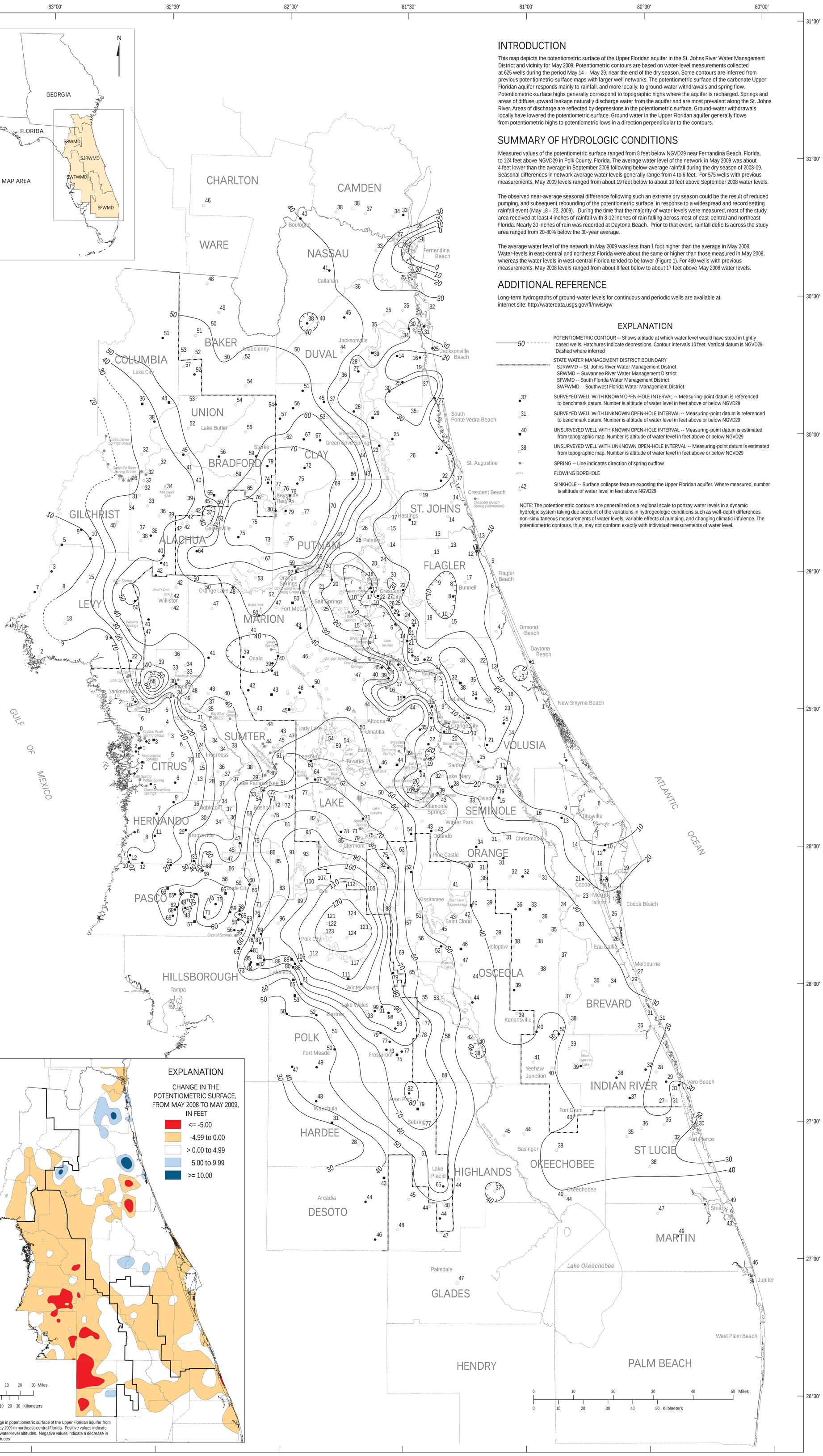


Figure 1. Change in potentiometric surface of the Upper Floridan aquifer from May 2008 to May 2009 in northeast-central Florida. Positive values indicate an increase in water-level altitudes. Negative values indicate a decrease in water-level altitudes.



Base from U.S. Geological Survey digital data, 1:100,000, 1983
State Plane Florida East projection, NAD 1983

POTENTIOMETRIC SURFACE OF THE UPPER FLORIDAN AQUIFER IN THE ST. JOHNS RIVER WATER MANAGEMENT DISTRICT AND VICINITY, FLORIDA, MAY 2009

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This report is available online at
http://infotrek.er.usgs.gov/pubs/