DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with the
SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

OPEN-FILE REPORT 88-303

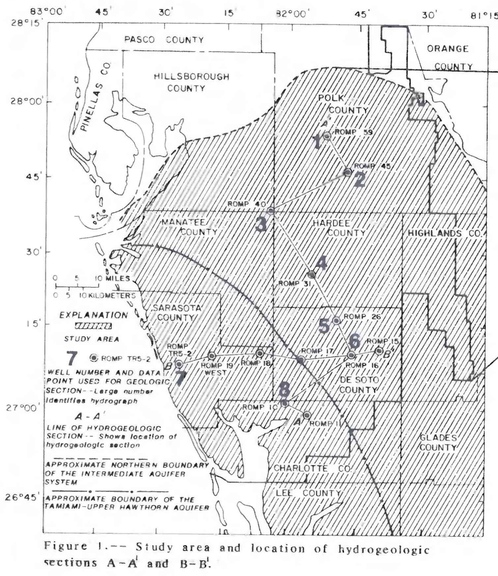


Figure 1.-- Study area and location of hydrogeologic sections A-A' and B-B'.

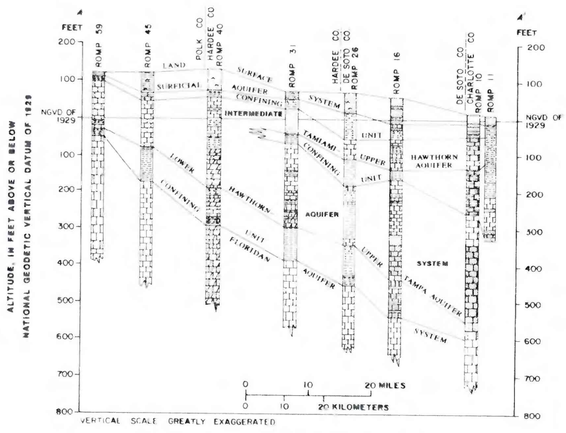


Figure 2.-- Generalized hydrogeologic section A-A'. (For line of section, see figure 1.)

EXPLANATION (FIGURES 2 AND 4)

SAND | SANDY CLAY | CALCAREOUS CLAY
SHELL | LIMESTONE | CLAYEY LIMESTONE
CLAY | SANDY LIMESTONE | DOLOMITE
DOLOMITIC LIMESTONE

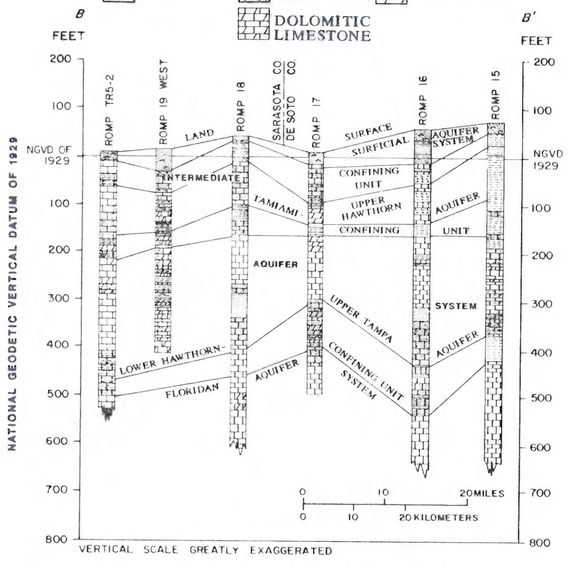


Figure 4.-- Generalized hydrogeologic section B-B'. (For line of section, see figure 1.)

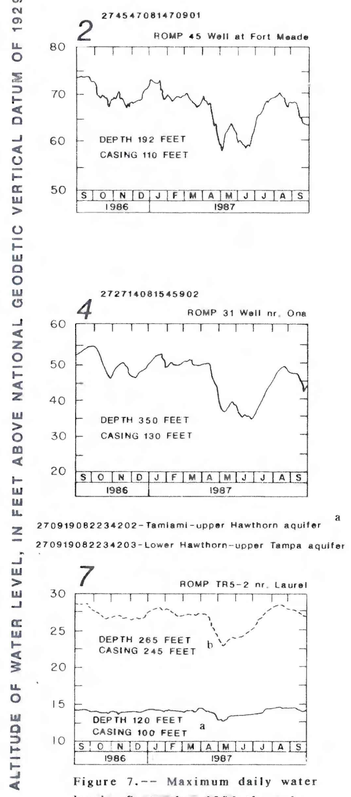


Figure 7.-- Maximum daily water levels, September 1986 through September 1987.

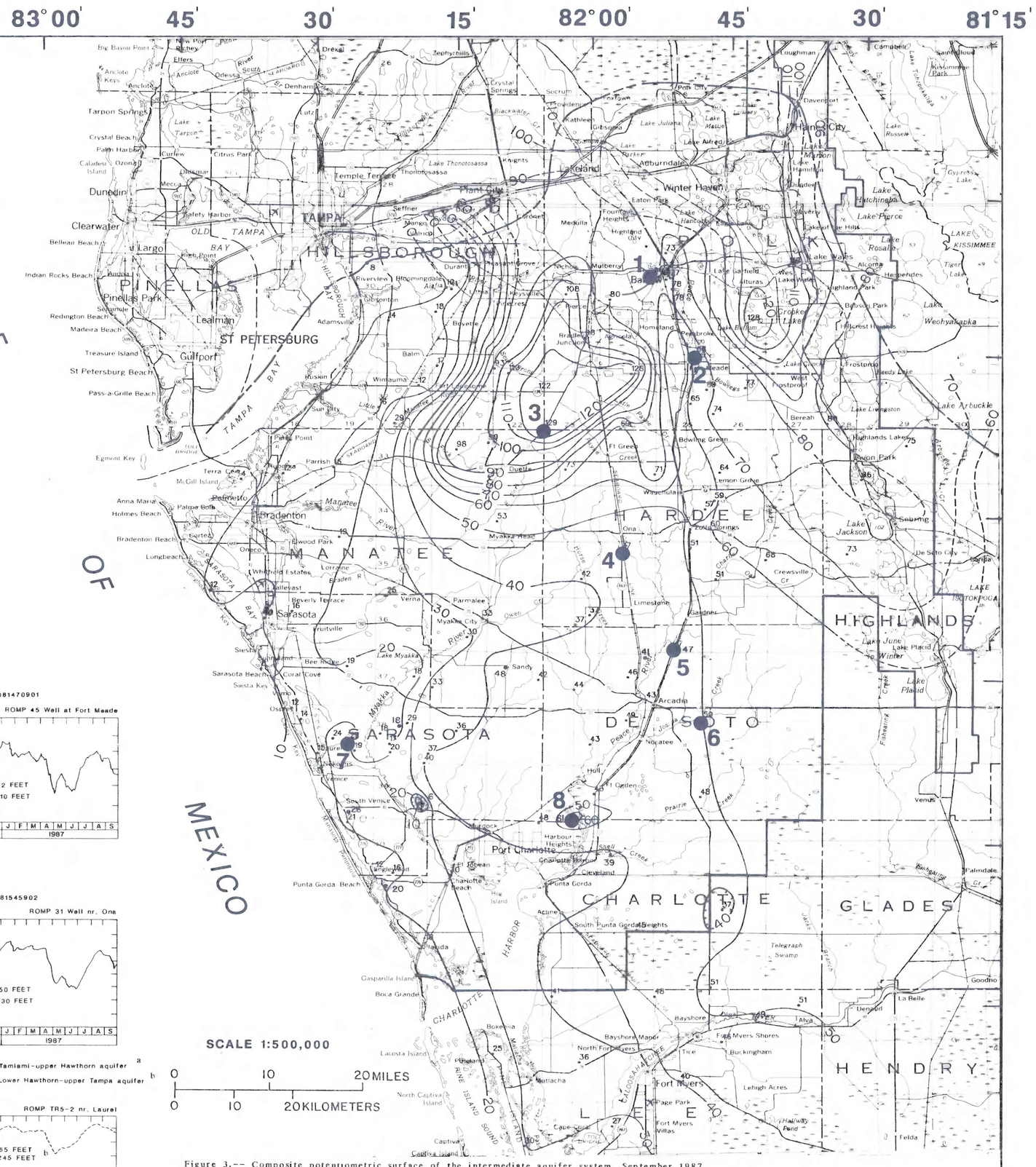


Figure 3.-- Composite potentiometric surface of the intermediate aquifer system, September 1987

EXPLANATION (FIGURES 3 AND 5)

—20— POTENTIOMETRIC CONTOUR--Shows altitude at which water level would have stood in tightly cased wells. Contour interval 5 and 10 feet. National Geodetic Vertical Datum of 1929 (NGVD of 1929). Dashed where approximate

5 ● 47 / 41 OBSERVATION WELLS FOR FIGURE 3--Large number and large closed circle identifies hydrograph. Small number with either large or small closed circle shows altitude of water level in feet above NGVD of 1929

7 ○ 13 / ● 14 OBSERVATION WELLS FOR FIGURE 5--The open circle represents wells that are drilled and open exclusively to the Tamiami-upper Hawthorn aquifer. Large number with the open circle identifies hydrograph, and small number shows altitude of water level in feet above NGVD of 1929

BOUNDARY OF THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

APPROXIMATE NORTHERN BOUNDARY OF THE INTERMEDIATE AQUIFER SYSTEM (FIGURE 3)

APPROXIMATE NORTHERN BOUNDARY OF THE TAMIAMI-UPPER HAWTHORN AQUIFER (FIGURE 5)

NOTE: The potentiometric contours are generalized to portray synoptically the head in a dynamic hydrologic system taking due account of the variations in hydrogeologic conditions such as differing depths of wells, nonsimultaneous measurements of water levels, variable effects of pumping, and changing climatic influence. The potentiometric contours thus may not conform exactly with individual measurements of water level

INTRODUCTION

The intermediate aquifer system within the Southwest Florida Water Management District underlies a 5,000-mi² area of De Soto, Sarasota, Hardee, Manatee, and parts of Charlotte, Hillsborough, Highlands, and Polk Counties (fig. 1). The intermediate aquifer system occurs between the overlying surficial aquifer system and the underlying Floridan aquifer system (fig. 2) and consists of layers of sand, shell, clay, calcareous clays, limestone, and dolomite of the Tamiami, Hawthorn, and Tampa Formations of late Tertiary age. The intermediate aquifer system contains one or more water-bearing units separated by discontinuous confining units. This aquifer system is the principal source of potable water in the southwestern part of the study area and is widely used as a source of water in other parts where wells are open to the intermediate aquifer system or to both the intermediate and Floridan aquifer systems. Yields of individual wells open to the intermediate aquifer system range from a few gallons to several hundred gallons per minute. The volumes of water withdrawn from the intermediate aquifer system is considerably less than that withdrawn from the Floridan aquifer system in the study area (Duerr and others, in press).

The purpose of this report is to show the potentiometric surface of the intermediate aquifer system in September 1987. The potentiometric surface is an imaginary potential surface represented by the level to which water will rise in tightly cased wells that tap the aquifer system. The surface is mapped by determining the altitude of water levels in a network of wells and is represented on maps by contours that connect points of equal altitude. The composite potentiometric surface of all water-bearing units within the intermediate aquifer system is shown in figure 3. In areas where multiple aquifers exist, wells open to all aquifers were selected for water-level measurements whenever possible. The water levels along the northern boundary of the intermediate aquifer system generally reflect levels similar to those of the underlying Floridan aquifer system because of good hydrologic connection. In the southwestern and lower coastal region of the study area, Wolansky (1983) describes two aquifers with intervening confining units in the intermediate aquifer system: the Tamiami-upper Hawthorn aquifer and the underlying lower Hawthorn-upper Tampa aquifer (fig. 4). The potentiometric surface of the Tamiami-upper Hawthorn aquifer is shown in figure 5. Water levels are from wells drilled and open exclusively to that aquifer. The exact boundary for the Tamiami-upper Hawthorn aquifer is undetermined because of limited hydrogeologic data available from wells.

This report is one of an ongoing series of intermediate aquifer system potentiometric surface map reports made in the study area based on synoptic measurements by the U.S. Geological Survey in cooperation with the Southwest Florida Water Management District. Water-level data are collected twice annually, in May and September, to show the normally expected annual low and high water-level conditions, respectively. Most of the water-level data for this map were collected by the U.S. Geological Survey during the period of September 14-18. Supplemental data were collected by other agencies and companies. The maps show water-level conditions after the end of the summer rainy season when ground-water withdrawals are usually low and the potentiometric surface is near its highest level for the year.

SUMMARY OF HYDROGEOLOGIC CONDITIONS

The hydrographs for selected wells shown in figure 6 indicate that the annual and seasonal fluctuation of the water levels generally are large where water demand for irrigation is large in the central interior region (hydrographs 2, 4, 5, and 6) and smaller in the northern recharge areas (hydrograph 3) and the coastal areas (hydrographs 7 and 8) where water used predominantly for public supply is less. Daily maximum water levels for selected wells from September 1986 through September 1987 are shown in figure 7.

Water levels measured in September 1987 averaged about 3 feet higher than those measured in May 1987. Water levels increased about 5 feet or less along coastal and extreme southern regions and 1 to 14 feet in other areas. The largest increase in water levels occurred in Hardee County as a result of a reduction in heavy seasonal pumping, which allowed the aquifer to recover.

September 1987 water levels averaged about 2 feet lower than September 1986 levels. The decline was as much as 11 feet in some interior regions and about 2 feet or less in the coastal and extreme southern regions.

Water levels in wells in the Tamiami-upper Hawthorn aquifer are 2 to 38 feet lower than in wells open to the entire system. At hydrograph site 7 (figs. 1, 3, 5, 6, and 7), separate monitor wells are open to the Tamiami-upper Hawthorn aquifer and to the lower Hawthorn-upper Tampa aquifer. Water levels in the Tamiami-upper Hawthorn aquifer were 10 feet lower in May 1987 and 13 feet lower in September 1987 than in the lower Hawthorn-upper Tampa aquifer.

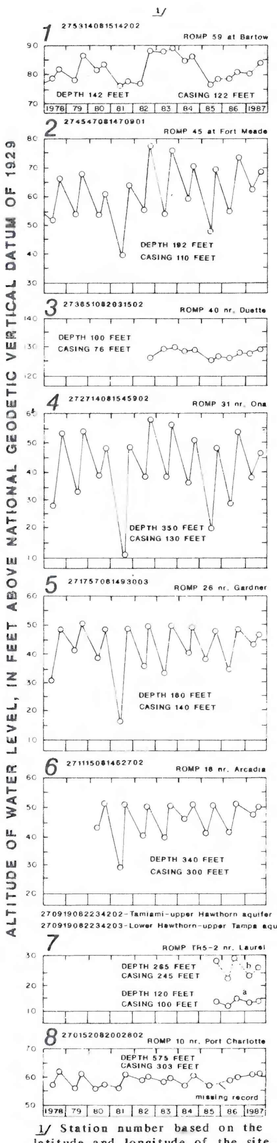
SELECTED REFERENCES

Duerr, A.D., Hunn, J.D., Lewelling, B.R., and Trommer, J.T., in press, Geohydrology and 1985 water withdrawals of the aquifer system in southwest Florida with emphasis on the intermediate aquifer system: U.S. Geological Survey Water-Resources Investigations Report 87-4259.

Lewelling, B.R., 1986, Potentiometric surface of the intermediate aquifer system, west-central Florida, September 1986: U.S. Geological Survey Open-File Report 87-35, 1 sheet.

------ 1987, Potentiometric surface of the intermediate aquifer system, west-central Florida, May 1987: U.S. Geological Survey Open-File Report 87-705, 1 sheet.

Wolansky, R.M., 1983, Hydrogeology of the Sarasota-Port Charlotte area, Florida: U.S. Geological Survey Water-Resources Investigations Report 82-4089, 48 p.



1/ Station number based on the latitude and longitude of the site.
Figure 6.-- Hydrographs showing May and September water levels in selected wells, 1978-1987

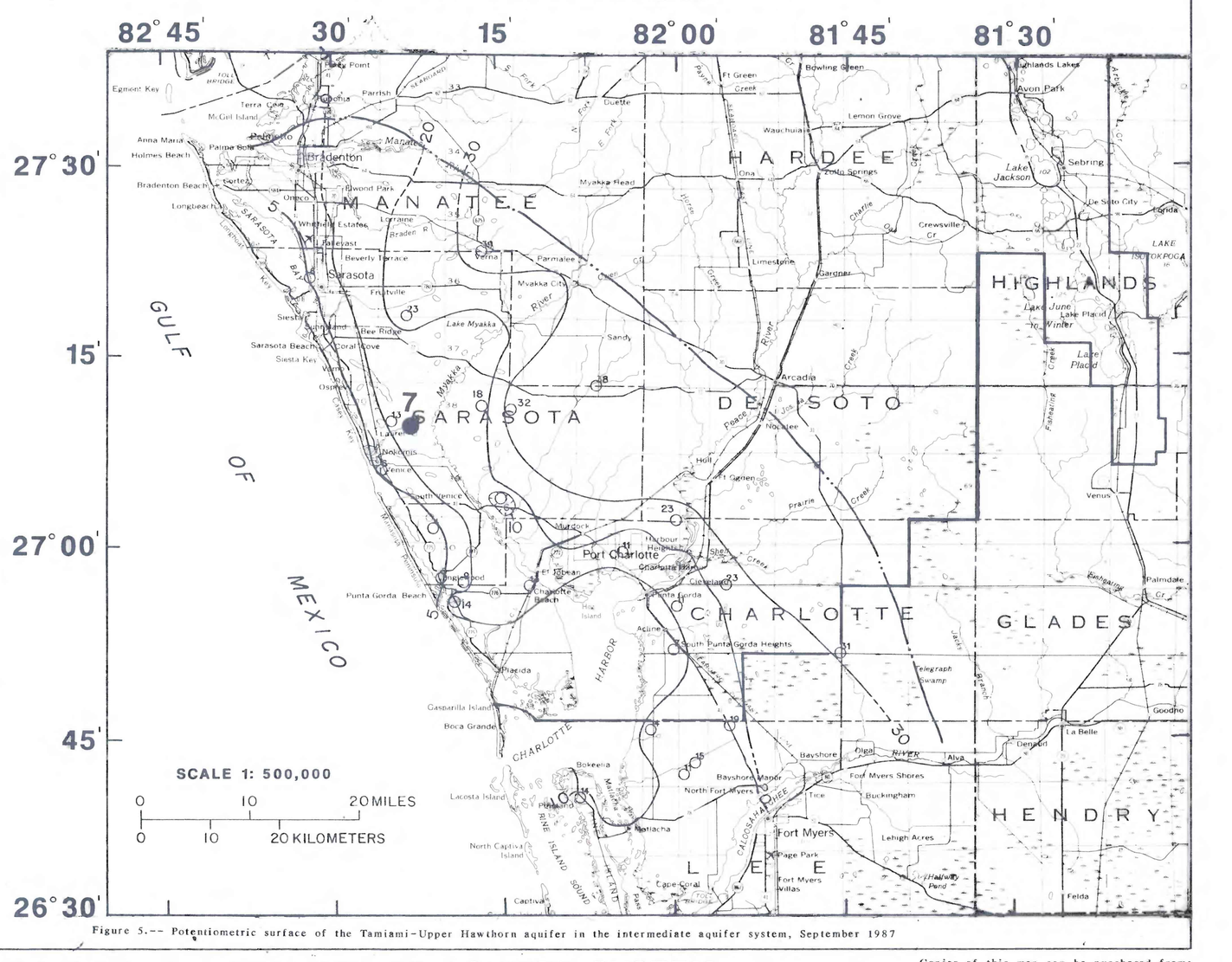


Figure 5.-- Potentiometric surface of the Tamiami-Upper Hawthorn aquifer in the intermediate aquifer system, September 1987

Base from U.S. Geological Survey
State of Florida Map 1967 1: 500,000

POTENTIOMETRIC SURFACE OF THE INTERMEDIATE AQUIFER SYSTEM, WEST-CENTRAL FLORIDA, SEPTEMBER 1987

By

B.R. Lewelling

1988

Copies of this map can be purchased from:
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