# Chapter 19

# Aquifers of West Texas Field Trip Guide

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## Stop 1: Sul Ross University Center Parking Lot—Start and End of the Field Trip

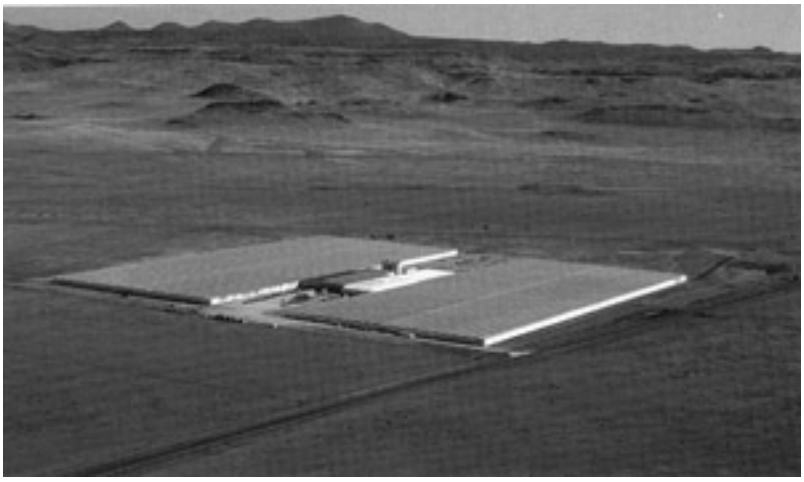
Sul Ross State University came into existence under authorization by act of the Thirty-Fifth Legislature in 1917 and was named for Lawrence Sullivan Ross, Texas governor from 1887 to 1891 (Tyler and others, 1996a). The university, originally established to train and certify teachers, currently offers a broad range of studies and promotes scientific research in biology, geology, and range animal science with emphasis on Chihuahuan Desert studies (Tyler and others, 1996a). For the 1999-2000 Fall and Spring semesters there were 4,157 enrollments and 115 faculty. The governing body is the Board of Regents of the Texas State University System. During fiscal year 1999, the university had $30.8 million in revenues and $29 million in expenditures (Sul Ross State University, 2000).

## Stop 2: Kokernot Springs–West Texas Springs: Igneous Aquifers

The Kokernot Springs, now dry, are located at the Kokernot Lodge inside the city limits of Alpine, Texas. The springs were originally known as Charo de Alsate, named after a powerful Apache war chief. Later the springs were called Burgess Springs or Burgess Water Hole after John Burgess, a cattle driver in the 1860's. The springs served as a water supply for countless generations of native peoples and later to many Spanish explorers, including de Vaca, de Espejo, and Mendoza.

In October of 1929, flow at Kokernot Springs was recorded at 222 gallons per minute (gpm) and later in 1947, at 396 gpm. As a result of well development in the Alpine area, the springs ceased to flow in 1950 (Brune, 1981).

## Stop 3: Village Farms–Commercial Application of Groundwater



This facility is one of several Village Farms greenhouses in Texas. This 41-acre greenhouse took 25 mo to develop and build, from ground breaking in March of 1996 to full-scale production in January of 1997 (Village Farms, 2001). The abundant wintertime light and cooler nighttime temperatures in the summer make this location ideal for greenhouse-tomato production.

There are nine wells associated with this Village Farms facility. The average well depth is 245 ft and the average well yield is about 200 gpm (Alan Standen, personal communication, 2001). Water usage was approximately 286 acre-ft/yr from three wells for 2000, according to Jeff Davis County UWCD (Janet Evans 2001, personal communication).

Some interesting facts about the Fort Davis Village Farms facility:

| | |
|---|---|
| ***Total Growing Area:*** | 41 acres (1,785,960 $ft^2$) |
| ***Packing and Support Facilities:*** | 76,230 $ft^2$ |
| ***Construction:*** | Aluminum, steel, and glass |
| ***BTU Capacity:*** | 96 million |
| ***Computer System:*** | Hoogendoorn Vitaco state-of-the-art system to control ventilation, shading, heating, fertigation, $CO_2$ levels, recirculation and pasteurization of nutrient feed |
| ***Number of Plants/Yield:*** | 416,000 plants, planted twice yearly, yield approximately 19 million pounds of tomatoes annually |
| ***Variety:*** | Beefsteak |

## Stop 4: Fort Davis National Park—West Texas Springs: Igneous Aquifers

The Fort Davis Spring is located on the southeast side of Fort Davis National Park. Nearby, crown-polished boulders indicate the use of the spring by early native peoples. The Spanish explorer Espejo stopped here in 1583 on his travels through West Texas (Brune, 1981). In the mid-1800's the area was known as Painted Comanche Camp because the Indians had painted pictures on many trees (Brune, 1981). From 1875 to 1883, the spring was used to supply drinking water to the fort. The men stationed at the fort suffered dysentery from unsanitary conditions that existed in the spring because, as the post surgeon Exra Woodruff stated, "it (the spring) is the resort of pigs…." A stonewall was erected around the spring to alleviate the water-quality problem. Sometime in the 1930's, the spring stopped flowing, possibly as a result of pumping in the vicinity of the fort.

There are approximately 141 springs that have been surveyed in the Davis Mountain area (Chastain-Howley, this volume), with an estimated spring flow of about 1.1 million gallons per day (Hart, 1992). While accurate numbers of springs and spring flow for historic times do not exist, current records show that spring flow has declined as groundwater development has increased in the area.

## Stop 5: Balmorhea State Park—West Texas Springs: Edwards-Trinity Aquifer

The springs at Balmorhea also have a long history of use by all peoples frequenting West Texas. The springs are still quite popular, and they form the main attraction at Balmorhea State Park, providing excellent swimming for visitors. San Solomon Spring is the largest of the springs in the Balmorhea area. Other significant springs include Phantom Lake and Giffin Springs. All are considered artesian and mildly thermal (20º-23º C) (Kreitler and Sharp, 1990). These springs are also home to a number of unique species, the Comanche Pupfish being one that relies on the special habitat of the springs and associated wetlands. Spring flow at San Solomon Spring has been consistent, but nearby springs, such as Phantom Lake, have seen a decline in flow over the past decade. Phantom Lake Spring does not currently flow.

## Stop 6: Clayton Draw—The Rustler Aquifer

The Rustler aquifer, composed of the Rustler Formation, was deposited in Permian times in the Delaware Basin and consists of mostly limestone, dolomite, and gypsum beds. Groundwater occurs in the very permeable solution zones within the upper portion of the formation. Most all groundwater from the Rustler is very high in dissolved solids concentrations and is therefore not potable for human consumption. Heavy pumping in the 1950's resulted in significant drops in water levels (Boghici, this volume). However, a subsequent decline in pumping has allowed water levels to rebound.

## Stop 7: Kent General Store—Rest Stop

The town of Kent was founded in 1892 and was originally known as Antelope because of the great numbers of antelope found in the area. A post office was founded there in 1893 with John Charles Rickli as postmaster (Tyler and others, 1996b). By 1914, the town had four cattle breeders, a general store, and a population of 25. From 1924 until 1965, the population approximately doubled (Tyler and others, 1996b). At its peak in the late 1960's, there were 4 businesses and a population of 65. Currently there is only one business in Kent, the Kent General Store. Feel free to buy something and make a contribution to the economy of Kent.

## Stop 8: Salt Basin—Salt Basin Aquifer

The Salt Basin in Texas extends from the New Mexico-Texas State border in Culberson County to a point about 10 miles west-northwest of Marfa Texas. It is 140 miles long and 25 miles across at its widest point. The basin is subdivided into the Salt, Wild Horse, and Michigan Flats in the north and Lobo and Ryan Flats in the south. Interstate Highway 10 happens to split the basin exactly in half. The freshest water in the Salt Basin is found in Lobo and Ryan Flats, where there may be as much as 4.6 million acre-ft of water available (Gates and others, 1980). Recharge to the Salt Basin is low because of the high evaporation rates and low rainfall rates (Gates and others, 1980). Recharge occurs along the basin margins and as cross-formational flow. Historically, water levels have dropped dramatically in response to heavy pumping, so the viability of this resource is limited.

## References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Kreitler, C. W., and Sharp, J. M., Jr., 1990, Hydrogeology of Trans-Pecos Texas: The University of Texas at Austin, Bureau of Economic Geology, Guidebook 25, 120 p.

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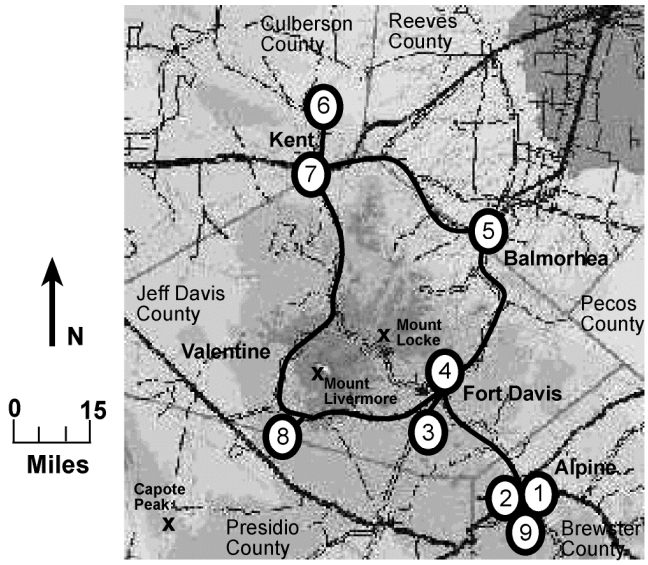
Village Farms, 2001, www.villagefarms.com.

# Aquifers of West Texas
# Field Trip Map




| Stop | Description | Arrive | Depart | Mileage |
|---|---|---|---|---|
| 1 | Sul Ross University Center<br>Introduction | 8:00 | 8:10 | 0 |
| 2 | Kokernot Lodge<br>Visit the Kokernot Spring and discuss spring history, hydrographs of nearby wells, and Igneous aquifer in the Alpine area. | 8:15 | 8:40 | .06 |
| 3 | Village Farms<br>Visit the Village Farms hydroponic tomato farm. | 9:15 | 10:45 | 27.8 |
| 4 | Fort Davis National Park<br>Visit the Fort Davis Spring and discuss spring history, hydrographs of nearby wells, and Igneous aquifer in the Fort Davis area. | 10:55 | 11:20 | 33 |
| 5 | Balmorhea State Park<br>Lunch break | 12:00 | 12:30 | 64.5 |
| | San Solomon Springs<br>Discuss San Solomon Springs, Giffin and Phantom Lake Springs, and Edwards Trinity aquifer. | 12:30 | 12:45 | |
| | Walk Spring Area | 12:45 | 1:00 | |
| 6 | Clayton Draw (end of RR 2424)<br>Observe Rustler outcrops and discuss regional groundwater flow regime. | 1:50 | 2:20 | 105.5 |
| 7 | Kent General Store<br>Rest break. | 2:35 | 3:00 | 119 |
| 8 | Salt Basin (midway on RR 505)<br>Observe southern portion of Salt Basin and discuss Salt Basin hydrogeology. | 4:00 | 4:25 | 167.7 |
| 9 | Sul Ross University Center<br>Concluding comments. | 5:30 | 5:45 | 223.1 |