INTRODUCTION

The geology of the lower Fresno Canyon area includes rock deposits that represent the diverse geological history of the Big Bend region. The rocks visible in the area span the time frame from Cretaceous to recent (~100 million years to present). The Cretaceous rocks were deposited during the last major marine transgression onto the North American continent, in a shallow inland sea that extended from Texas to Alaska.

These deposits are divided into two groups, an older group that represents the maximum of this transgression ("Comanchean" group) and a later group that represents a time when the sea was receding ("Gulfian" group). As the Cretaceous sea was receding, a major mountain building event referred to as the Laramide orogeny caused regional folding and faulting. This is the event that created the Rocky Mountains. Locally, this event uplifted the Cretaceous limestones and resulted in the deposition of coarse gravel deposits due to the erosion of the uplifted rocks. Volcanism from 48 million to 17 million years ago followed the Laramide orogeny. This volcanism occurred throughout what is now west Texas, and in the Fresno canyon area, the volcanic products include basalts, rhyolites and tuffaceous rocks. Associated with this volcanism was the intrusion of a large magma mass that uplifted the overlying rocks to form the Solitario dome and other smaller domes in the area.

Following the volcanism, the area experienced a period of deformation associated with crustal extension. During this period, strike slip faults and other structures developed small basins in the area. This faulting began as the volcanism was waning, and continues in an abated form to this day.

Our current terrain has developed through the modern evolution of the Rio Grande Basin and with contributions by natural landscape processes, especially erosion. In our area these drainages include Fresno, Contrabando and Commanche creeks. The landscape we observe today has been subjected to further modification through a myriad of anthropogenic episodes (land-uses) in addition to ongoing natural processes.

This guide briefly describes five locations in the Rincon Loop area that represent this diverse geologic history. The text is based upon the author's knowledge and Henry, 1998.

View west of Rincon Mountain and Arroyo Mexicano from stop 4. The mountain is capped with basalt. The rock debris in the foreground is peralkaline rhyolite from the mountain due south of this stop.

actual fragmentation of the lava as it hardened. One can see evidence of this in the boulders near the trail.

5 THE JEFF CONGLOMERATE

This stop is located in Fresno Creek. It is best accessed by walking up the creek 20 meters from where the trail enters the creek from the north. From here we can see Chisos strata to the east similar to what we saw at stop 3. A layer visible at the bottom of these rocks, and on top of the Cretaceous strata, is the Jeff conglomerate. This is a coarse gravel conglomerate composed of rounded limestone clasts (Comanchean series) and basalt that is a basal conglomerate for the Tertiary section of rocks in this area. The conglomerate formed as the result of erosion of the Terlingua uplift associated with the Laramide orogeny.

Henry, Christopher D. 1998. "Geology of Big Bend Ranch State Park, Texas." Guidebook - Bureau Of Economic Geology, University Of Texas At Austin.

TEXAS PARKS & WILDLIFE

PWD BR P4501-0152U (6/15)

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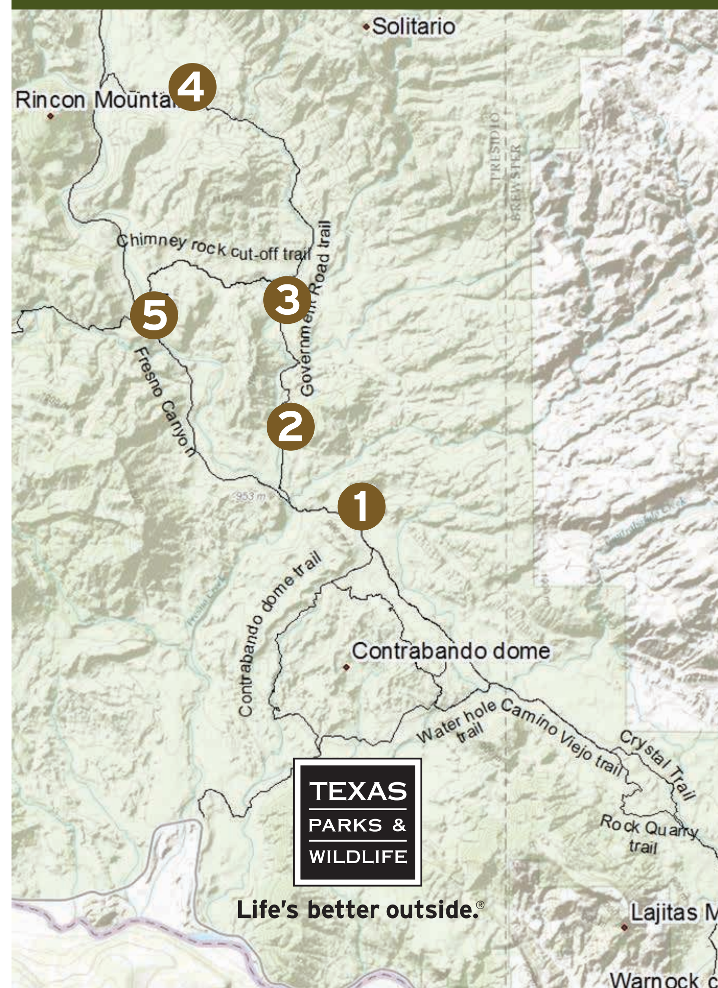
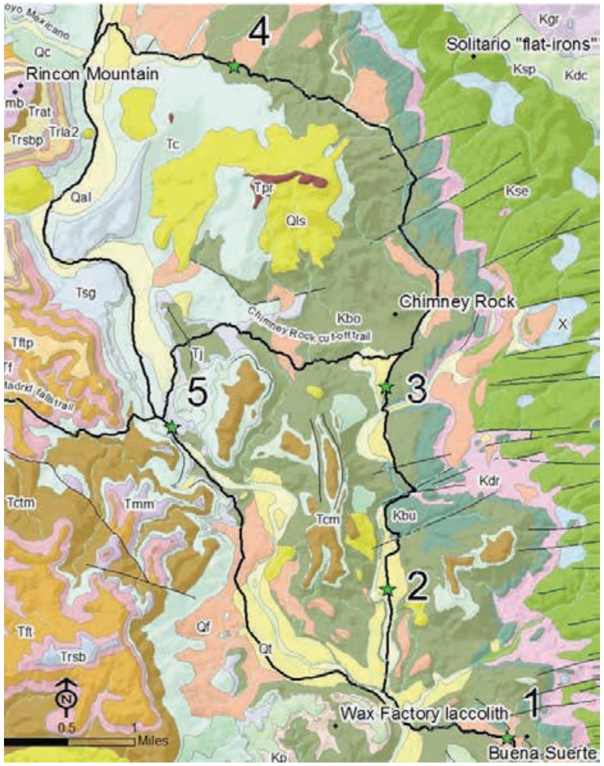
BIG BEND RANCH STATE PARK

Rincon Loop Geology Tour

BY KEVIN URBANCZYK





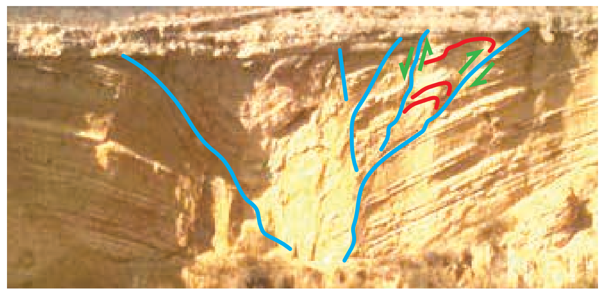
Qal, ls, f	Quaternary alluvium, landslide and fan deposits
Tmb	Closed Canyon Formation–basalt
Trsb	Trsbp–Rawles Formation–Sauceda basalt
Tpr	Peralkaline rhyolite
Tctm	Chisos Tule mntn trachyandesite
Tcm	Chisos Mule Ear spring tuff
Tc	Chisos undifferentiated
Tj	Jeff conglomerate
Kbo	Boquillas formation
Kbu	Buda limestone
Kdr	Del Rio clay
Kse,dc,gr	Santa Elena, Del Carmen, Glen Rose limestones

1 BUENA SUERTE / WHITROY MINE AREA AND WAX FACTORY LACCOLITH

From this stop, evidence of the Mercury mining that occurred in the Fresno canyon area is prevalent. Old mining structures and ore processing equipment are still present. Also visible to the west is an exposure of the Wax Factory laccolith. A laccolith is a magma body that was emplaced fairly high in the earth's crust. This laccolith was intruded into one of the Gulfian series rock units referred to as the Boquillas formation. You can see it as the dark wedge shaped rock outcrop in the cliff across the canyon.

2 FLOWER STRUCTURE

To the west across the small arroyo where you can see evidence of a particular style of strike slip faulting referred to as transpressional. This strike slip faulting with a component of compression. A careful observation of the outcrop here reveals individual wedge shaped segments of Boquillas flagstone, wide at the top, pushed upward to form the "flower." Drag folds can be seen, particularly in the north section visible to the right in the following image (folded rocks delineated in red, offset indicated by green arrows):



Drag folds such as this imply a "positive" flower structure, but, the overall orientation of the beds across the outcrop imply some type of downward motion of the strata (a "negative" flower structure). This fault is one of many structures in this area that trend east-northeast and is related to the Laramide orogeny.

3 VOLCANIC STRATIGRAPHY, CHIMNEY ROCK AND THE SOLITARIO

From stop 3, we can first observe the volcanic stratigraphy of the area. The mesa to the west is composed of lavas and tuffs of the Chisos formation. These include the Mule Ear Spring Tuff and the Tule Mountain trachyandesite, and are lying on the Boquillas formation flagstone. To the north, the small butte located in Boquillas flagstone is referred to as Chimney rock. It appears to be a particularly erosionally resistant layer within this formation. Farther to the north and east, the prominent flatirons of the Solitario dome are visible. These represent steeply tilted Comanchean limestone (tilted by the intrusion of the Solitario) that was then eroded to their present shape. As we proceed from here to our next stop, we will ride through exposures of the Buda limestone (Comanchean) which has been described as being "porcelaneous" due to its hard, white and vitric appearance. It also has a very rough erosional surface that is distinctly different than the uniform flaggy layers seen in the overlying Boquillas formation.

View east of the Solitario from Stop 4. Note the flat-irons formed from erosion of steeply tilted limestone.

4 RINCON MOUNTAIN, ARROYO MEXICANO AND VOLCANIC ROCKS OF THE BOFECILLOS MOUNTAINS

The view to the west from this stop is toward the Bofecillos Mountains, which are composed of a different group of volcanic rocks. The prominent canyon to the west is Arroyo Mexicano. Rincon mountain is immediately south of this and is composed of basalt. Numerous trachyte lava flows are also found in this area. The Terneros Creek rhyolite makes up the top of the mountain to the south. This rhyolite is peralkaline and was emplaced on softer tuffaceous sediments of the Chisos formation. A landslide and subsequent erosion has formed the chaotic boulder field below the cliff. The flow was apparently fairly viscous as it was emplaced. This resulted in flow folds and