1. STRATIGRAPHY BY E.H. SELLARDS, W.S. ADKINS, AND F.B. PLUMMER pdf

1: Britton Formation - Wikipedia

BL The Geology of Texas, v. 1, Stratigraphy - [Book Only], by E. H. Sellards and others. p., 54 figs., 10 pls., indexed. Book format.

SW edge of escarpment. Uvalde, Kinney, Edwards and Real Counties. Dice provided a map of biotic provinces of North America based primarily on faunal distributions, and included the Plateau with the Rolling Plains in his Commanchean Biotic Province. This treatment was later modified by Blair , who separated the Plateau including the Llano Uplift as the Balconian Province. Johnson School of Public Affairs published a map of the natural regions of Texas that was essentially similar to one adopted by the United States Fish and Wildlife Service To the south and east it is separated from the lower-lying West Gulf Coastal Plain by the Balcones Fault Zone, where elevations drop sharply to less than m. The Stockton Plateau is geologically similar to, and has been considered by some as part of the Edwards Plateau Gould, ; however, it has more often been lumped with the more desertic Trans-Pecos region Tharp, ; LBJ School of Public Affairs Figure 1 provides a schematic rendering of this physiographic region. The elevation of the Edwards Plateau generally increases from the southern and eastern margins to the northwest. Austin and San Antonio on the south are at m and m, respectively, while Junction near the center of the Plateau is at m and Big Lake on the northwest is at m. The southern and southeastern margins of the Edwards Plateau are highly dissected, and could hardly be considered a plateau. These short streams originate in the Hill Country and generally flow south or southeast to the Gulf of Mexico. The Pedernales flows eastward through the region, joining the Colorado just west of Austin. Topographically, it is a basin with respect to the main body of the Plateau to the south and west. Its geologic origin is as an uplift, hence the name. There are numerous rounded, nearly barren, granitic outcrops and the landscape is gently rolling except near drainages such as the Llano and Colorado Rivers and their tributaries or near granite outcrops, where steep slopes and some sheer cliffs appear. The Lampasas Cut Plain on the northeast is generally flatter than the Llano region or southeastern margins of the Plateau previously discussed. It consists of broad valleys and wide stream divides with relatively few steep, high-gradient canyons. The Lampasas and San Gabriel Rivers are the only two major streams that bisect the area. From the central Edwards Plateau to the north and northwest, the topography is generally flat to gently rolling with rounded hills, wide stream divides, and few steep slopes. Much of the area could be described as a broad plain. Several major streams cut west to east paths across this plain, including, from north to south, the Concho, San Saba and Llano Rivers. These eventually join the Colorado, which flows southerly through the Llano Uplift and eventually to the Gulf of Mexico. The Devils River and its tributaries also bisect this plain in the southwest, but flow south to join the Rio Grande. The less eroded central and western portions are dominated by Lower Cretaceous rocks within the Edwards Limestone group, while southward and eastward Edwards Limestone has largely been eroded exposing older Cretaceous material, primarily the Glen Rose formation Sellards et al. The Lampasas Cut Plain, which represents a generally more mature landscape than the main portion of the Edwards Plateau to the south and west, is composed of strata from both the Glen Rose and Fredericksburg Divisions. Patches of limestone, dolomite, chert and marl alternately crop out at the surface across the area. Some Upper Cretaceous material, consisting primarily of chalk and marl, crops out along the southern and western margins of the Plateau. It is an intrusive outcrop of Precambrian rock that comprises about 1. The material overlying this intrusive granite, where it has not been eroded away around the perimeter, especially the northern border , consists of early Paleozoic sedimentary rocks including limestone, dolomite, sandstone, siltstone and shale. Minerology of the granitic material varies, with hornblende schist, graphite schist, quartz-feldspar gneiss and quartz-plagioclase-microcline rock common. In addition, local Precambrian outcrops are scattered throughout the southern and eastern margins of the Plateau. SOILS Variation in substrate and a generally hilly landscape have led to the development of a large number of different soil types on the Edwards Plateau. Excluding the Llano Uplift, upland soils of the Plateau have generally developed in

place and occur over limestone or caliche. They are shallow and rocky or gravelly on slopes and deep in broad valleys and on flats. Most are dark colored and calcareous, although pH is variable depending on base saturation of the substrate, and the degree of soil profile development Godfrey et al. Surface texture also varies from loamy to clayey, depending on substrate and profile development. These upland soils are generally classified as Mollisols on flats and valleys deeper soils or Inceptisols on slopes shallow soils. Many have vertic properties due to montmorillonitic clay minerology. These soils shrink and swell on wetting and drying, developing deep cracks in the dry months. Clayey Vertisols are also present, especially in the east or run-on areas in the north and northwest. Both Mollisols and Vertisols have surface layers that are high in organic matter, but nitrogen, phosphorus, potassium, iron and magnesium may still be limiting factors to plant growth when water is sufficient. Inceptisols may also have fairly high organic matter content, although they are not generally as fertile, mature, or deep as Mollisols and Vertisols. Over less alkaline parent materials, or where soil profile development has occurred for long periods over moderately or non-calcareous secondary colluvium or alluvium for example, on old stream terraces or in former shallow depressions , loamy Alfisols have developed. They are often less fertile than Mollisols or Vertisols, although plant-soil-water relations may be good. Soils of the Llano Uplift have generally developed over long periods from granitic materials or, around the margins of the region, from a variety of shale, limestone, dolomite or siltstone. Most have acid, loamy surface layers and are classified as Alfisols. Some deep, well-watered, sandy deposits occur around the base of major granite outcrops and in stream bottoms. These have poor profile development and are classified as Inceptisols. The eastern and central portion is classified as sub-tropical, subhumid, while the western one-fourth is classified as sub-tropical, semi-arid Larkin and Bomar, , Fig. The general decrease in moisture content of Gulf air as it flows northwestward across the Plateau is the controlling factor responsible for this difference in moisture regime. There is a concomitant increase in mean lake-surface evaporation rates from east to west. The July-plus-August precipitation rates also decrease from east to west, ranging from 13 cm to 9 cm Larkin and Bomar, Hence, there is a pronounced decrease in summer precipitation and an increase in summer evapotranspiration, and this effect is increasingly severe to the west. The average frost-free period ranges from approximately days in the south early March through late November to days in the north. Summer average highs and lows do not vary significantly across the Plateau and average about 35 degrees C and 22 degrees C respectively. Average January lows decrease northward, ranging from approximately 4 degrees C to O degrees C. Hence, there is little variation in environment related to north-south variation in temperature. Along with normal summer moisture deficiencies and periodic severe drought, high-intensity rainfall events caused by tropical cyclonic disturbances are characteristic of the Edwards Plateau. These torrential storms are most common in the Hill Country along the southern and southwestern margins of the region Baker, Flooding and erosion caused by the storms are major factors in the environment of the Edwards Plateau. Soils of the Llano Uplift region are generally sandy and non-calcareous, in contrast to the calcareous, clayey or loamy soils of most of the remainder of the region. These observations have been made by early Bray, ; Johnson, ; Tharp, , as well as later LBJ School of Public Affairs, ; USFWS, investigators, who have all separated these regions into separate vegetational or at least physiographic subregions. The Balcones Canyonlands or Hill Country region is more mesic and supports more forest or woodland vegetation on slopes and in canyons; the Lampasas Cut Plain is also mesic but flatter and more open and, therefore, grassier; the central and western Plateau becomes more xeric and more open; and the Llano Uplift region contains a species composition similar to but distinct from the remainder of the Plateau. Hence, the interactions of climate, topography and soils cause major shifts in vegetation patterns evident across the region. These factors, along with past and present disturbance regimes, also interact to cause coarse and fine-scale variations in vegetation on the Plateau. The demise of free-roaming bison, introduction of domestic livestock and exotic herbivores and the drastic change in fire regime since have led to widespread increase in density of woody species and loss of grasslands across the Plateau see Smeins, In addition, variations in the timing and density of grazing by domestic livestock, together with mechanical and chemical brush control have led to an even more patchy

landscape in which the influence of natural variation in soils, slopes and aspect are obscured. The following will provide a general regional characterization of the contemporary and potential, late-seral vegetation of the Plateau; however, the principal focus will be on the San Antonio-Austin segment of the Balcones Canyonlands and adjacent lands east of the fault zone, including the southern extension of the Blackland Prairies. Affinities of the Vegetation Modern flora and fauna of the Edwards Plateau are comparatively well known. Pleistocene fauna, known primarily from caverns and sinkholes is likewise fairly well known Lundelius ; however, we know almost nothing of the last 22, years of vegetational history on the Plateau except through inference from Quaternary pollen records to the east and west Bryant and Schafer, There are hints of an excitingly complex vegetational history which is manifested in the modern occurrence of certain insular woodland communities such as the temperate deciduous Acer-Tilia-Quercus or evergreen Pisatacia-Quercus or Lacey oak Quercus glaucoides woodlands restricted to mesic canyons; the restricted, insular Pinus remota evergreen pygmy woodlands; the insular Taxodium-Sabal grotto swamps; the tropical ferns in isolated sinkholes; and by such exciting stories as the apparently rapid colonization of Ashe juniper Juniperus ashei onto the Plateau from a source on the margins of the Mexican Plateau Adams, Plant communities of the more mesic, dissected portions of the Plateau owe much of their origin to the Sierra Madre Oriental and its outliers. One could also characterize the Balcones Canyonlands of the Plateau as northern facies of the eastern piedmont of the Sierra Madre Oriental. Mesic habitats in the protected eastern canyons are strongly influenced by floristic contributions from the eastern Austroriparian deciduous forests, including tall-grass prairie species. The Plateau on the undissected uplands owes much of its influence to the Great Plains grasslands to the north. On the more xeric western plateau and its canyons, the biotic contribution is from the dry plateaus and massifs of northern Mexico and Trans-Pecos Texas where semidesert grasslands prevail. To the northwest, centered in Reagan, Irion, Schleicher and Crockett Counties, the mesquite-tobosa community seems more akin to the Rolling Plains, as does the mesquite savannah on heavy textured soils of the Llano Basin. Other parts of the Llano basin, over lighter textured soils, are covered in an open oak-hickory woodland whose affinities are with the Cross Timbers and oak woodlands to the north and east. Oak woodlands are also widespread on limestone uplands across interfluvial divides on the eastern margins of the Plateau where Alfisols occur, usually over karstic features or Quaternary terrace deposits. Taxa such as spiny hackberry Celtis pallida , catclaw acacia Acacia gregii , fern acacia A. Disclimax or disturbed grasslands on heavy soil usually have an abundance of huisache Acacia smallii , while a sub-tropical component, anaqua Ehretia anacua , is found occasionally along riparian corridors. Balcones Canyonlands This region of steep slopes and high-gradient streams is dominated by evergreen woodlands and deciduous forests. Grasslands are restricted primarily to drainage divides, usually in the context of open woodlands. Although more quantitative data on plant ecology are available for this region than for other subdivisions of the Plateau Buechner, ; Solcher, ; Lynch, , ; Van Auken et al. Van Auken and Bush, ; Fowler and Dunlap, the composition and structure of the plant communities of this zone are still not well known. Community composition reflects exposure, edaphic factors and microclimate, and although vegetation changes covered by the factors are qualitatively obvious, only one study Van Auken et al. An idealized profile of the canyons contains at least three major community types. Streamsides Along perennial watercourses, the streamside component is dominated in our area south of the Colorado by bald cypress Taxodium disticum , sycamore Platanus occidentalis and to a lesser extent black willow Salax nigra. Buttonbush Cephalanthus occidentalis is often conspicuous in the shrub stratum. Quite often, bald cypress forms monodominant stands. This streamside community is always very narrow, often less than 2 m. Dwarf Palmetto Sabal minor occurs occasionally. This community is a western expression of eastern swamp communities, although it is adapted to periodic flooding of great magnitude, which may be essential for its maintenance see Gehlbach, Intermittent drainages support sycamore woodlands or in the case of very "dry" sites, cedar elm usually predominates. If deep soils accumulate, the streamside component is often indistinguishable from some mesic lower-slope or floodplain woodlands within Canyonlands. Floodplains Like the streamside community, floodplains are subject to periodic catastrophic flooding, and are dominated

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by some combination of oak-elm-hackberry gallery forests. In our area this gallery woodland also may include Arizona walnut Juglans major , box elder Acer negundo , chittamwood Bumilia lanuginosa , soapberry Sapindus , Ashe juniper, pecan Carya illinoensis , eastern cottonwood Populus deltoides , live oak, Texas oak, chinkapin oak Quercus muhlenbergii , ash Franixus pennsylvanica , American elm Ulmus americana , cedar elm, Q. Species such as pecan, scalybark oak, chinkapin oak, and black walnut are more important in the east or on more mesic bottoms.

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Block Jefferson County, Texas is located in the extreme southeastern part of the state. It is a metropolitan center with a population in approaching one-quarter million persons. Beaumont, the county seat, has , residents and ranks in tenth place among Texas cities. Other principal cities and their populations in are Port Arthur, 57,; Groves, 18,; Nederland, 16,; and Port Neches, 10, The county has an area of square miles, ranging in altitude from sea level to fifty feet. Its thirty-five mile southern boundary is the Gulf of Mexico. Its forty-five mile eastern boundary lies adjacent to the Neches River, Sabine Lake, and the Sabine Pass, which in part, constitutes the common boundary between the states of Texas and Louisiana. On the north, Pine Island Bayou, a navigable stream one hundred feet wide and seventy-five miles long, separates Jefferson County from neighboring Hardin County. The western boundary is shared in common with Liberty and Chambers counties. As the confluence of three rivers, the Neches, Sabine and Angelina, Sabine Lake drains approximately 30, square miles of Texas and Louisiana. It is one of Texas counties, which comprise the Coastal Plains, commonly called the Gulf Prairie. The southern one-third of the county lying adjacent to the seacoast consists of marshy, and often inundated, salt grass terrain where cattle flourish. The middle one-third of Jefferson County is coastal prairie suitable for grazing or rice production. The northern one-third is a heavily forested region, where hardwoods and southern yellow pine grow in abundance. Rainfall in the county averages fifty inches annually. Its thickness varies between four hundred and nine hundred feet, and is overlain principally by river silts and wind-blown beach alluvium. Sometimes these are visible, as at Spindletop and Big Hill, by an abrupt increase in elevation. With a channel depth to Beaumont of forty feet, the Neches on occasion has accommodated the ,ton, 1,foot American tanker Manhattan. The river is miles long and derives its name from the Neches Indian tribe that formerly lived near its banks. Steinhagen and Sam Rayburn Dams on the Neches and its chief tributary, the Angelina, have created artificial reservoirs in Southeast Texas, which impound more than 5,, acre-feet of water to feed the growing population and heavy industry of Jefferson County. There are also substantial calcium deposits clam and oyster shell , which could be utilized in the manufacture of lime and cement. The Frasch process is used to extract sulfur from Spindletop oil field, where 9. Sand and gravel deposits are excavated by the construction industries, and there is an abundance of ceramic clays suitable for brick-making. Orange County is wedged between the lower Neches and Sabine Rivers, where, for half of the nineteenth century, logs were floated from the timbered counties to the north for milling at Beaumont and Orange, Texas. In , a modern network of highways and bridges has mushroomed this interdependency to the point that Vidor, an Orange County city, is economically linked to Beaumont, and hundreds of south Jefferson County residents commute daily to and from the industries of Orange County. Only one person in the foreground, John F. It would entail spending 15 times the original cost to replace the structure today. Belo Corporation, , pp. The Molyneaux Craftsmen, Incorporated, , p. Hastings House, , pp. The Geology of Texas, Stratigraphy Austin: University of Texas Ness, , I, p. Clark, The Texas Gulf Coast: Its History and Development 4 volumes; New York: Lewis Historical Publishing Company, , p. Scott, Texas Geography Oklahoma City: Harlow Publishing Company, , pp. The Rise, Progress, and Prospects, pp. Rainfall, Streams, and Climate Austin: Von Boeckmann-Jones Company, , p. American Association of Petroleum Geologists, , pp. Gammel compiler , The Laws of Texas, 7 10 volumes; Austin: Johnson and Eugene C. American Historical Society, , II, pp. Unless otherwise indicated, the material published on this site is copyrighted by William T. Like us on Facebook:

3: Balcones Escarpment

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