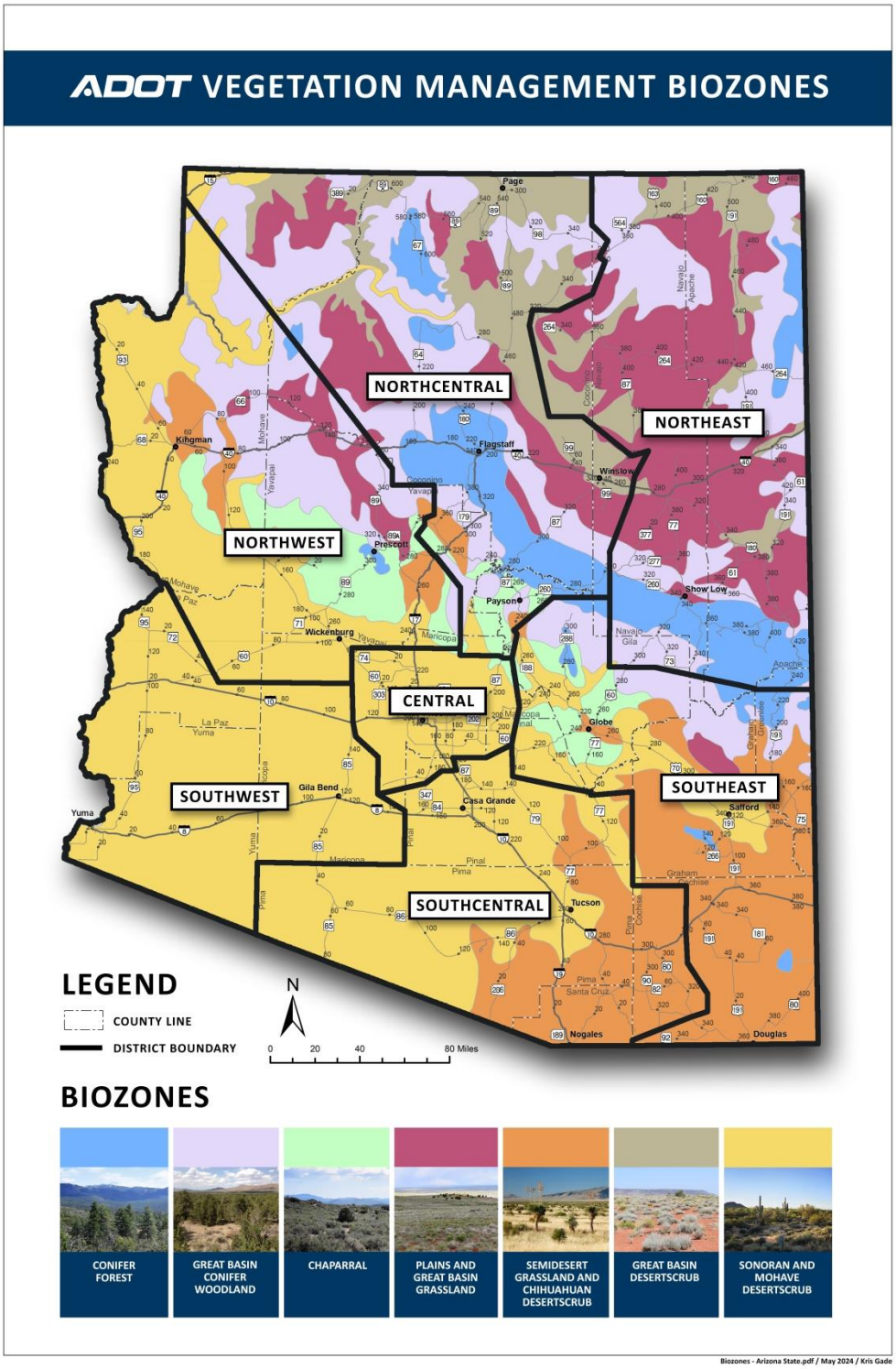
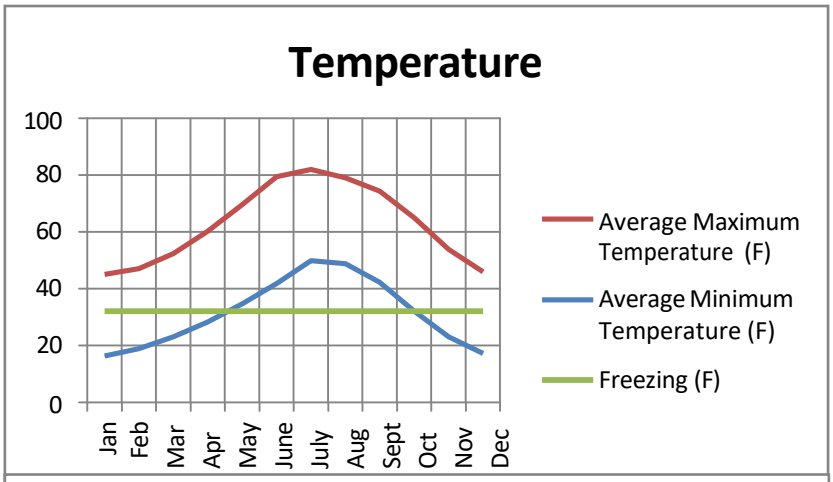
Appendix C: Biozone Map

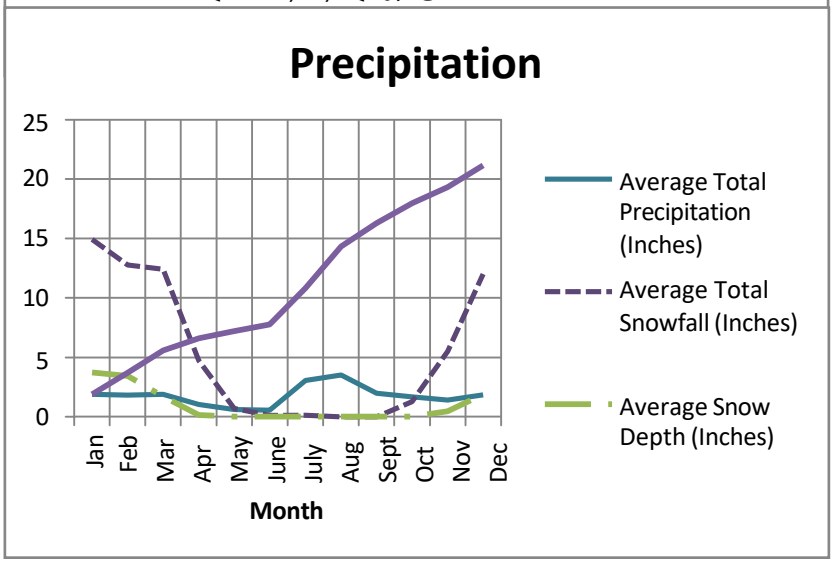
See the District-specific posters on the Roadside Resources webpage for more detailed biozone location information. The following pages give details on each biozone. Contact Roadside Resources to receive a biozone poster if your office does not have one available.



CONIFER FOREST

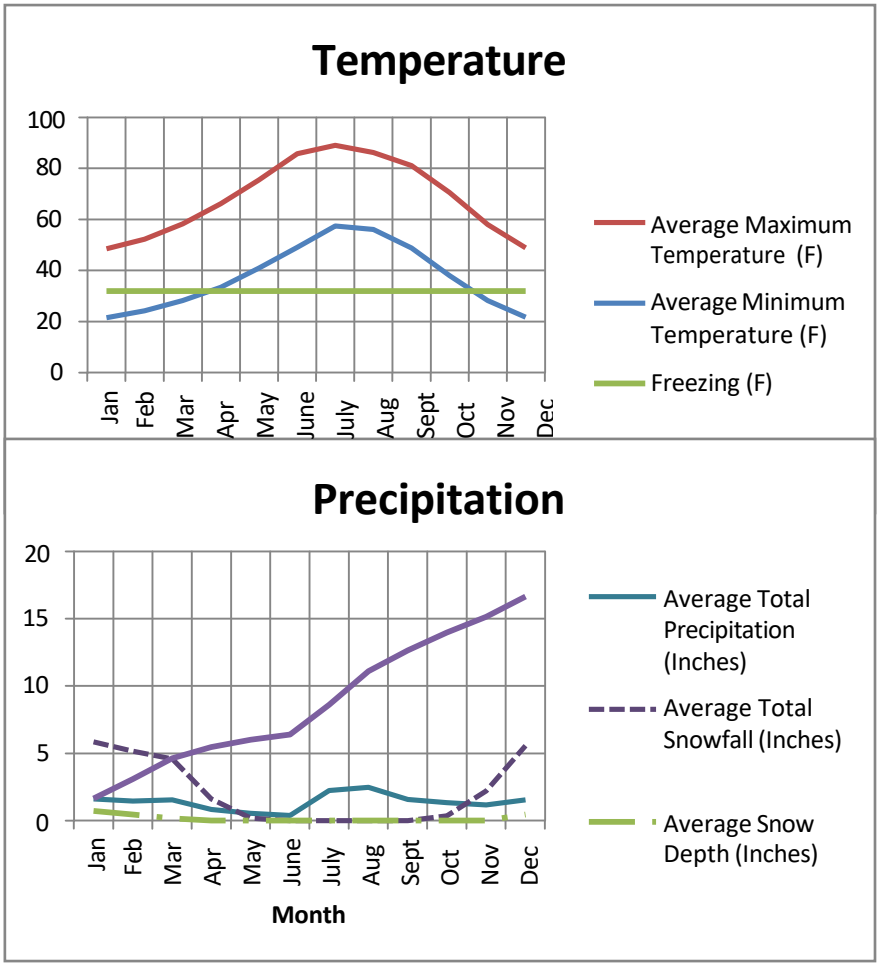
- Needleleaf evergreen trees dominate in this biozone
- Ponderosa pine (*Pinus ponderosa*) is the most common tree species, occurring at the lower elevations
- Occasionally found at the lower elevations are the deciduous trees Gambel oak (*Quercus gambelii*) and New Mexico locust (*Robinia neomexicana*).
- The most common mid-elevation conifer is Douglas-fir (*Pseudotsuga menziesii*).
- Engelmann spruce (*Picea engelmannii*) and other spruces are found at the higher elevations of the conifer forest.
- Quaking aspen (*Populus tremuloides*) fills a niche role in vegetational succession, appearing after fire or other forest disturbance
- Shrubs, grasses, and forbs are not common in the understory, but may occur in natural openings and at the edge of the forest
- Mountain slopes, high plateaus, as well as canyons, support conifer forest vegetation
- Soils found within this biozone include andesite, basalt, granite, limestone, and sandstone
- Elevations range from 3,900 to 8,300 feet
- Summer precipitation (July, August, September) accounts for nearly half of the yearly average of 21 inches
- Snowfall amounts vary widely, from 24 inches at the lower elevations to 90 inches at the higher elevations
- Below-freezing temperatures are typical from November through April
- Temperatures in the summer are mild, with the average maximum temperature peaking at just over 80 degrees F during July, the hottest month





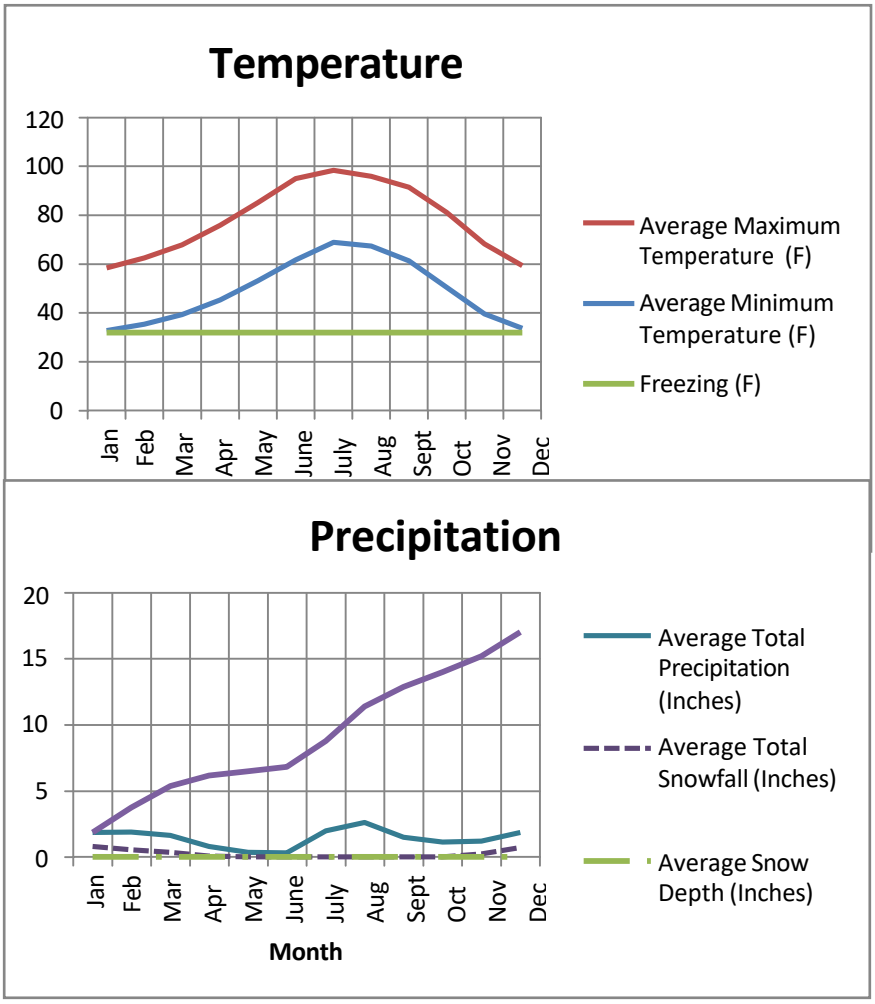
GREAT BASIN CONIFER WOODLAND

- The two dominant species of tree: pinyon (*Pinus* species) and juniper (*Juniperus* species) are the basis for the nickname often applied to this biozone, Pinyon-Juniper Woodland
- Junipers are generally dominant although either species can occur as a nearly pure stand
- Junipers tend to occur at lower elevations than pinyons
- The shrub-like form of the needle-leaf evergreen trees is typically no more than 35 feet tall
- The plant canopy is open, hence the term "woodland" versus a "forest" in which canopies touch
- Open areas are typically vegetated with grasses, and, to a lesser extent, shrubs
- Small cacti are well represented in this biozone, ranging from hedgehog (*Echinocereus* species) and beehive cactus (*Coryphantha* species) to prickly pear (*Opuntia* species) and cholla (*Cylindropuntia* species)
- Characteristic topography includes mesas, slopes, and ridges; habitats tend to be rocky, with thin soils predominating
- Elevations range from 4,400 to 7,000 feet
- Summertime maximum temperatures are moderate, with the hottest month (July) averaging 89 degrees F
- Winters are cold and snowy: from November through March, the average minimum temperature is well below freezing, and an average of 25 inches of snow falls each year
- The two driest months (May and June) are followed by the two wettest months (July and August)
- Annual precipitation averages 16 inches



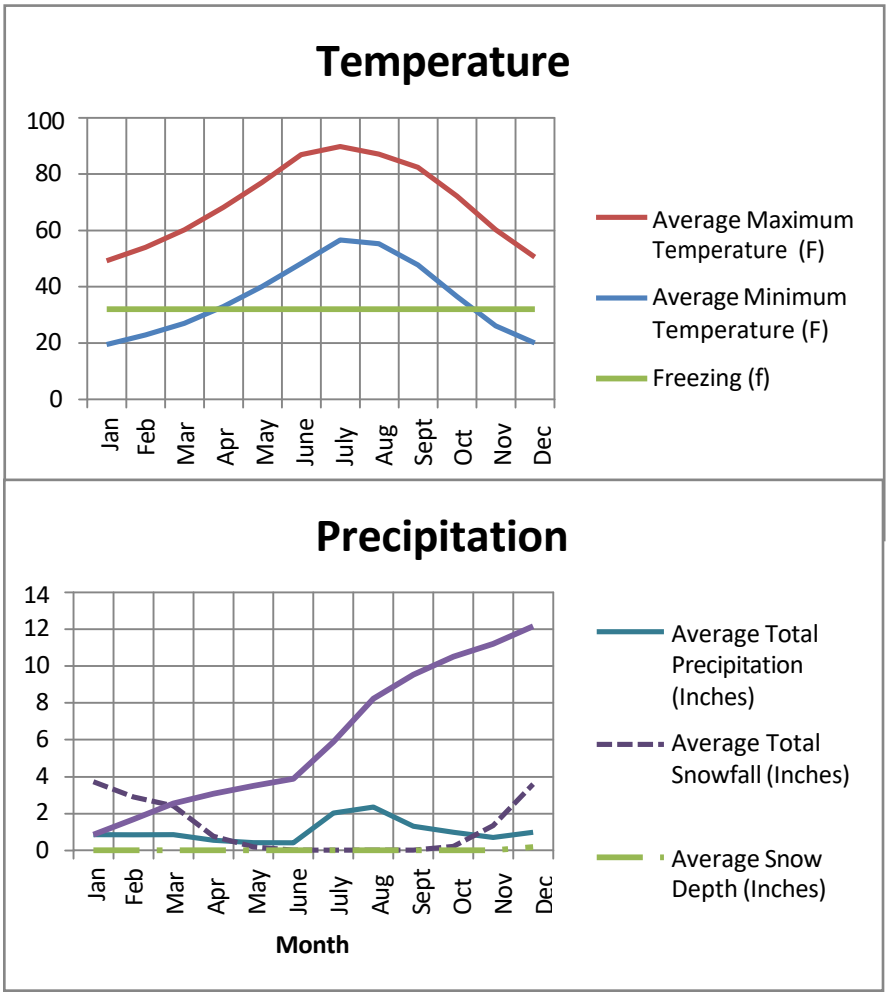
CHAPARRAL

- Vegetation is comprised predominantly of shrubs with small, leathery leaves
- Typical height of the shrub canopy is 4 to 7 feet
- The plants are deeply rooted and most species quickly regenerate after burning
- The most widespread shrub species is shrub live oak (*Quercus turbinella*)
- Leafy succulents such as yucca (*Yucca baccata*) and sotol (*Dasylirion wheeleri*) occur sporadically
- Trees are typically limited to drainages
- Grasses and forbs are not abundant (except following fires) due to the dense shrub canopy, typically 70% cover or greater
- This biozone is found in foothill, mountain slope, and canyon habitats between 3,400 and 6,000 feet in elevation
- Soils are typically derived from granite and limestone parent material
- Maximum temperatures in the summer months can reach into the high 90's F
- Below-freezing temperatures occur in the winter, with December and January being the coldest months
- Average annual precipitation is 17 inches



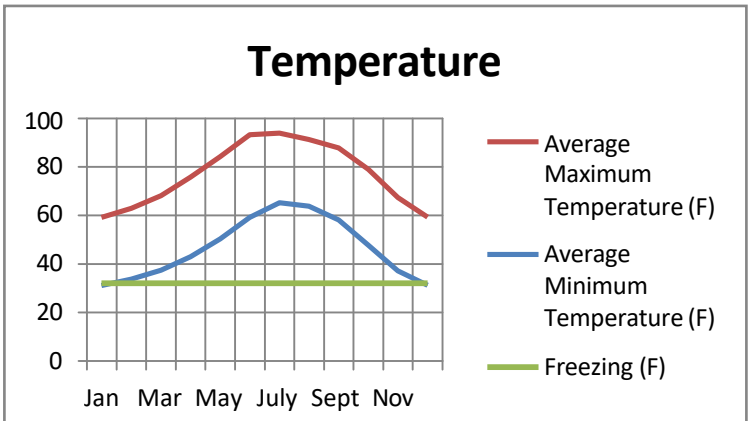
PLAINS AND GREAT BASIN GRASSLAND

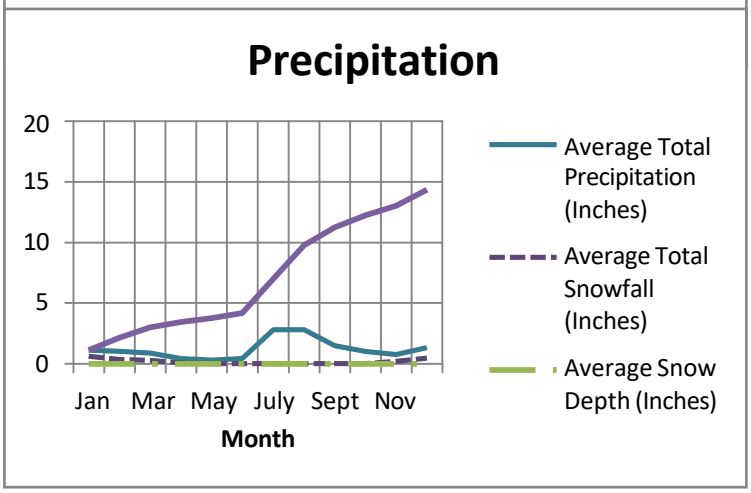
- Vegetation is dominated by perennial, sod-forming grasses, including blue grama (*Bouteloua gracilis*) and other gramas
- Shrubs such as fourwing saltbush (*Atriplex canescens*) and snakeweed (*Gutierrezia sarothrae*) may be scattered throughout the grassland, or due to grazing or soil conditions, may be abundant
- Several species of prickly pear (*Opuntia* species) and cholla (*Cylindropuntia* species) as well as smaller types of cacti may occur, though usually not in large numbers
- Junipers (*Juniperus* species) are common invaders of grassland, particularly on rocky, thin soils
- Characteristic topography of this biozone includes plains, mesas, and rolling hillsElevations range from 4,500 to 7,000 feet
- Summertime high temperatures are relatively moderate, with the average maximum in the hottest month (July) just under 90 degrees F
- Below-freezing temperatures occur consistently from November through April
- An average of 15 inches of snow falls each year
- More than a third of the 12 inches of average annual precipitation occurs in July and August
- Long windy periods are common, particularly during winter and early spring



SEMIDESERT GRASSLAND AND CHIHUAHUAN DESERTSCRUB

- Grasses and shrubs are the dominant vegetation types, varying in composition as influenced by soils, elevation, and precipitation
- Common grasses include the perennial bunchgrasses tobosa (*Hilaria mutica*) and black grama (*Bouteloua eriopoda*), as well as other gramas.
- In some areas where heavy grazing has occurred, the shrubs, trees, cacti, and forbs outnumber grasses
- Shrubs such as creosote bush (*Larrea tridentata*), tarbush (*Flourensia cernua*), and viscid acacia (*Acacia neovernicosa*) and subshrubs such as burrowed (*Isocoma tenuisecta*) and snakeweed (*Gutierrezia sarothrae*) often form mosaics within the grasslands
- Leaf succulents are particularly well-represented within this biozone: yucca (*Yucca* species), beargrass (*Nolina* species), sotol (*Dasylirion* species) and agave (*Agave* species)
- Common cacti include barrel cactus (*Ferocactus* species), prickly pear (*Opuntia* species), and cholla (*Cylindropuntia* species), as well as numerous types of smaller cacti.
- Trees such as mesquite (*Prosopis* species) and juniper (*Juniperus* species) are typically restricted to drainages
- Basin and range topography is characteristic of this biozone
- Much of the region's drainage is internal, resulting in enclosed basins, or playas
- Many of the soils are derived from limestone
- Elevations range from 3,300 to 4,800 feet
- Winters are relatively mild, although freezing temperatures commonly occur, particularly in December and January

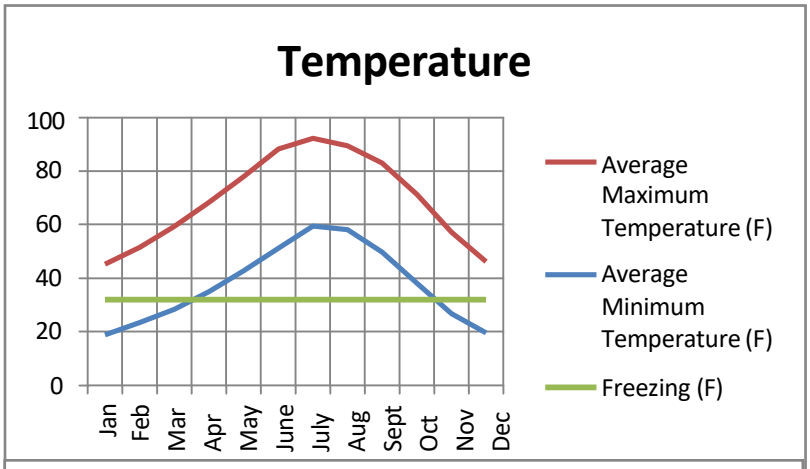


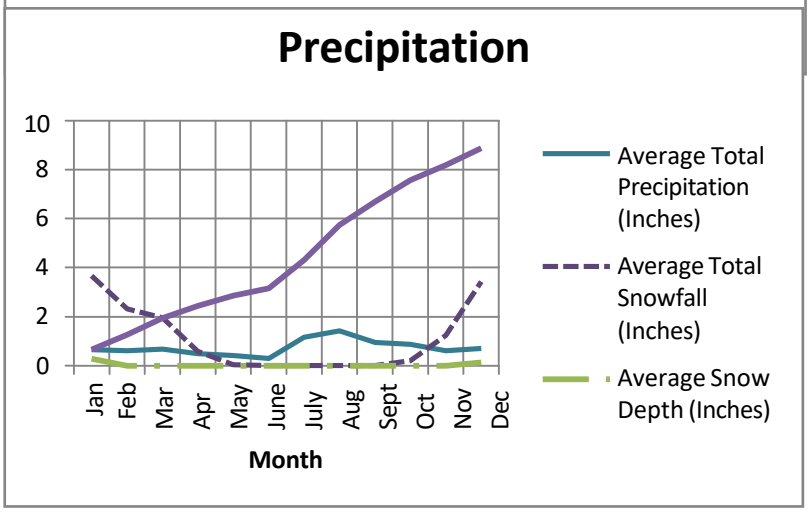


- Summers are hot, with the average maximum temperature reaching between 91 and 94 degrees F in June, July, and August
- About half of the annual rainfall of 14 inches occurs from July through September
- The months of April, May, and June are very dry, with total rainfall of just over an inch, on average

GREAT BASIN DESERTSCRUB

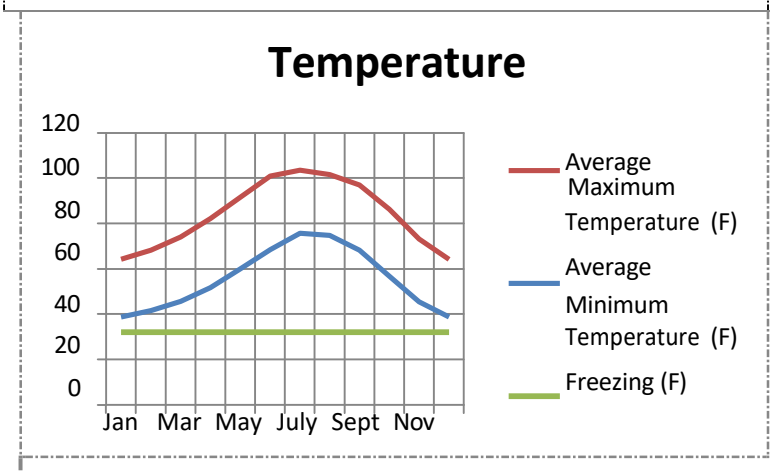
- The vegetation is dominated by shrubs, commonly sagebrush (*Artemisia* species), saltbush (*Atriplex* species), winterfat (*Krascheninnikovia lanata*) and other small- to medium-sized species
- Few grass species occur, due to low amount of precipitation
- Cacti are not abundant and tend to be low growing; common species are pricklypear (*Opuntia* species) and cholla (*Cylindropuntia* species)
- Elevations range from 4,100 to 6,400 feet
- Basin and range topography is typical, with north-south tending mountain ranges separated by flat valleys or basins
- Many basins do not drain, so salts accumulate in the soil
- The basins are often dominated by plants in the goosefoot family (*Chenopodiaceae*) because of their salt tolerance
- Summers are warm, with maximum temperatures in the high 80's and low 90's F
- Minimum temperatures in the coldest months of January and February are typically 20 degrees F
- Total annual precipitation averages 9 inches, with July and August being the wettest months, and May and June the driest
- On average, 13 inches of snow falls each year

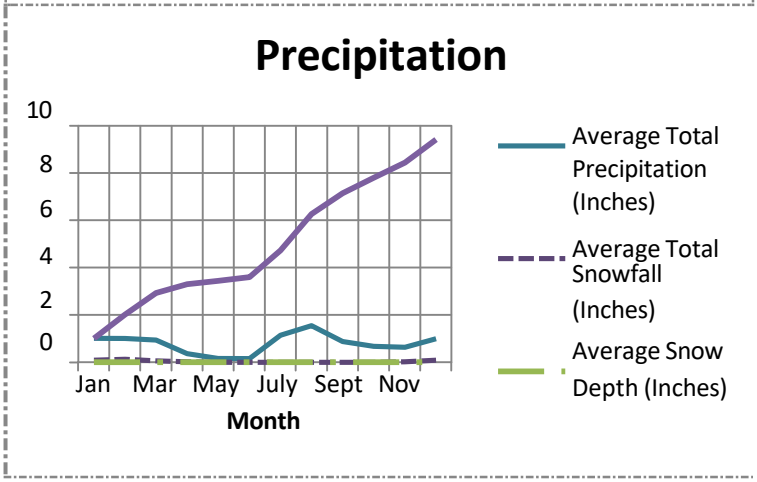




SONORAN AND MOHAVE DESERTSCRUB

- Palo verde (*Parkinsonia* species) is one of the most common trees of this biozone
- Ironwood trees (*Olneya tesota*) thrive in the warmest, nearly frost-free areas, and mesquite trees (*Prosopis* species) are commonly found along drainages and in lowlands
- Large cacti, most notably saguaro (*Carnegiea gigantea*), are common in the Sonoran Desert, their existence enabled by the lack of hard frosts
- A rich assortment of small and medium-sized cacti such as barrel cactus (*Ferocactus* species) and prickly pear (*Opuntia* species) occurs in both the Sonoran and Mohave Deserts
- The tree-like yucca nicknamed Joshua tree (*Yucca brevifolia*) represents the largest succulent in the Mohave Desert
- Common shrubs include creosote bush (*Larrea tridentata*), bursage (*Ambrosia* species), saltbush (*Atriplex* species), and acacia (*Acacia* species)
- Depending on seasonal rainfall, annual wildflowers may be a showy, though short-lived, element of the desert vegetation
- Landforms range from broad plains to rocky hillsides, with bajadas forming the intermediate topography; canyons bisect the mountainous areas and dry lakes are common, especially in the Mohave Desert
- Soils are primarily of granitic and volcanic origin
- Elevations range from near sea level to 3,000 feet
- Extreme summer heat defines the climate of this desert region, with three months of average maximum temperatures above 100 degrees F
- Freezing temperatures are uncommon, and when they do occur, are typically of short duration





- Annual rainfall varies significantly across the region, from less than four inches in the west (the Mohave) to greater than twelve inches in the east (the Sonoran)
- The Mohave Desert receives most of its annual rainfall from winter storms that originate in the Pacific Ocean, while in the Sonoran Desert, a bimodal pattern of rainfall brings moisture in both winter and summer, the Gulf of Mexico being the source of the latter storms