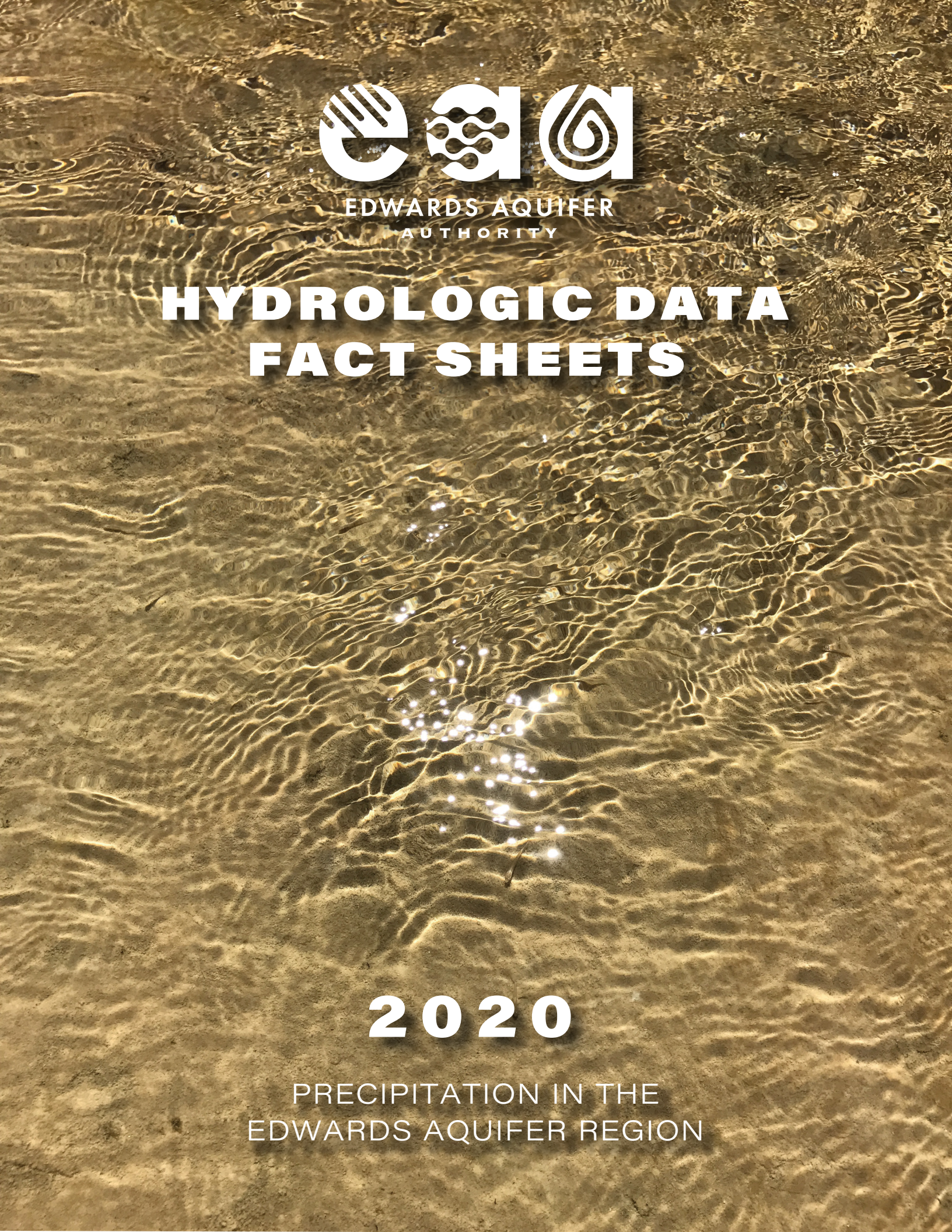

EDWARDS AQUIFER AUTHORITY

# HYDROLOGIC DATA FACT SHEETS

## 2020

PRECIPITATION IN THE EDWARDS AQUIFER REGION

# 2020 Precipitation in the Edwards Aquifer Region

The Edwards Aquifer Authority (EAA) monitors precipitation throughout the region using a network of 76 real-time rain gauges. Rainfall data is used as input for watershed data models that can provide estimates of monthly recharge to the aquifer. Collected over several years or decades, the extensive database of rainfall information can also be useful for monitoring climate trends, evaluating relationships between rainfall and aquifer levels, or understanding how global-scale phenomena such as "El Niño" (term referencing above-average sea surface temperatures in the equatorial region of the Pacific Ocean) may effect rainfall in Central Texas.

The locations of the EAA rain gauges are shown in Figure 1. In general, rain gauges are not always reliable indicators of total rainfall over a region. Rainfall can vary greatly over relatively short distances and a gauge only reflects rainfall at a specific point. Additionally, gauges are susceptible to occasional malfunctions such as clogging, battery or electronic failure, or physical damage. Next-Generation Radar (NEXRAD) data from the National Weather Service (NWS) provides a potential solution to the limitations of individual rain gauges. NEXRAD Doppler weather radars provide overlapping and continuous coverage of the entire region. The locations and coverages of NEXRAD radar stations are shown in Figure 2. Unlike rain gauges, NEXRAD does not measure the actual amount of rainfall, rather it measures reflectivity of precipitation near ground level. For this reason, EAA takes a two-step approach to precipitation analysis. This approach involves performing a quality review of the rain gauge data each month using the operational rain gauge data as a "ground-truth" to calibrate the NWS NEXRAD data. The resulting product is a dataset of hourly rainfall totals for a grid of 4 km x 4 km pixels over the entire region of interest extending back to January 1, 2003.

Figure 3 shows the calibrated NEXRAD coverage area with a thematic map indicating total 2020 rainfall for each 16-km$^2$ pixel. The high degree of spatial variability in rainfall totals across the region can be seen, with the highest rainfall total of 45.7 inches (1160.8 mm) in Hays and Travis Counties at the northeastern edge of the coverage area and the lowest total of 12.5 inches (317.5 mm) in Sutton County at the northwestern edge of the coverage area. The trend of decreasing rainfall from east to west is typical of the South-Central Texas region. The average rainfall for 2020 over the entire coverage area was 24.6 inches (624.8 mm).

Figure 3 also delineates the nine watershed catchment areas that intersect the Edwards Aquifer Recharge Zone. The rainfall over these watersheds is of interest because their catchment areas convey water to the Edwards Aquifer. This data can be used as a variable in the EAA's Hydrologic Simulation Program – Fortran (HSPF) models to estimate recharge. Table 1 provides the 2020 area-averaged rainfall totals for the nine watersheds obtained from the calibrated NEXRAD data.

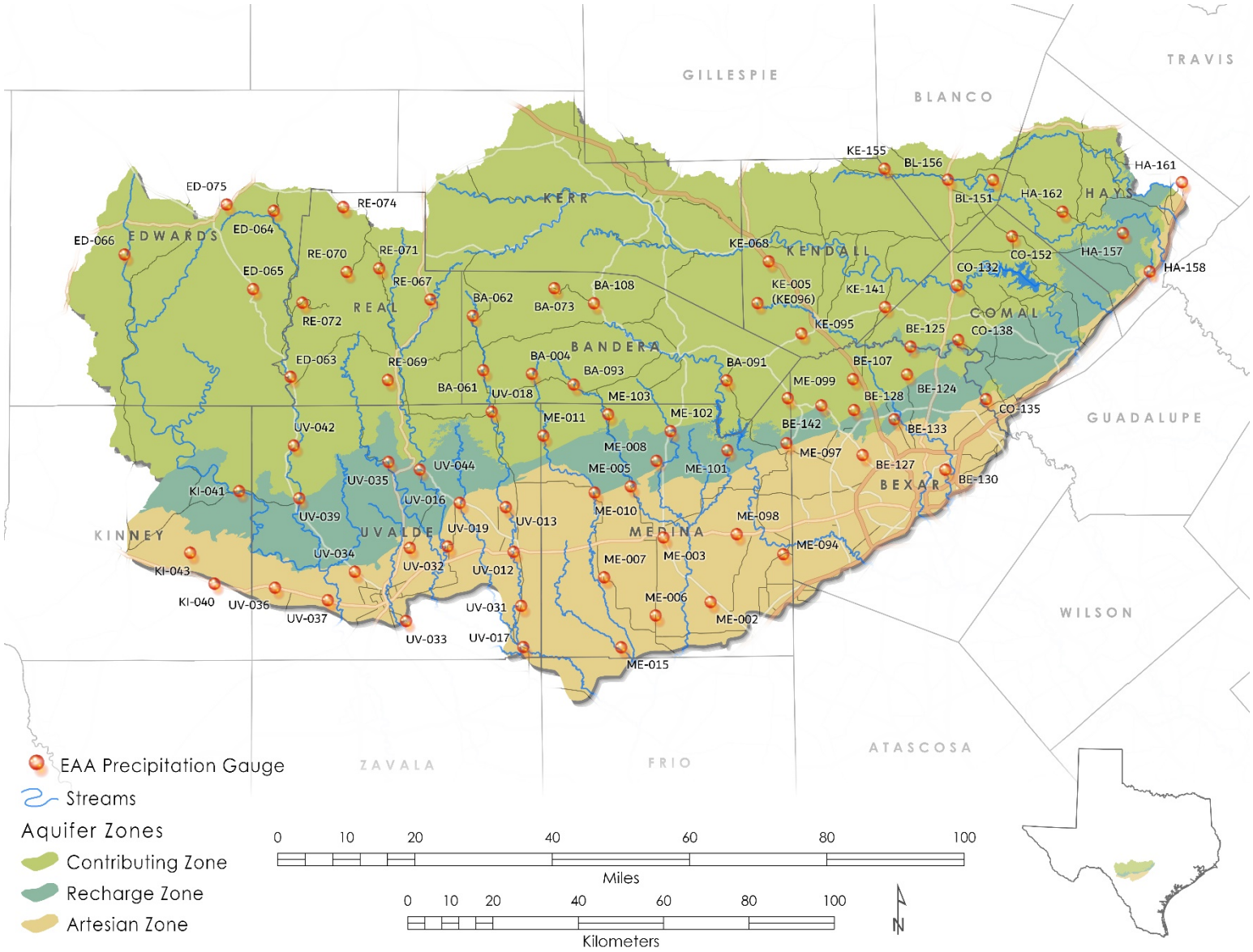


Figure 1. EAA precipitation gauge locations.

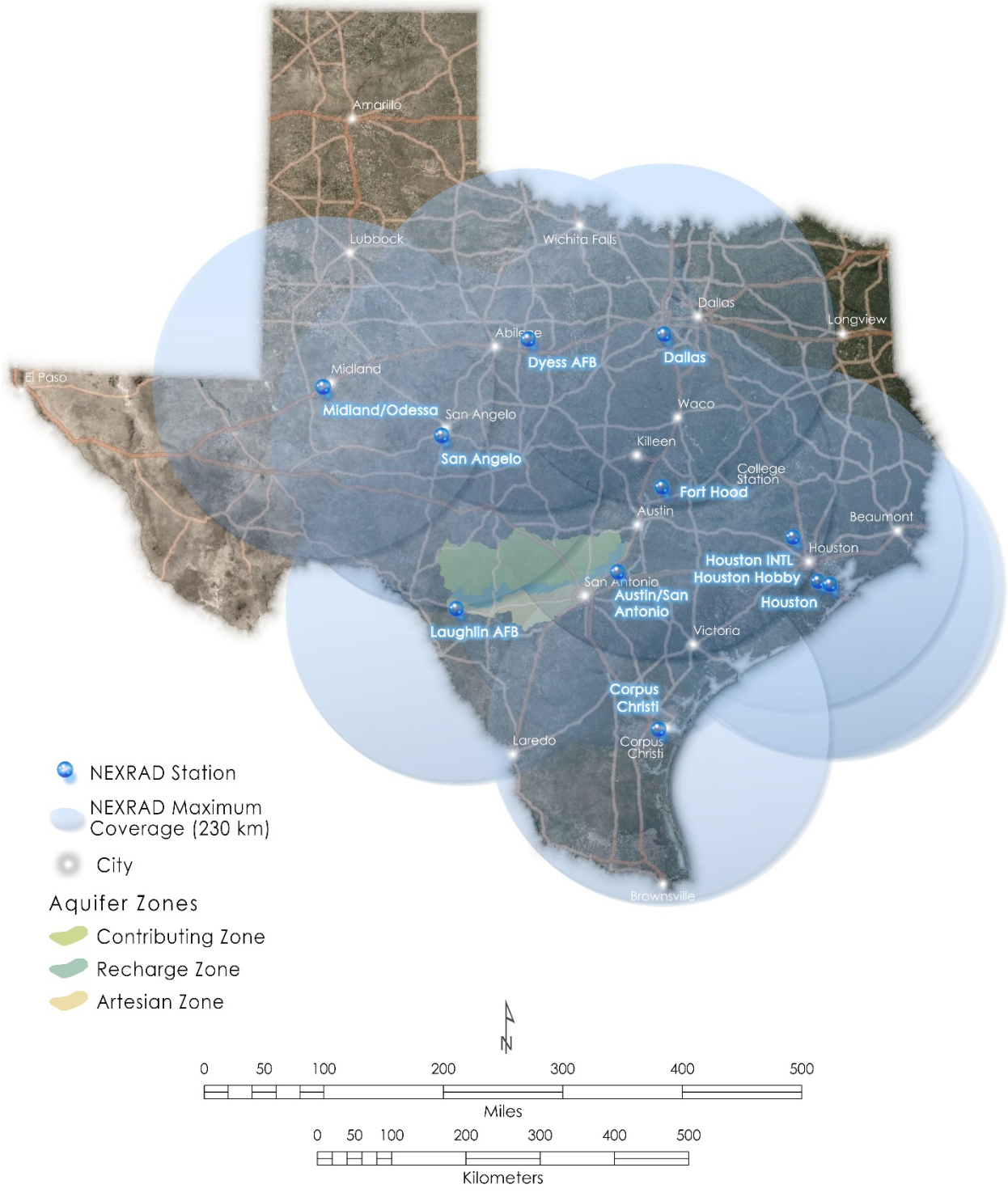


Figure 2. NEXRAD Doppler radar locations and coverage areas.

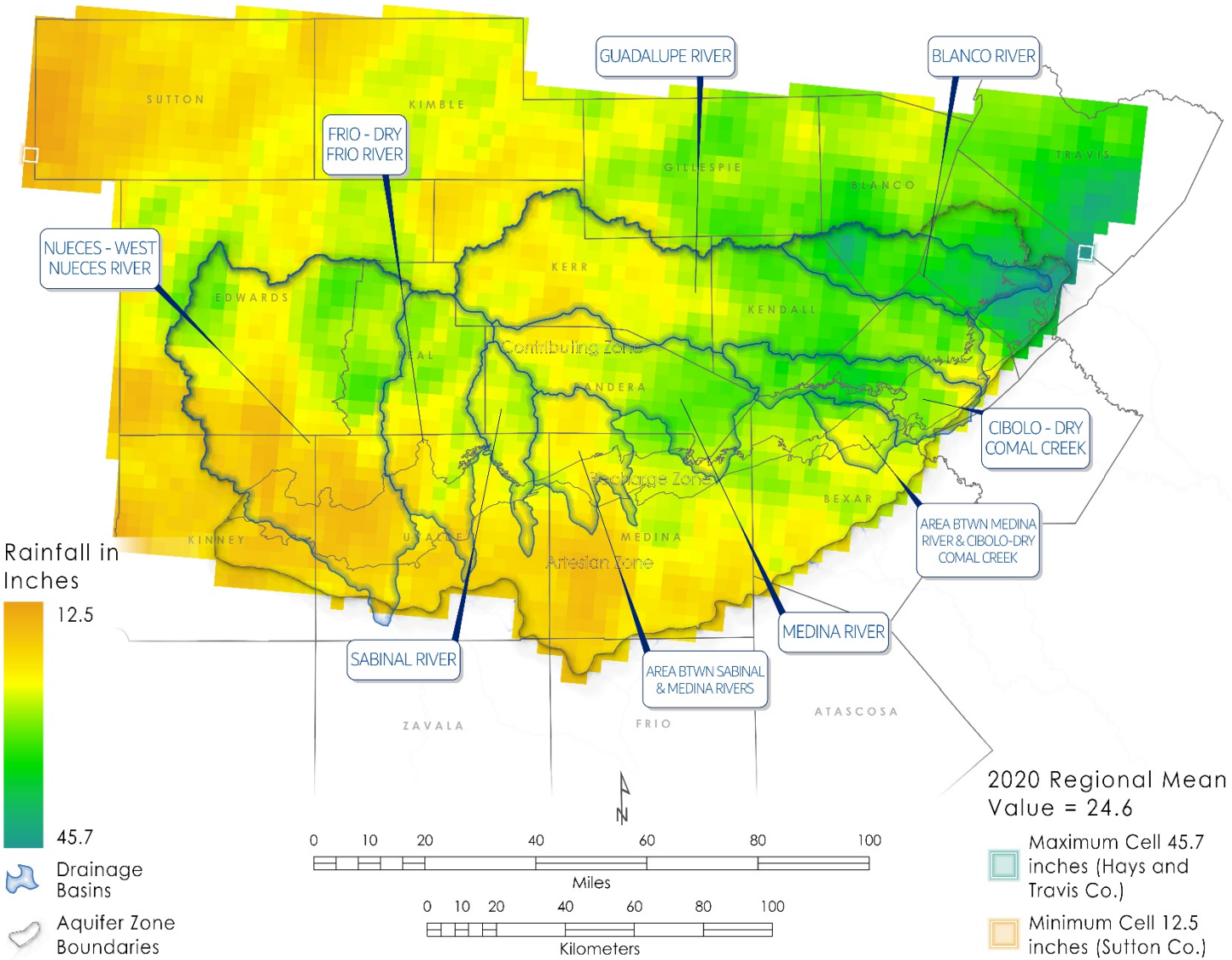


Figure 3. Map delineating 2020 precipitation totals for gauge-calibrated NEXRAD coverage area.

Table 1. 2020 rainfall averages for Contributing Zone watershed catchment areas.

| Basin | 2020 Area Average Rainfall (inches) |
|---|---|
| Nueces – West Nueces River Basin | 21.84 |
| Frio – Dry Frio River Basin | 24.02 |
| Sabinal River Basin | 24.49 |
| Area Between Sabinal and Medina River Basins | 22.79 |
| Medina River Basin | 25.92 |
| Area Between Medina River and Cibolo Creek Basins | 26.17 |
| Cibolo – Dry Comal Creek Basin | 28.68 |
| Guadalupe River Basin | 25.81 |
| Blanco River Basin | 35.04 |

Generally, the calibrated NEXRAD rainfall totals are considered to be the best available representation of annual rainfall totals in the region. However, evaluating long-term historical trends in annual rainfall is not yet suitable due to EAA's calibrated NEXRAD rainfall data only dating back to 2003. For long-term analysis, we rely on data at individual rain gauges that have been in place for many decades. Several NWS stations throughout the region have long-term records for rainfall and various other weather parameters dating back to the early 20th century. These historical data can be obtained online from the National Centers for Environmental Information (formerly the National Climactic Data Center) at https://www.ncdc.noaa.gov/cdo-web/search. Data from the EAA's rain gauge network or calibrated NEXRAD database may be obtained from EAA upon request.