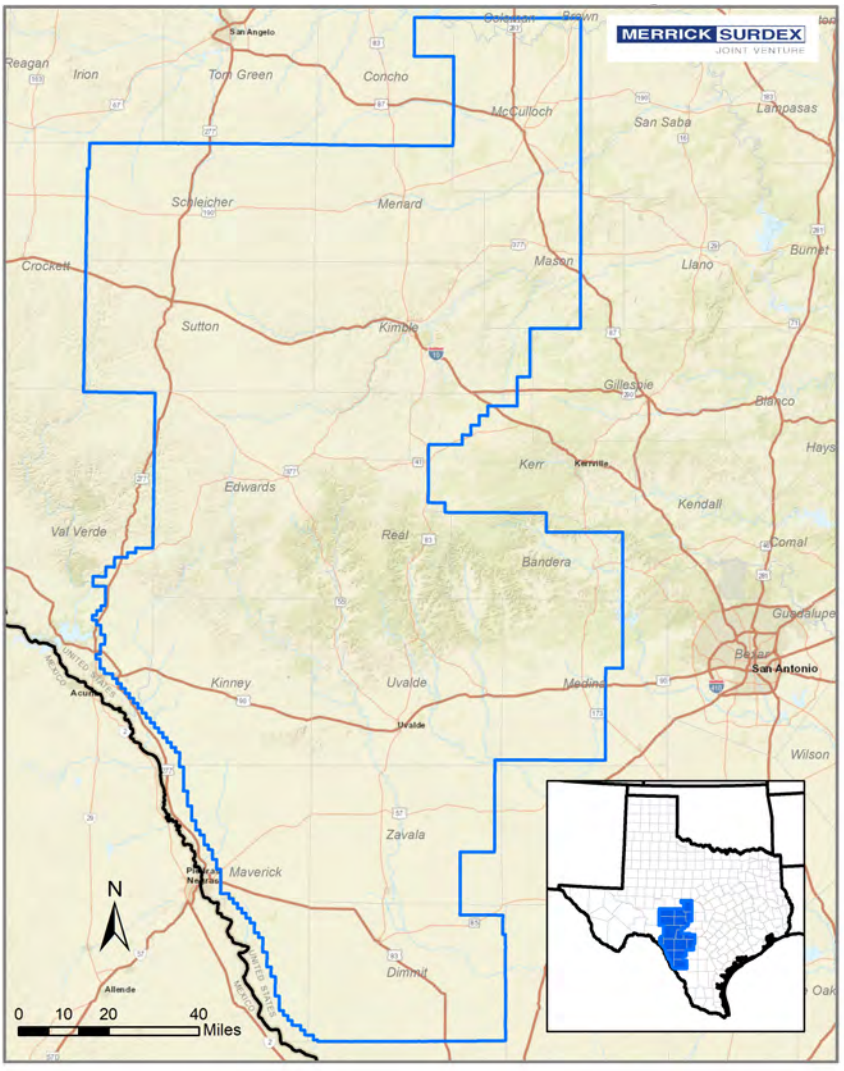
Enhanced Hydrology

Enhanced Hydrology in Texas Lidar Critical to Risk Mapping

In 2017 the U.S. Geological Survey selected the Merrick-Surdex Joint Venture to collect and process lidar data of approximately 17,950 square miles in southwest Texas through their Geospatial Product and Service Contracts (GPSCIII) program. One of the funding partners to the project, the Federal Emergency Management Agency (FEMA), required new elevation data in order to reclassify older hydrographic features to improve flood map accuracy. This data can assist with risk management of potential flooding areas resulting from significant shifts in precipitation over the past decade.

Texas has experienced a nearly decade-long drought; in February 2018, nearly 90% of the state was under a drought warning. Within one year, these conditions shifted dramatically – in 2018, rains had been so persistent and heavy that by October less than 5% of the state was under a drought warning. This sudden increase in such a large volume of water posed a significant risk of overflowing and flooding of once-dry riverbeds. The state consequently switched from a drought status to a situation of potential widespread flooding, with all the resulting possibility of damage. In anticipation of the effects of such a situation, FEMA and the Texas Water Development Board (TWDB) initiated a project with the USGS to obtain data to manage this situation.

South Central TX LiDAR Project



2018 southwest Texas lidar project area

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The hydrological collection effort for this project was designed to exceed the USGS project specifications to ensure map accuracy so that hydrological events could be monitored with confidence.

Hydrological feature from project lidar data (left) compared to non-drought imagery (right)

The Joint Venture's hydrographic feature collection effort was designed to ensure map accuracy and exceed the USGS project specifications so that hydrological events could be monitored with confidence. At the time of this project, version 1.3 of the USGS Lidar Base Specification was the most current version. According to this set of specifications, the minimum width for collection of inland streams and rivers is 100 feet; however, due to the low water levels there were multiple instances where these features were as narrow as 10-15 feet, meaning they ordinarily would not have been collected. In several cases, widths varied considerably along the same stream, and if only the portions of rivers/streams that were greater than 100 feet been collected, it would have resulted in disconnected networks of drainage.

Additionally, several lakes/ponds would have been omitted for not meeting the minimum two-acre size criteria. These conflicts of elevation in the hydro-flattened Digital Elevation Models (DEMs) would have limited the utility of the data to all agencies. The selected process ensured hydrological events could be monitored with confidence and guaranteed proper map accuracy. This enhanced data can be used by many agencies such as the U.S. Army Corps of Engineers (USACE), TWDB and Natural Resources Conservation Service (NRCS) to verify information required for river level management.