Refining Filtering Mechanisms used to Delineate Karst Depressions in Western Fort Hood, Coryell County, Texas

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ABSTRACT

The Fort Hood Military Installation is a karst landscape located in the Lampasas Cut Plain, characterized by outcrops of Lower Cretaceous limestones and dolostones from the Fredericksburg Group. The study area includes the Manning Mountain, Shell Mountain, and Royalty Ridge provinces in western Fort Hood, covering approximately 110 km² and bounded by the western border of the installation and the central "live-fire" range. It has been significantly altered and well developed for training exercises that encompass heavy vehicle maneuvers and simulated combat. Recent spatial interpolation of karst features using 0.5–meter LiDAR captured in March 2015 delineated and classified a depression database using geoanalytical methods. Initial filtering mechanisms were employed to remove anthropogenic depression features resulting from terrain modifications by military use, road building and maintenance, and the natural influence of water bodies in the study area.

The focus of this study was the refinement of the present depression database by employing additional filtering mechanisms to existing buffers to insure that this terrain is adequately characterized with respect to natural karst and anthropogenic features associated with military activity. Results show that filtering mechanisms based on lithology and proximity to natural water bodies accurately characterized karst depressions. Filtering mechanisms associated with minor roads were least accurate, mostly due to the ephemeral nature of road building in a military training area. Minor roads and bypass features created and utilized by wheeled and tracked machinery as a part of military traverses in the training areas caused this filtering mechanism to report higher error associated with the characterization of anthropogenic and natural karst depressions. The availability of high-density data makes it possible to model karst terrains in detail however,

high density data significantly increases data volume, which can impose challenges with respect to data storage, processing, and manipulation.