

Extended chronology of drought in South Central, Southeastern and West Texas

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Abstract

Short instrumental climatic records prevent appropriate statistical and historical characterization of extreme events such as the extent, duration, and severity of multiyear droughts. The best solution is to extend climatic records through well understood proxies of climate. One of the best such proxies is climate-sensitive annual tree rings, which can be dated precisely to the year, are easily sampled, and are widely distributed. We created 3 new baldcypress chronologies in South Central Texas and used them, along with existing Douglas-fir chronologies from West Texas and a composite post oak chronology in Central Texas, to calibrate 1931– 2008 and reconstruct June Palmer Drought Severity Index (PDSI) in Texas climate divisions 5 (Trans Pecos), 6 (Edwards Plateau), 7 (S. Central), and 8 (Upper Coast) 1500– 2008. We validated the reconstructions against observed data not used in calibration.

Most water planners in Texas at present use the drought of the 1950s, 1950– 1956, as a worst-case scenario. Our reconstructions show, however, that a number of extended droughts of the past were longer and/or more intense than the 1950s drought. Furthermore, extended droughts have been a consistent feature of southwestern climate since the 800s, including at least 4 megadroughts 15- to 30-years long centered in central or northern Mexico (Stahle et al. 2009; 2011b). This and previous studies indicate that severe decadal-scale droughts have occurred in Texas at least once a century since the 1500s. Current use by water planners of the 1950s drought as a worst-case scenario, therefore, is questionable. When water managers consider past droughts, population growth, and climate change, it becomes highly probable that the future poses unprecedented challenges.

Keywords

Texas, drought of record, Palmer Drought Severity Index (PDSI), paleoclimatology, dendrochronology, tree rings, baldcypress

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ISSN 2160-5319

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