

A Review of Wildfires and Drought Conditions for the Capital Area Council of Governments:

2002 to 2012

Course: BOR 6389: Capstone Seminar in Homeland Security

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ABSTRACT

An analysis of available national data on droughts and wildfires indicate that Texas has encompassed a fluctuating drought for over a decade. The central and western portions of the state have been affected particularly severely. In 2011 for example, the Capital Area Council of Governments (CAPCOG) endured drastic drought and wildfire conditions. Counties such as Bastrop, made major news headlines as the *Bastrop County Complex Fire* consumed more than 30,000 acres. While the use of technology to track and manage wildfire threat has increased in recent years, a project I just completed in BOR 6302, Introduction to GIS, found that many smaller county and city fire services are lacking the historical digital data that could be used to prepare for future wildfires, mitigate the damage caused, and expedite recovery operations. Therefore, the purpose of research is to muster the data of the enduring wildfire and drought conditions over the decade spanning 2002 to 2012 across the CAPCOG. The research of acquired data incorporated within the archives kept by various organizations to include the Texas A&M Forest Service, Water Data for Texas Organization, Southern Regional Climate Center, Water Development Board, and the United States Drought Monitor. This project produced a visual data set of the historical drought and wildfire conditions for the fire services, emergency managers, and community leaders within that jurisdiction in order to help enhance their planning efforts for future events.

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Introduction

An analysis of available national data on droughts and wildfires indicate that Texas has encompassed a fluctuating drought for over a decade. The central and western portions of the state have particularly grown to be affected. In 2011 for example, the Capitol Area Council of Governments (CAPCOG) experienced a drastic drought and wildfire threat. Counties such as Bastrop made major news headlines when the *Bastrop County Complex Fire* consumed more than 30,000 acres in 2011. It is estimated for that year alone, 450 fires were reported in Bastrop County with an aggregate of 55,511.91 burned acres. Not all county data was available for review, thus challenging the ability to use technology to trace and oversee wildfire threats. This can be seen as the completeness of wildfire data was not made available until 2005, and even then, there was missing data for some of the counties in the CAPCOG region that could potentially impair preparedness and response operations. Furthermore, the means on acquiring data incorporated the archives kept by various organizations to include the Texas A&M Forest Service, Water Data for Texas Organization, Southern Regional Climate Center, Water Development Board, and the United States Drought Monitor. Therefore, the purpose of this research was to muster the available data of the enduring wildfire and drought conditions over the decade spanning 2002 to 2012 across the CAPCOG. This project formulated visual data of the historical archived conditions for the fire services, emergency managers, and community leaders within the CAPCOG jurisdiction in order to help enhance their mitigation efforts in relation to future drought and wildfire events.

The educational tools that were used included ArcGIS 10.2 and Microsoft Excel for the purpose of the construction of maps and tables depicting the data amassed for the CAPCOG. The areas scrutinized are: Bastrop, Blanco, Burnet, Caldwell, Fayette, Hays, Lee, Llano, Travis, and

Williamson Counties. The following are the summary of the results obtained for the years 2002 to 2012 in subsequent sections.

Wildfires and Acres Burned

Data obtained from the Texas A&M Forest Service underlines that starting 2005 the CAPCOG began reporting complete data of experienced wildfires along with the amount of

Map 1. Wildfire Conditions by County 2005

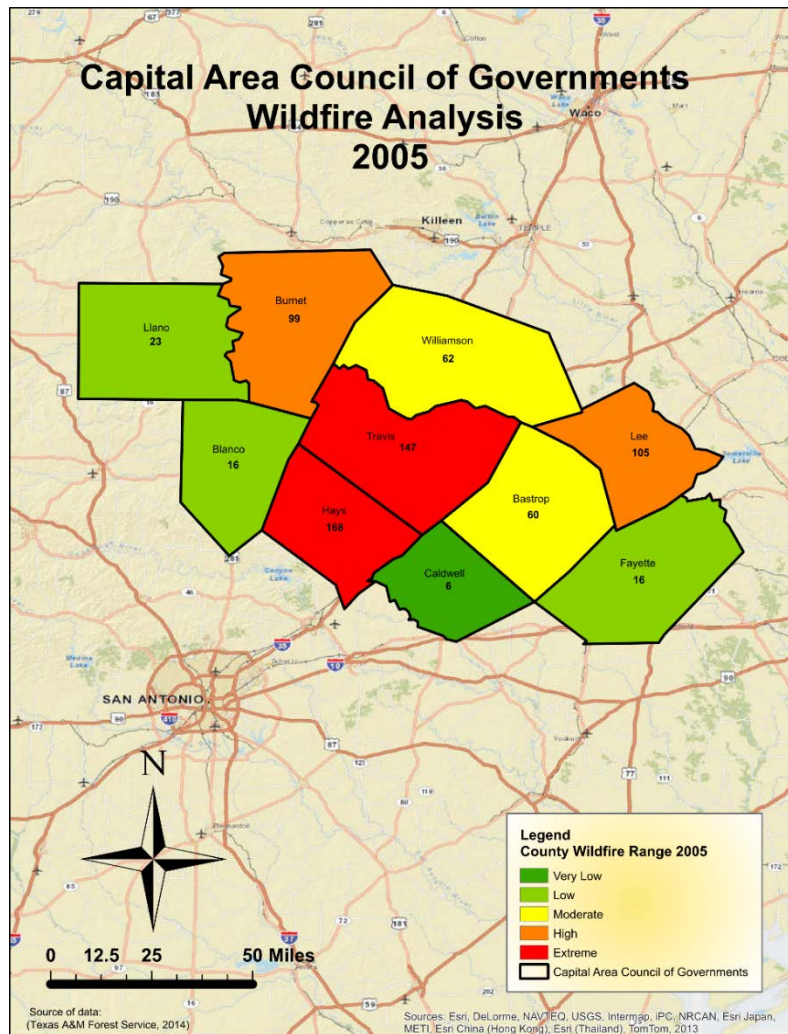


Image by: Emmanuel Rubio Perez and Dr. James Phelps - Used with permission.

acres consumed for each individual county. The assessment of the trends on wildfires and acres burned emphasizes the contributing factors of a decreased precipitation in addition to an escalating drought. This can be identified as data reported demonstrates a steadily increase on fires after 2005. Having data available enables the study on how our local communities may be at risk to the threat of wildfires in the event of a continued decline in precipitation which by nature helps soar drought conditions. Map 1 and Map 2 present a lens of the wild-

fires and acres burned in 2005. Please refer to Appendix A, Appendix B, and Appendix C for a

complete set of maps and tables depicting the wildfire and acre conditions endured throughout the decade.

Drought:

Drought data gathered from the U.S. Drought Monitor unfolds a relationship that threads to the amount of wildfires in the CAPCOG. This is seen in the classification into which the U.S. Drought Monitor categorically monitors the impact of drought severeness. In ordinal form, from least to greatest, the U.S. Drought Monitor labels drought conditions as follows:

- *D0: Abnormally Dry*
- *D1: Moderate Drought*
- *D2: Severe Drought*
- *D3: Extreme Drought*
- *D4: Exceptional Drought.* (U.S. Drought Monitor, 2014).

Map 2. Acres Burned by County 2005

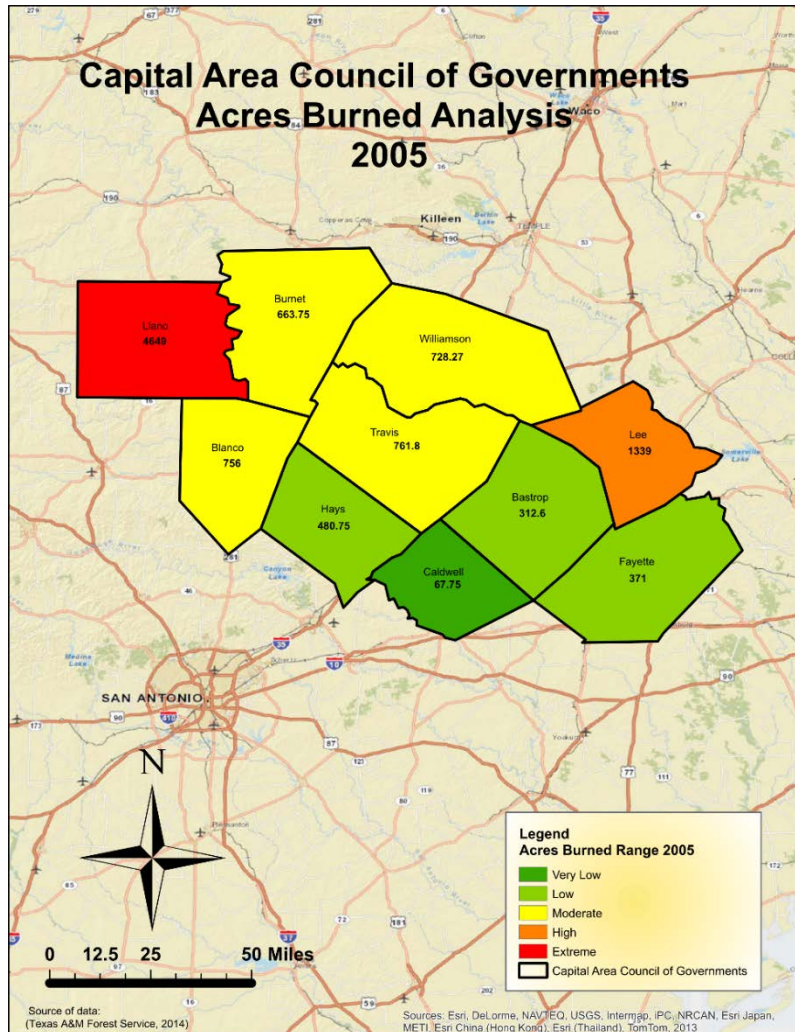


Image by: Emmanuel Rubio Perez and Dr. James Phelps-
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For the COPCOG region each individual county was scrutinized to attain yearly averages for the time period of 2002 to 2012. Table 1 represents Bastrop County and how drought conditions

might have impacted the way the *Bastrop County Complex Fire* engulfed in 2011. Please refer to Appendix D for individual county tables and additional information relating to the U.S. Drought Monitor’s categorical impact evaluation.

Table 1. Bastrop County Drought Conditions, 2002-2012

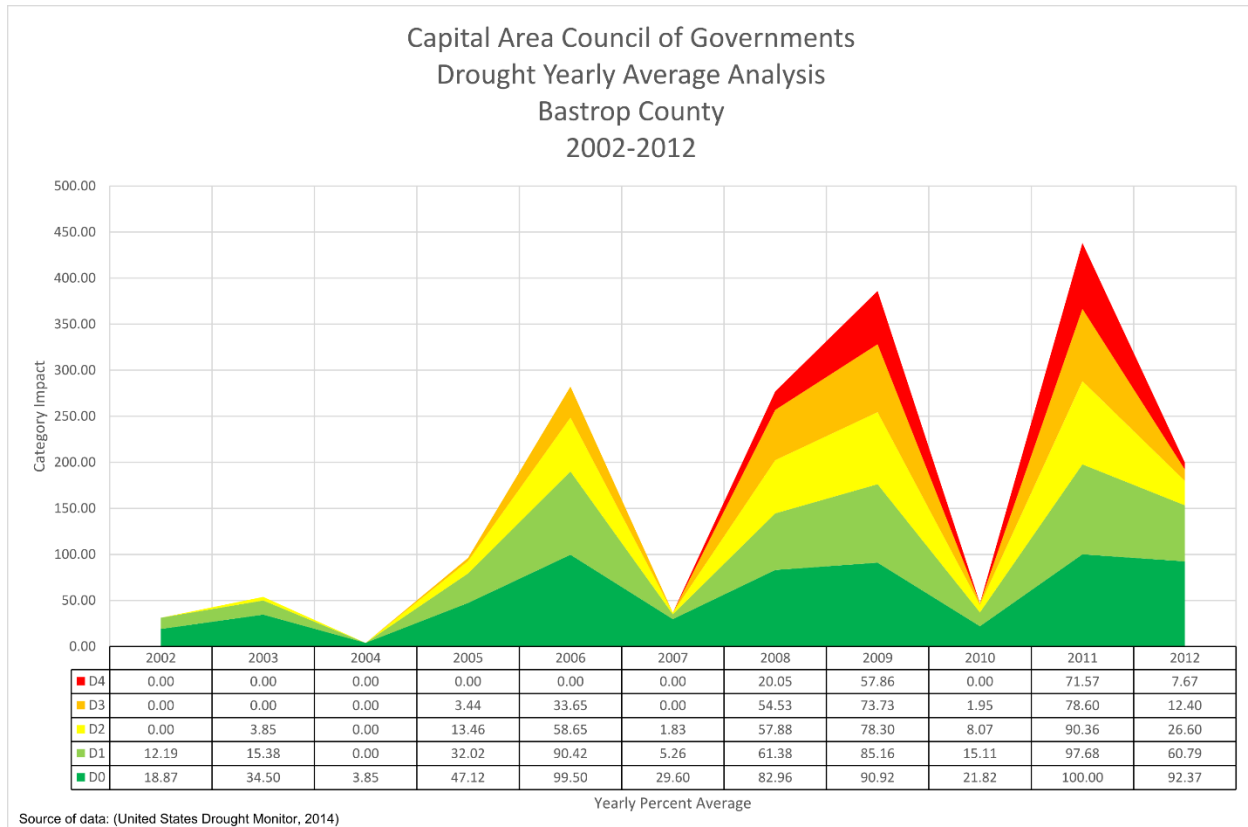


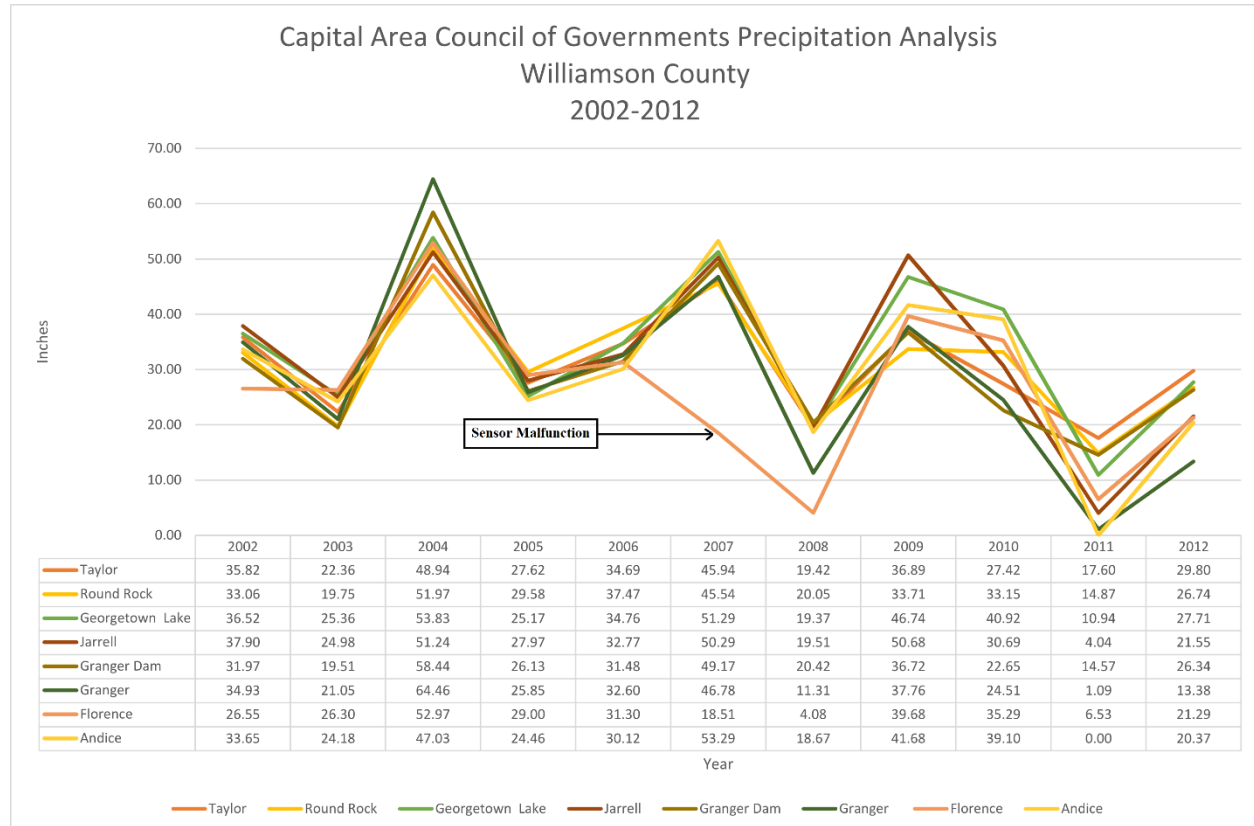
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Precipitation:

Precipitation data collected from the Southern Regional Climate Center also presents interesting results for the CAPCOG. From 2002 through 2012, the yearly trend of precipitation has reflected to be declining in all counties. Adding to the increasing drought conditions, little precipitation may contribute to the disbursement of heavy fires. Table 2 presents an outlook of the amount of precipitation received in Williamson County for the spanned decade. Please refer to

Appendix E for a complete set of individual county tables surveying the precipitation analysis for the CAPCOG territory.

Table 2. Williamson County Precipitation, 2002-2012



Source of data: (Southern Regional Climate Center, 2014)

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Lakes/Reservoirs:

In conjunction to having analyzed the wildfire, drought, and precipitation conditions for the CAPCOG, another important component of this study also involves a review of water availability within the region. Data obtained from the Texas Water Development Board and Water Data for Texas Organization suggests there are nine lakes in area with complete historical data, though for this study only data pertaining the time period of 2002 to 2012 was used. In order to enhance the results of the data, quarterly averages were used as a method to determine how full the lakes were in a yearly basis throughout the decade. Thus, also by utilizing quarterly averages,

the data was able to signify which lakes were constant and which lakes were non-constant. The

Map 3. Quarterly Lake/Reservoir Conditions 2011

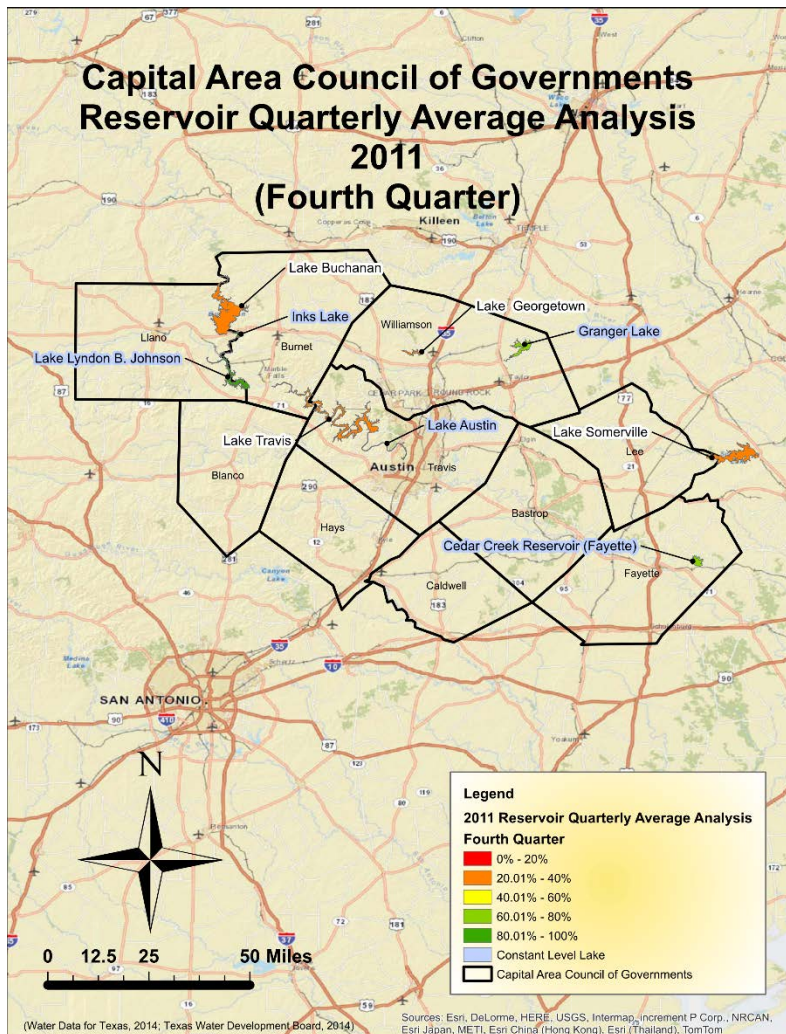


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difference between constant level lakes and non-constant level lakes is due primarily to the functionality of each lake, i.e., how water is used within the communities. For example, Lake Buchanan, a non-constant level lake, supplies water to Inks Lake and Lake Lyndon B. Johnson, both hydroelectric lakes responsible for supplying electricity to communities in the Hill Country area. Inevitably, these lakes will ultimately have to be maintained at a constant level, and in the 2011

fourth quarter, this was epitomized greatly as seen on Map 3.

Highlighting the already poor precipitation within the counties as seen in Appendix E, drought conditions for the majority of the counties was breaching “Exceptional Drought” in 2011. This further suggests that the right conditions for fires to increase was highly probable in the CAP-COG area. Please refer to Appendix F for additional maps and tables containing the yearly quarterly average lake levels sustained in the above referenced decade.

Conclusion:

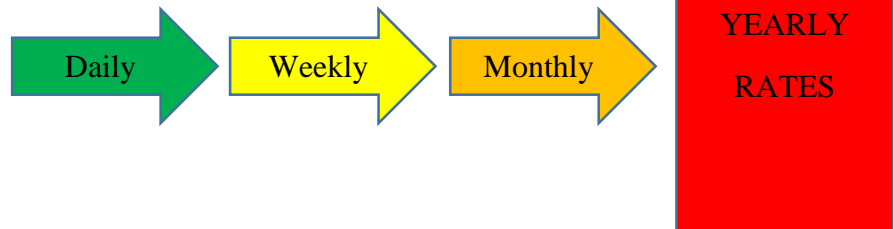
In conclusion, research data reports that after the year 2005, the Capital Area Council of Governments started an escalating trend of wildfires along with a substantial amount of acre damage. Years that most affected the CAPCOG were 2005, 2006, 2008, 2009, and 2011. After 2005, most of the counties started breaching drought 4 category (Exceptional Drought), primarily in years 2006, 2008, 2009, 2011, and 2012-- though to a lesser extent (maybe due to a little more precipitation gathered that year). In comparison to the years of fire and acre data, the findings reflect a relationship between drought conditions as the majority of the years encompass having wildfire and acre damage. Needless to say, years 2012, 2011, 2009, 2008, and 2006 all thread a linkage when it comes to drought 3 and drought 4 categories throughout the CAPCOG. By the same token, the counties also have some drought movement in years 2010, 2007 and 2005, though, to a much lesser degree. In contrast, the precipitation throughout the CAPCOG declined throughout the decade, as depicted by the tables in the precipitation section Appendix E. This would suggest that dry conditions contributed to the increment of wildfires that took place after 2005. Likewise, the lakes throughout the area (with the exception of constant level lakes) also seem to be affected as years 2005, 2006, 2008, 2009, 2011, and 2012 all exemplify low capacity levels.

Recommendation:

In order to successfully evaluate the wildfire and drought conditions throughout the CAPCOG, a reporting strategy needs to be formulated in order to help synchronize efforts in collaboration with the Texas A&M Forest Service. As mentioned above, given that technology has gradually made its way to our local responding units, the reporting of wildfires should be easily attained, and most importantly, maintained. An approach that can be used is to accrue the daily,

weekly, and monthly rates of wildfire conditions for each individual county. Having a system that oversees those three objectives would contribute to produce reliable yearly data. Also, working cooperatively with

other governmental agencies particularly those that monitor drought, precipitation, and reservoir/lake



levels, would tremendously enhance the ease for authorities to establish policies that could help communities withstand nature’s hardships. By the same token, having complete wildfire data from the CAPCOG would enable for local agencies start early to address unburned tinder; institute community outreach efforts to underline wildfire safety and proper preparations; and consider implementing a greater community and responder awareness of the threat and need to abide by burn bans. Reporting all fires as soon as they are identified will be essential to preventing another situation that mimics the losses suffered in the 2011 *Bastrop County Complex Fire*.

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