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# ZUMWALT PRAIRIE WEATHER

## 2016

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*A summary of the weather year based on data from the Zumwalt weather station*



Figure 1. An unusual summer storm on July 10, 2016 brought the second-largest precipitation day of the year. *Photo credit: Heidi Schmalz*

Allison K. Rossman<sup>1</sup>

The Zumwalt Prairie weather station (Lat 45.577745 N, Long -116.971754) has operated since fall of 2005 and provides hourly weather data on precipitation, temperature, and wind speed. This document summarizes and compares to previous years the precipitation and temperature patterns of the 2016 weather year. Summaries are provided for the entire year and for individual seasons.

A detailed description of the weather station is provided in Hansen *et al.* (2010). A summary of long-term climate of the Zumwalt Prairie and nearby areas is provided in Hansen *et al.* (2011).

You can learn more about the weather station, obtain other weather and climate reports, and download data on the web at:

<http://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/oregon/grasslands/zumwalt/weather>

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<sup>1</sup> Zumwalt Field Technician, The Nature Conservancy, 906 S River St, Enterprise, OR 97828 (allison.rossman@tnc.org)

## Summary of the 2016 Weather Year

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The year of 2016 was wetter and warmer than average at the Zumwalt Prairie weather station (Figs. 2 and 3). Total annual precipitation was 38.7 cm (15.2 in), 9.9% (3.5 cm; 1.4 in) more than the 2006-2015 average of 35.2 cm (13.9 in). The proportion of precipitation that fell during the growing season (defined as April 1 – July 31) was 46%, slightly more than the average of 42%. The 2016 “water year”, occurring from October 1, 2015 to September 30, 2016, was the second wettest on record behind 2010, with 40.5 cm (16.0 in) of precipitation. This was 15.5% more than the average water year.

The annual average temperature for 2016 at the weather station was 6.5 °C (43.7 °F; Fig. 3). It was 0.57 °C (1.0 °F) more than the 2006-2015 average, making it the second warmest year on record behind 2015, which was 1.2 °C (2.2 °F) hotter than average. Despite a warmer than average annual temperature, temperatures during the typically hottest month, July, and coldest month, December, were lower than average (by 2.3 °C [4.1 °F] and 3.1 °C [5.5 °F], respectively; Fig. 3).

Month-to-month precipitation was variable; seven months were above-average and five were below-average (Fig. 4). Most precipitation fell between February and July, except for an unusual spike in October. There was no precipitation in January, but starting in March, cumulative precipitation was consistently above average. Monthly average temperatures followed a predictable pattern, with the hottest average temperature occurring in August, the coldest in December, and intermediate temperatures between these months. While August temperatures were near the 2006-2015 average, December was quite a bit colder than usual. Additional monthly patterns and wind events are discussed in the following Seasonal Summaries.

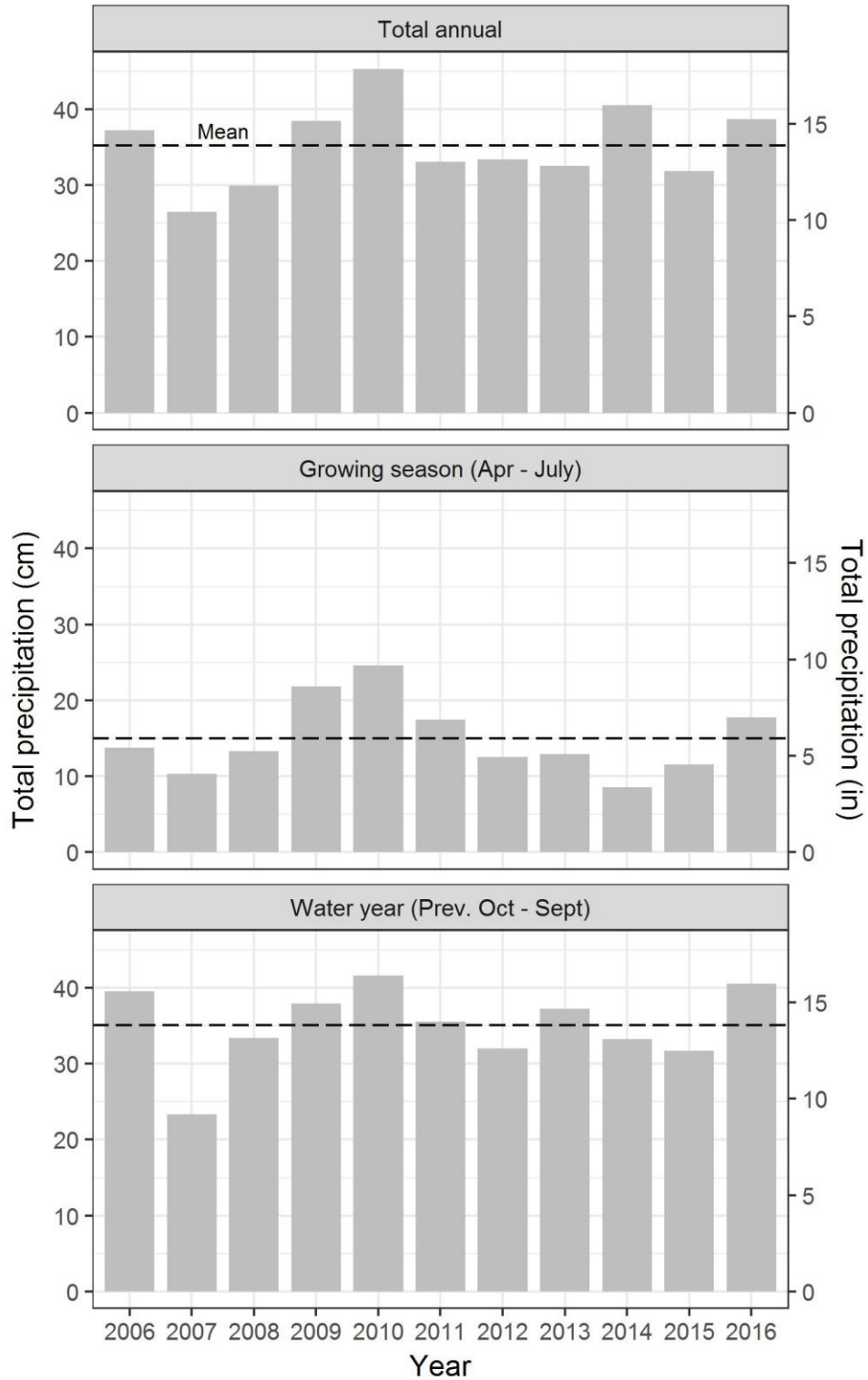


Figure 2. Total precipitation recorded by the Zumwalt weather station each calendar year, growing season (April 1 – July 31), and water year (for 2016, October 1, 2015 – Sept 30, 2016). Dashed lines are the 2006 – 2016 means.

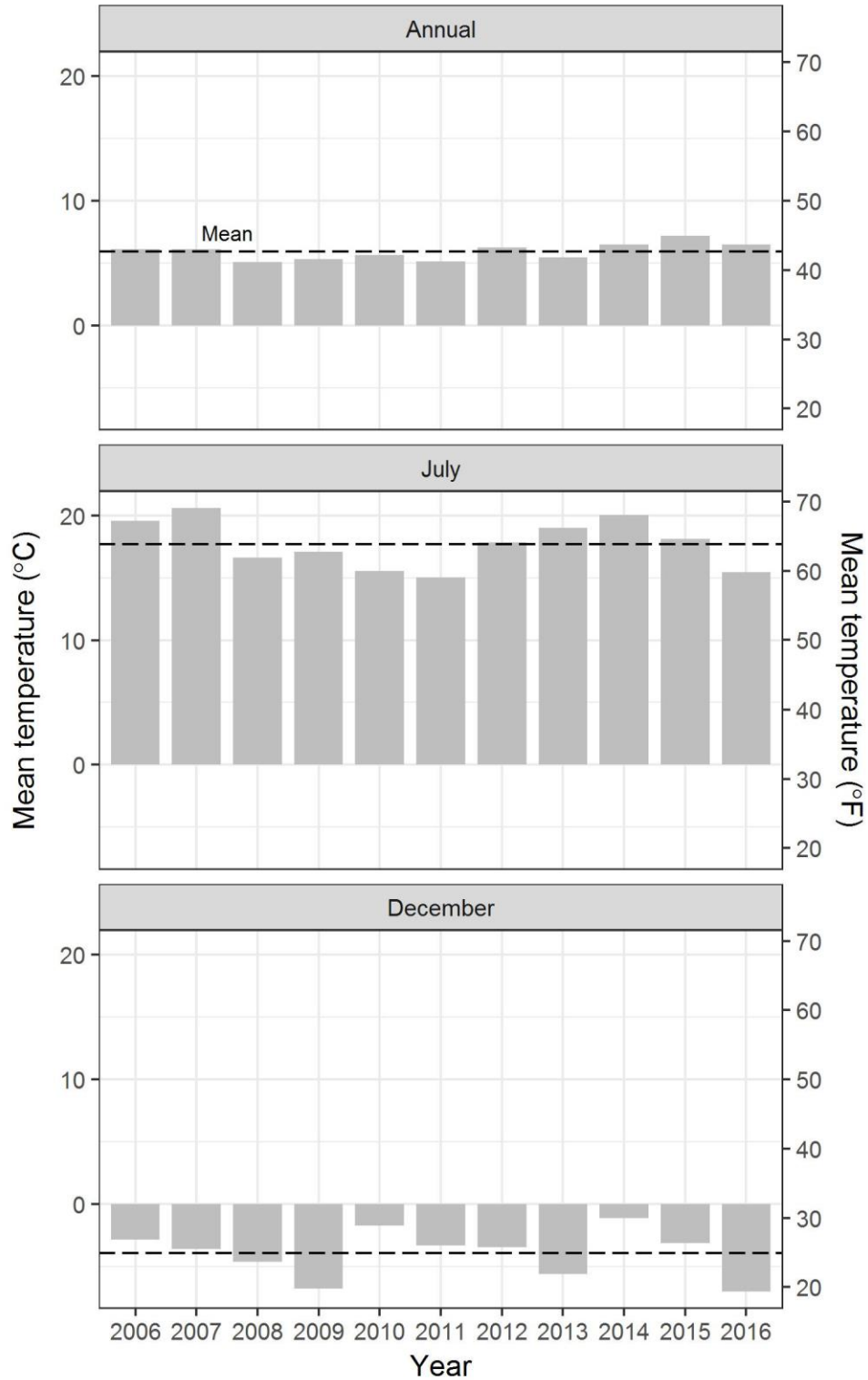


Figure 3. Mean temperatures recorded by the Zumwalt weather station for each calendar year, the month of July, and the month of December. Dashed lines are the 2006 – 2016 means.

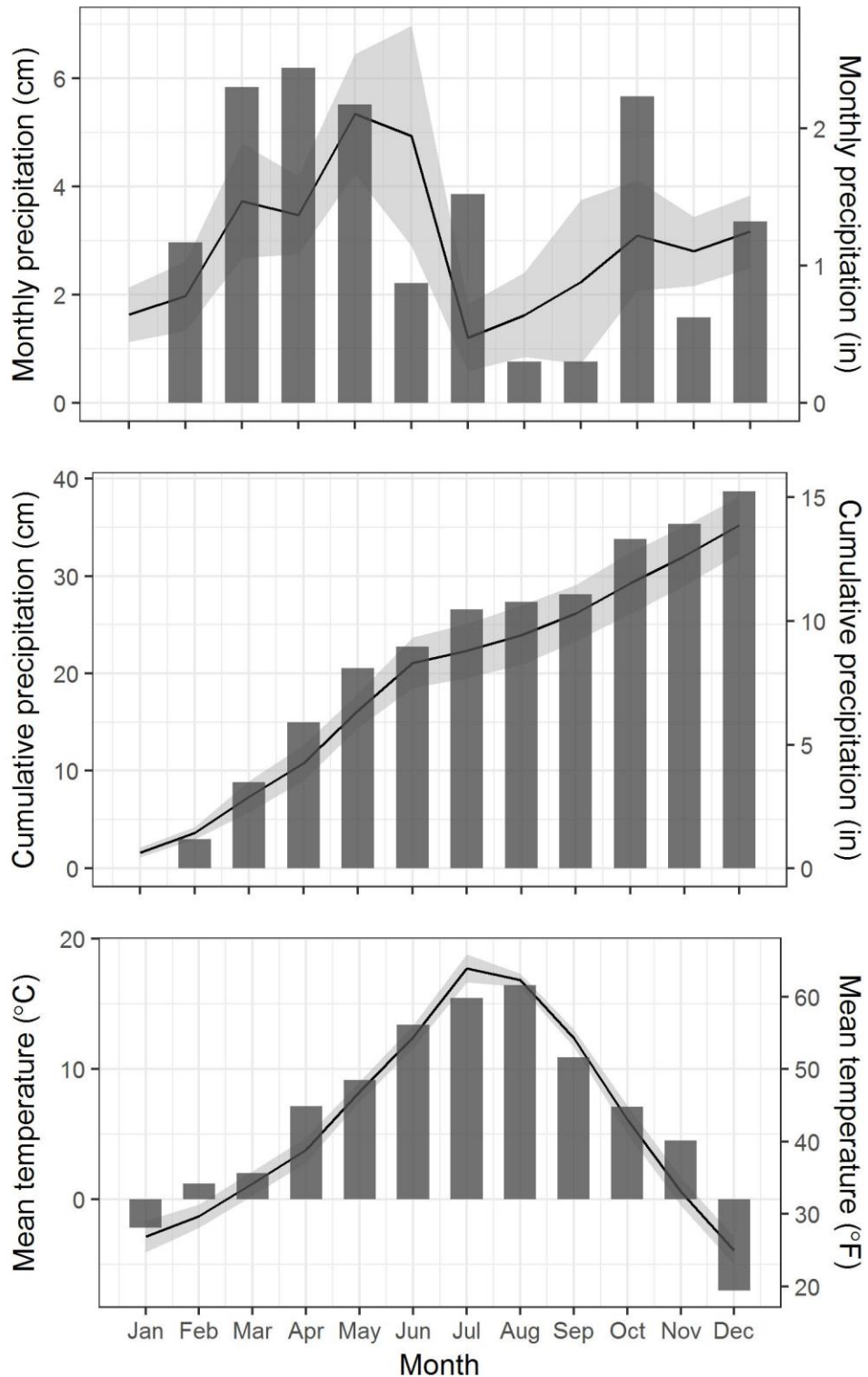


Figure 4. Total monthly precipitation, cumulative precipitation, and average temperature for each month of 2016 shown with bars. Continuous black lines are the 2006-2015 means. Grey bands represent the 90% confidence intervals of the means.

## Seasonal summaries

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### Winter (January, February, March)

The year started out extremely cold and dry (Fig. 5). The mean temperature on January 1 was -17.6 °C (0.3 °F), and the next day was not much warmer. January 1 was also the least windy day of the year. While the mean temperature in January was near normal (-2.2 °C or 28.1 °F), no rain or snow fell, which was unusual. Precipitation fell regularly over the next two months, and the winter total was 8.8 cm (3.5 in), 122% of average. Based on high wind speeds and precipitation, notably stormy periods were February 17-19 and March 9-13.

### Spring (April, May, June)

Spring was characterized by slowly warming temperatures. Four rain events, each with more than 1.6 cm (0.6 in) of moisture, occurred between April 23 and May 15 (Fig. 6). Rainy days during the season, which occurred approximately weekly, were accompanied by cooler temperatures that otherwise warmed from a daily mean of 7.2 °C (44.9 °F) to 19.6 °C (67.3 °F) over the season. June precipitation was just 45% of average, but the season total was 1% more than average.

### Summer (July, August, September)

Summer temperatures in 2016 were slightly cooler than normal and precipitation patterns were atypical (Fig. 4). July is typically the hottest and driest month of the year, but in 2016 there were several days of substantial precipitation that were accompanied by cool temperatures (Fig. 7), making August the hottest and nearly driest month of the year (with less than 1 cm of rain). The second-largest precipitation event of the year brought 2.2 cm (0.9 in) of rain on July 10. Temperatures dropped abruptly in September. Highs went from a mean of 27.8 °C (82.1 °F) in the last week of August to 17.5 °C (62.4 °F) the first week of September. Three days (September 12-14) had mean temperatures of just 6.1 °C (43.0 °F). However, the last five days in September provided a reprise of summer with temperatures reaching at least 23.6 °C (74.4 °F) each day. Like August, September had less than 1 cm of rain, but the July rains resulted in a season total 112% of typical summer precipitation.

### Fall (October, November, December)

Moderate temperatures and steady precipitation in October gave way to falling temperatures and pulses of precipitation beginning in mid-November (Fig. 8). The highest precipitation event of the year occurred on December 4, as measured by 2.4 cm (1.0 in) in the rain gauge. The coldest temperature observed during the year was -27.9 °C (-18.2 °F) on December 17. The month was easily the coldest of the year, with temperatures well below average (Fig. 4), setting up what was to be a remarkably cold and snowy Winter 2017. The fall season in total saw 116% of typical precipitation.

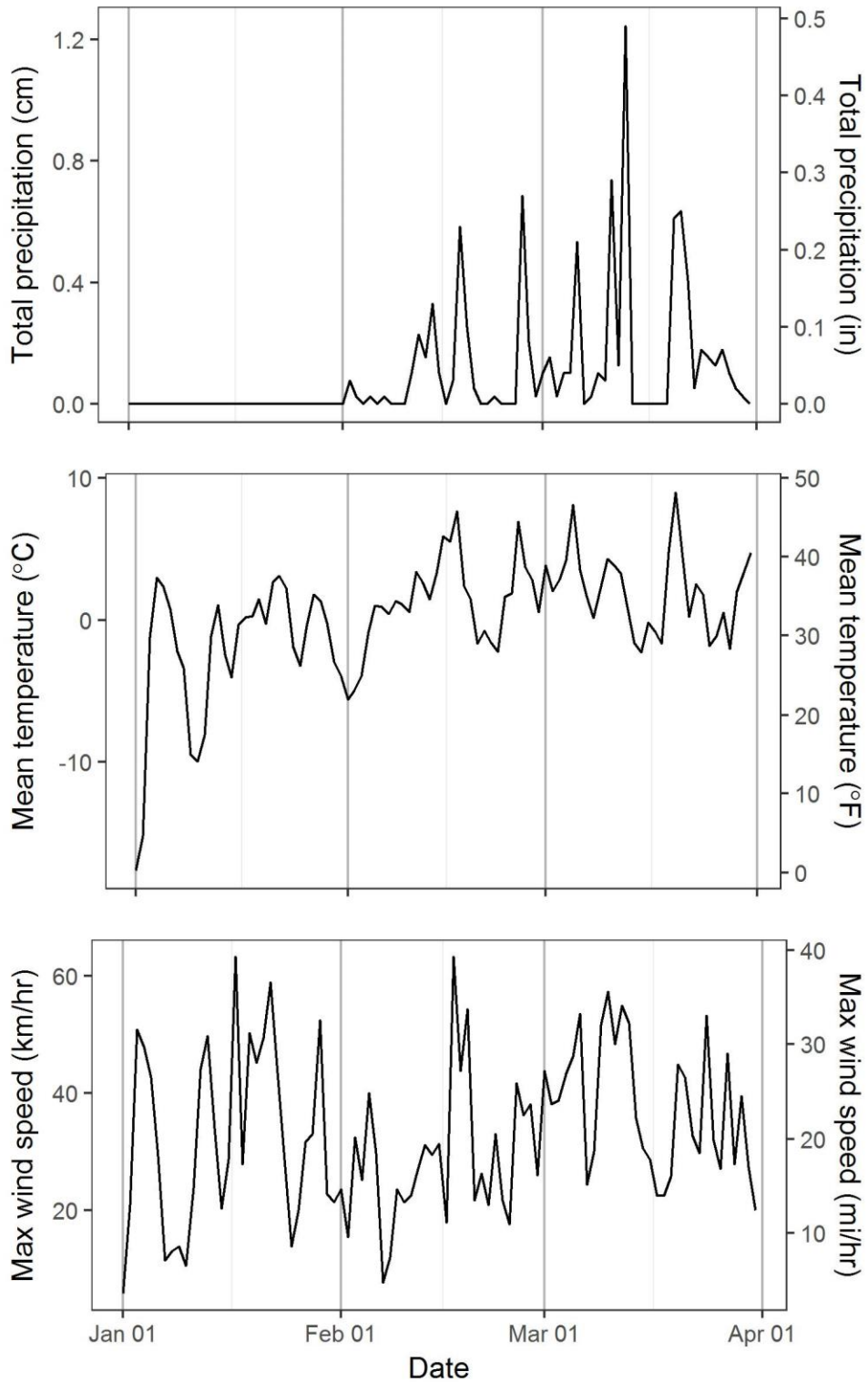


Figure 5. Daily precipitation, temperature, and maximum wind speed during Winter 2016 (January, February, and March).

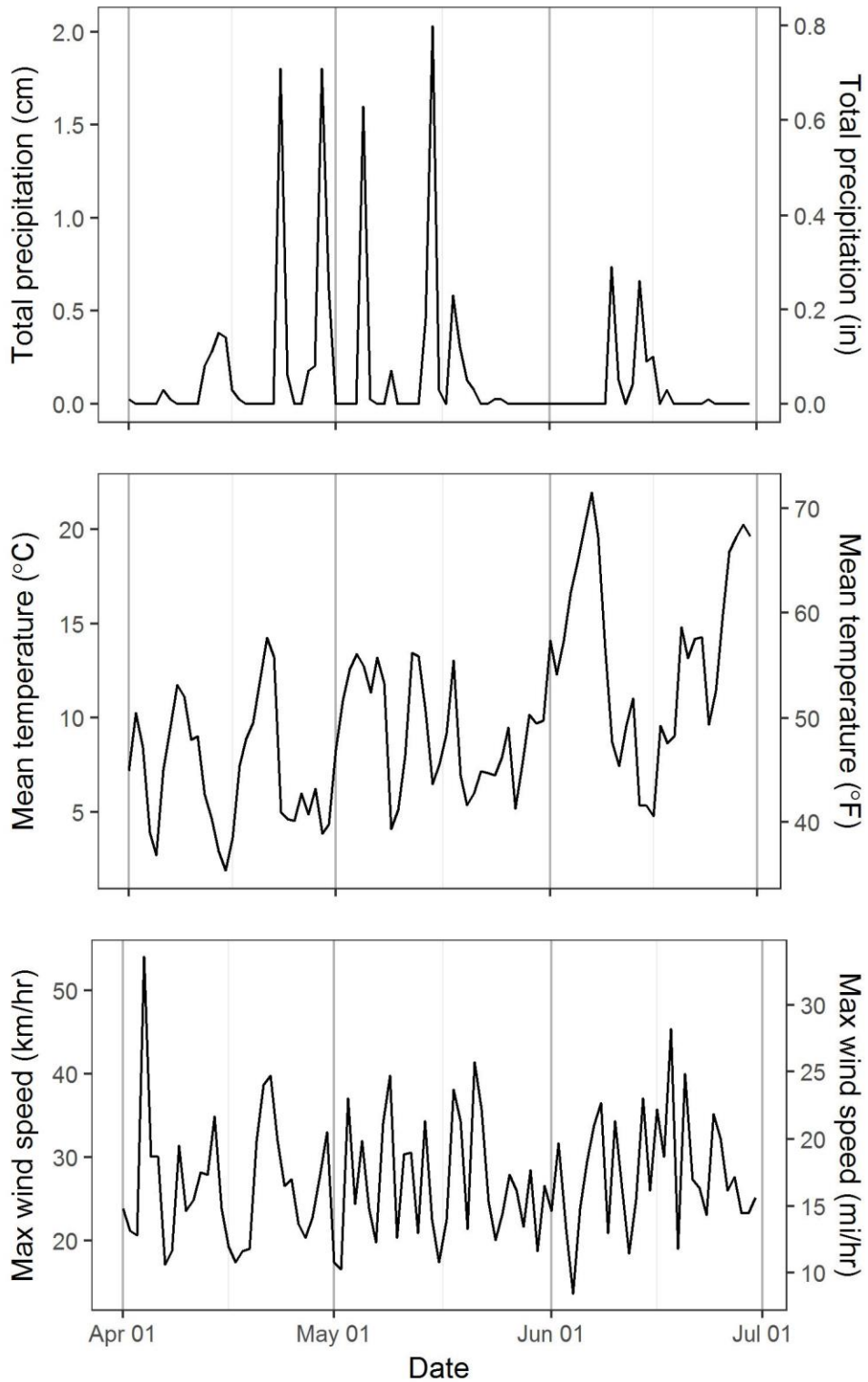


Figure 6. Daily precipitation, temperature, and maximum wind speed during Spring 2016 (April, May, and June).



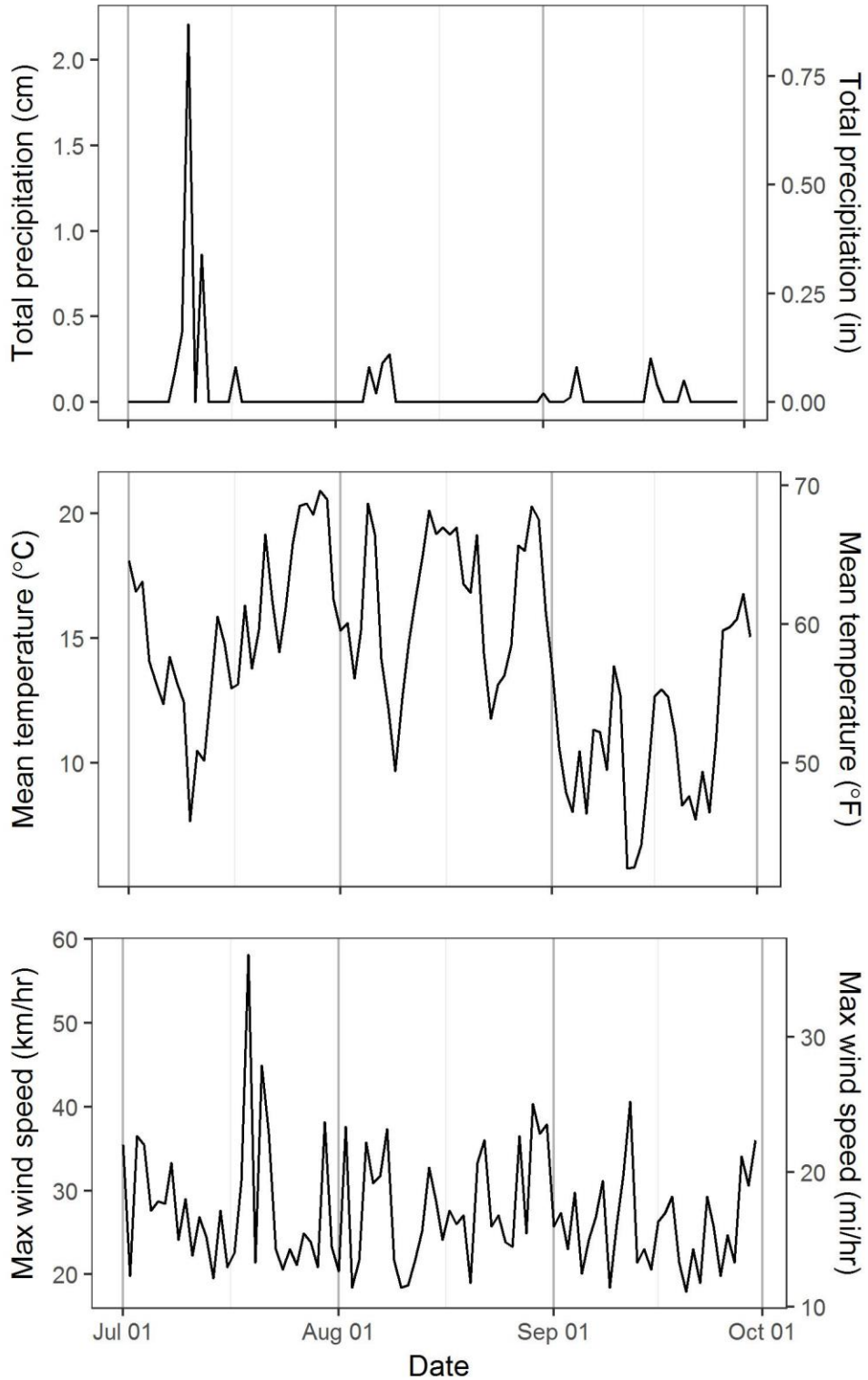


Figure 7. Daily precipitation, temperature, and maximum wind speed during Summer 2016 (July, August, and September).

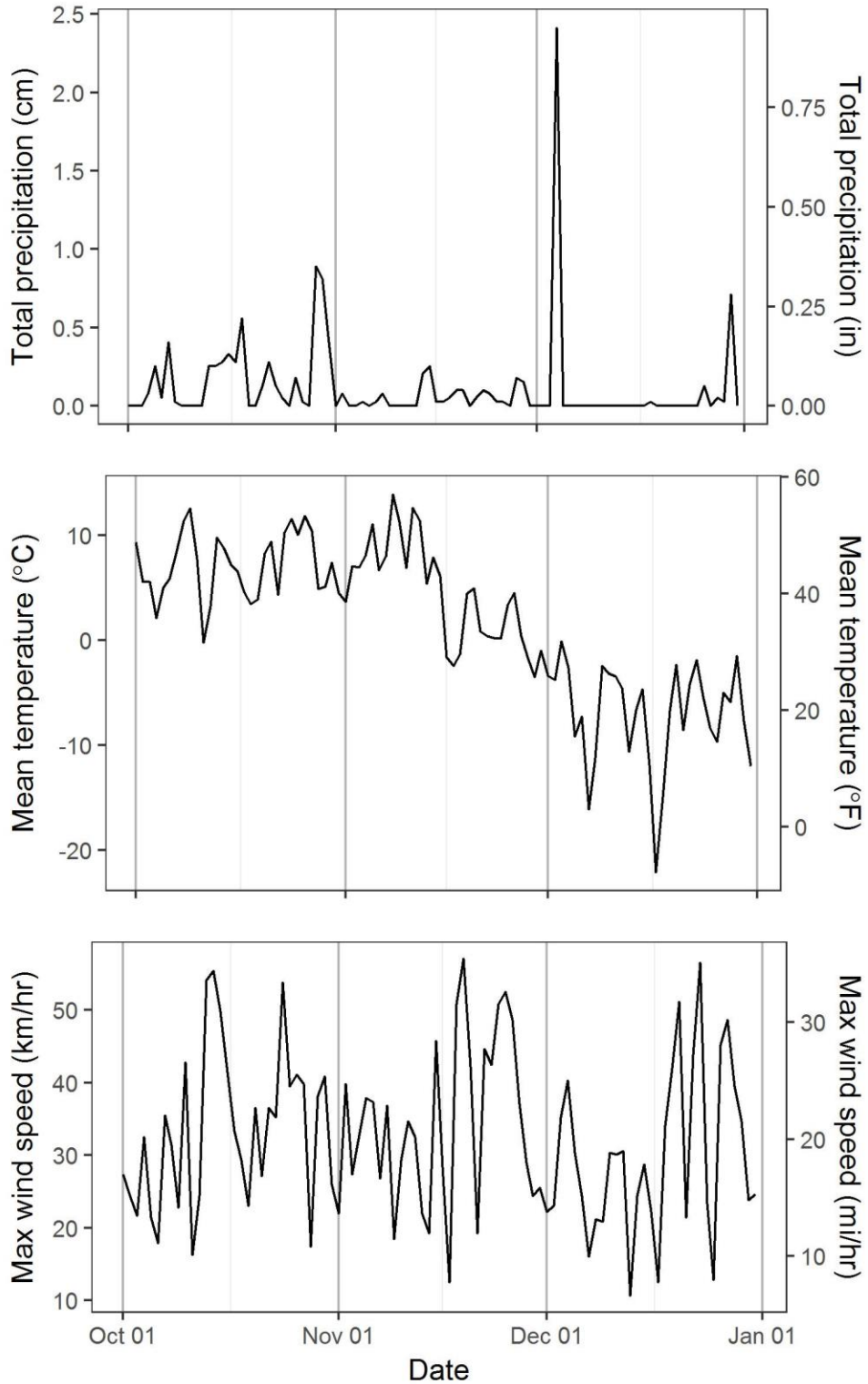


Figure 8. Daily precipitation, temperature, and maximum wind speed during Fall 2016 (October, November, and December).

## Acknowledgments

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## References

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Hansen, J. D., V. S. Jansen, and R. V. Taylor. 2010. Zumwalt Weather and Climate Annual Report (2006-2009). The Nature Conservancy, Enterprise, OR.

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