



Obed Wild and Scenic River Annual Climate Summary for 2007

Natural Resource Data Series NPS/APHN/NRDS—2010/041



ON THE COVER

Lilly Rapid on Clear Creek, 2008
Photograph by Patrick Flaherty

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Glossary

Climatological Normal - The prevailing set of weather conditions calculated over a 30-year period, presently 1971-2000. Note that the Climatological Normal taken over different periods of time (30 years, 1000 years) may be different.

COOP- Citizen Operated Weather Station

RAWS- Remote Automated Weather Station

Abstract

The average annual temperature at the Crossville COOP station for 2007 was 2.9 degrees F warmer than the 1971-2000 Climatological Normal 30-year average; summer months exhibited temperatures above average with extreme months being March and August at 7.5 and 7 degrees above the Climatological Normal for those months. The average 2007 temperature at Lancing was 1.4 degrees above average with March the extreme month, at 6 degrees above average.

Precipitation at Crossville was 38.5 inches for 2007, with 57.2 being average for the previous Climatological Normal 1971-2000 (-18.6 inches below average, 67.4% of average). The precipitation for the 2007 Lancing station was 42.94 inches, with 52.67 being average for the 1990-2006 station record (-10.42 inch difference, 80.5% of average). Extreme months were March for Crossville at 4 inches below average and December for Lancing at 3.4 inches below average. This was the second driest summer since records began in 1895 for Tennessee and the 1st driest for the period for January-October (NCDC 2008).

Introduction

Obed Wild and Scenic River (OBRI) is located in the northern Cumberland Plateau of Tennessee in Cumberland and Morgan counties, approximately 10 miles NE of Crossville, TN (Figure 1). OBRI is a temperate eastern park, and the climate is characterized by relatively high annual precipitation, high summer average humidity, and periodic flooding of the rivers and creeks from big rain events (Emmott et al. 2004). The climate in OBRI for 2007 reflected both local scale climatological disturbances, and the larger synoptic climatic signal experienced by the southeastern United States.

Methods

In this report, two stations near the park boundary were selected for data analysis, Crossville Memorial Airport (approximately 10 miles SW) and Lancing 6S (approximately 2 miles N). The stations were selected so Crossville, located near the top of the Obed River drainage, would represent precipitation entering the park from the SW and Lancing would represent weather near the confluence of the Obed River with Clear Creek, two of the park's major park drainages. Weather data has been collected at Crossville Memorial Airport since 4/1/1954, and Lancing 6S provides weather records since 5/17/1989.

Results

Data Completeness and Reporting

The OBRI weather and climate monitoring network consists of no presently running stations in the park, and two occurring relatively near the park boundary (Figure 1). Other stations are available for weather information in the area. At each of the stations, three climate statistics are collected on a daily schedule (temperature, snow, and precipitation). For 2007, data completeness and quality was good with all stations reporting more than 97% of all potential measurements. A summary of data completeness is provided in Table 1.

Averages from the Crossville Airport COOP station are represented by the Climatological Normal (30 year history 1971-2000), however the Lancing COOP station averages come from the complete yearly station record, from 1990 to 2006 (17 years). In 2007, Lancing had 4 days of temperature data missing for March, and 5 days of temperature data missing for September. Lancing had 6 days of precipitation data missing for 2007.

Table 1. OBRI data completeness (percentages) for 2007. For complete station metadata and descriptions of the weather monitoring equipment see: Davey, C.A. et al., 2007.

Station	Temperature	Precipitation	Wind	Snow	Solar Radiation
Crossville Memorial Airport(COOP)	100	100	NA	100	NA
Lancing 6S (COOP)	98	99	NA	100	NA

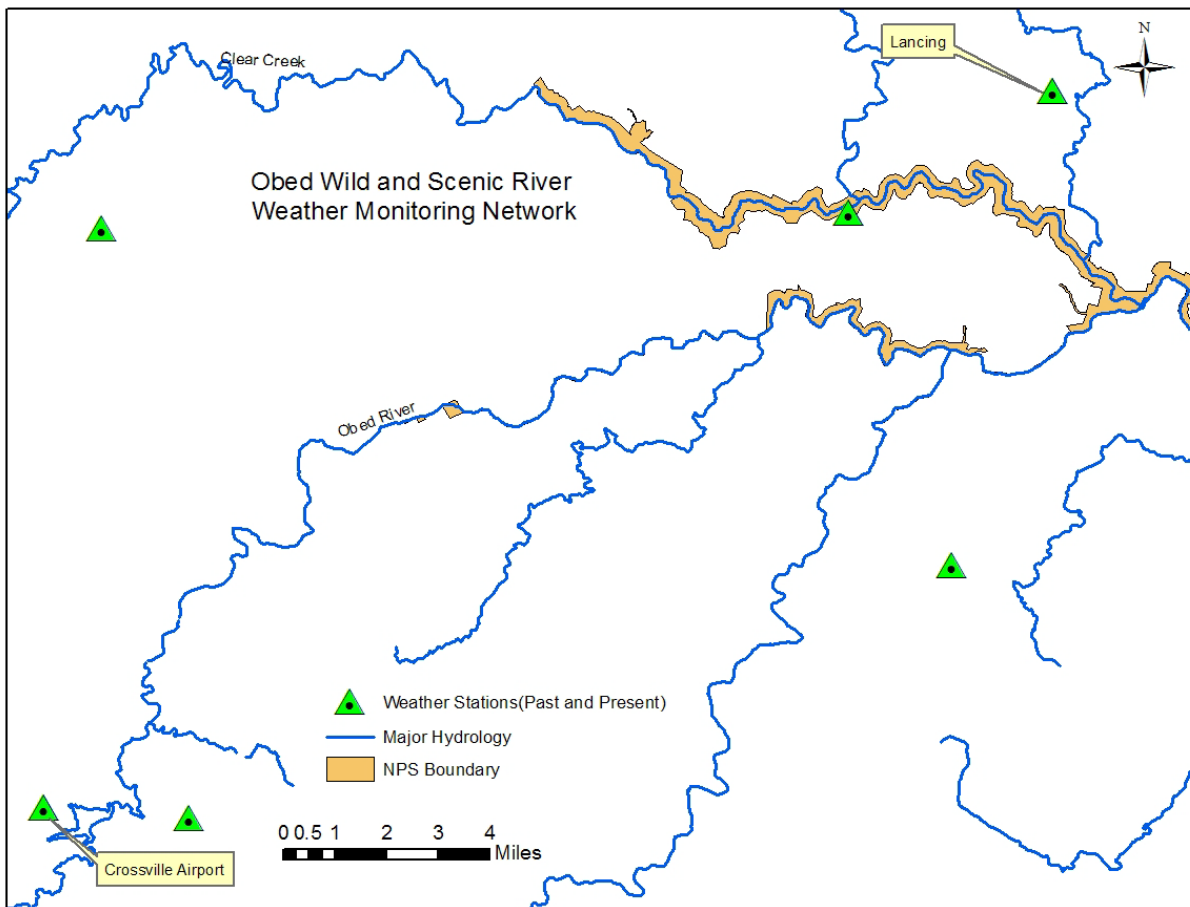


Figure 1. Map of the Obed Wild and Scenic River weather monitoring stations.

Temperature

Data records for temperature have been collected near OBRI for almost 90 years: Crossville Experimental Station (COOP) has been operating since 1928. These records indicate a fluctuating temperature cycle that has shown steady increases in temperature since 1976 (NOAA 2008). 2007 data from Crossville and Lansing showed average monthly temperature 5 degrees F above average for March and December. All reporting stations showed February as the only month with a below average monthly temperature: -5.3 and -6.7 degrees F for Crossville and Lansing, respectively.

These increased temperatures were consistent with NOAA reports showing the 2007 average temperature for the contiguous United States in March at least 5 degrees F warmer than average, making March 2007 the second warmest on record. Based on preliminary data, March was 5.6 degrees F (3.1 degrees C) warmer than the 20th century mean of 42.5 degrees F (5.8 degrees C) (NOAA 2008). Besides March, August and October, temperatures for the rest of the year were near long-term averages except for a notable 4 degree above average December: +6.4 and +4.6 from Crossville and Lansing respectively.

Table 2. 2007 monthly temperature data summaries for Crossville, elevation 1867 ft.
Values are in degrees F.

Month	Mean Max.	Mean Min.	Mean	Departure from Normal 1971-2000	Highest	High Date	Lowest	Low Date
Jan	46.2	30.2	38.2	3.1	66	13	7	29
Feb	43.6	23.9	33.8	-5.3	65	28	10	16
Mar	65.3	43.8	54.6	7.5	82	25	22	4
Apr	63	42.1	52.6	-2.6	82	30	20	8
May	78.1	53.4	65.8	2.8	85	1	37	19
Jun	83.4	61.1	72.3	1.9	88	23	53	21
Jul	82.6	65	73.8	-0.6	89	8	53	22
Aug	90.9	69.5	80.2	7	98	23	64	13
Sep	81.7	59.1	70.4	3.3	91	5	44	29
Oct	72.2	51.6	61.9	5.7	86	7	33	30
Nov	58	35.7	46.9	0	71	21	24	30
Dec	54.1	36.2	45.2	6.4	72	11	22	17

Table 3. 2007 monthly temperature data summaries for Lansing, elevation 1520 ft.
Values are in degrees F.

Month	Mean Max.	Mean Min.	Mean	Departure from Normal 1990-2006	Highest	High Date	Lowest	Low Date
Jan	48.7	28.9	38.8	2.7	69	15	6	30
Feb	44	20.9	32.5	-6.7	68	22	7	1
Mar	65.1	37.9	51.5	6.0	84	26	21	4
Apr	64.4	39.5	52	-2.4	82	4	17	9
May	79.7	50	64.9	2.7	87	30	34	19
Jun	85.6	57.5	71.6	1.9	90	25	49	21
Jul	83.8	58.9	71.4	-2.7	90	9	50	23
Aug	92.1	62.8	77.5	4.6	99	17	51	13
Sep	83.1	54.8	69	2.7	90	6	40	29
Oct	72.7	46.6	59.7	3.8	85	9	28	31
Nov	58.1	32	45.1	-0.9	71	22	19	24
Dec	53	32.9	43	5.0	75	12	18	18
Annual	69.2	43.6	56.4	1.4	99	Aug	6	Jan

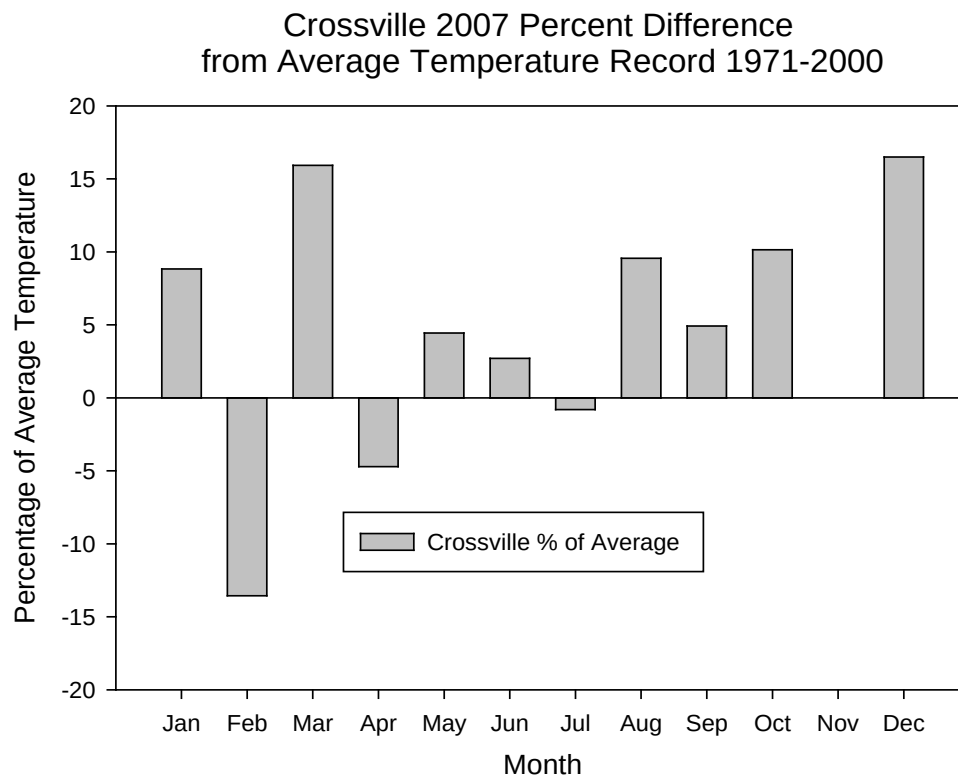
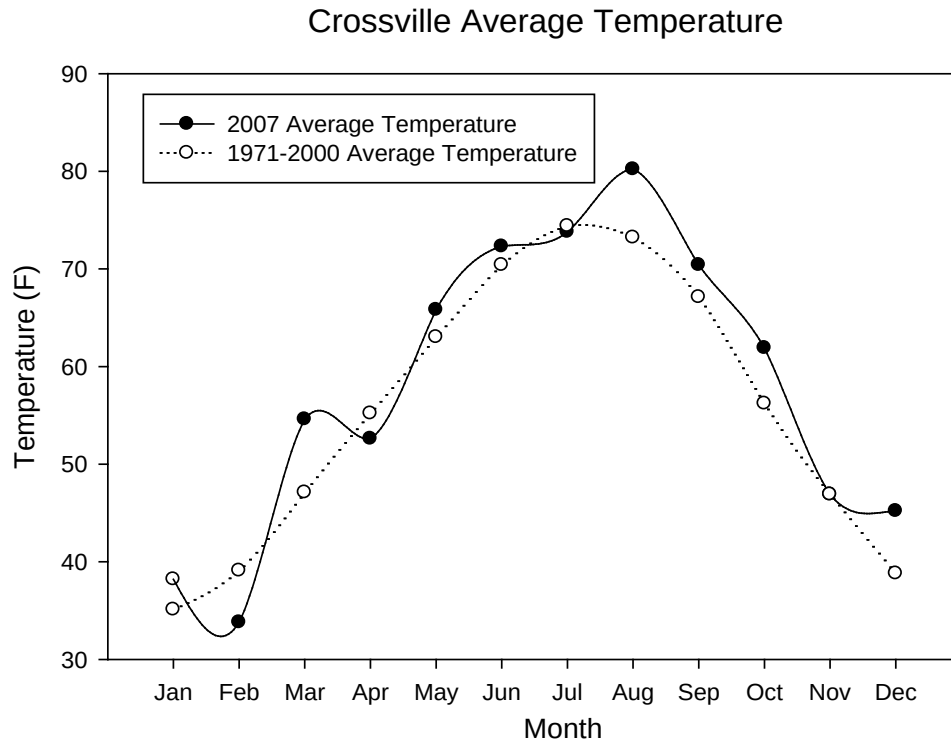


Figure 2. Comparison of 2007 average monthly temperatures with monthly averages for the Climatological Normal (1971-2000) for Crossville: a) absolute differences and b) percentage differences.

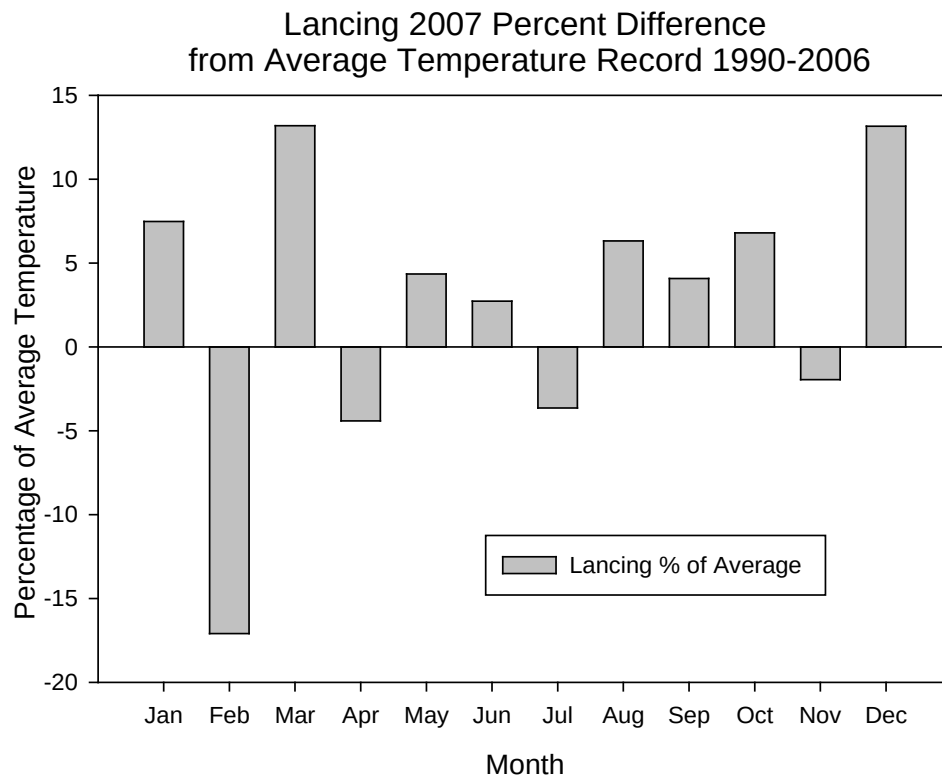
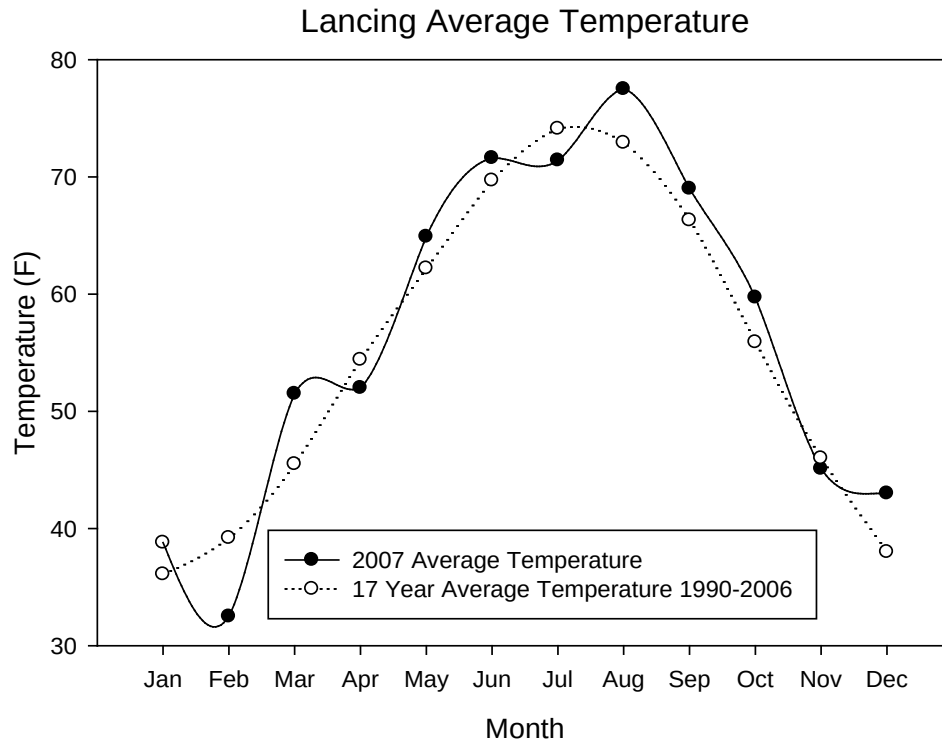


Figure 3. Comparison of 2007 average monthly temperatures with monthly averages for the period of record (1990-2006) for Lancing: a) absolute differences and b) percentage differences.

Precipitation

Precipitation data has been collected at Crossville Airport since 4/1/1954, Lancing 6S since 5/17/1989. The 2007 records show annual precipitation was quite low with the annual totals being 38.5 and 42.9 inches for Crossville and Lancing, respectively (Table 4). Data was spatially variable, with Crossville showing an 18.6 inch deficit and Lancing only a 10.4 inch deficit (Table 4; Figures 8 and 9). January to March precipitation was uncharacteristically low with Crossville at 8.7 inches below average, and Lancing -5.4 inches for the period. December notably recorded 2.1 inches below average for Crossville, and -3.1 inches for Lancing. 2007 was the second driest summer since records began in 1895 for Tennessee and the 1st driest for the period for January-October (NCDC 2008).

Table 4. 2007 precipitation compared with average monthly precipitation at Crossville (1971-2000, 30 year record) and Lancing (1990-2006, 17 year record). Values in inches.

Month	Crossville 2007	Crossville Difference from Average	Lancing 2007	Lancing Difference from Average
January	3.01	-2.14	3.31	-1.63
February	1.9	-2.43	2.21	-2.19
March	1.95	-4.12	3.23	-1.59
April	4.54	-0.06	4.18	-0.43
May	4.36	-1.12	2.5	-2.06
June	2.43	-2.3	3.04	-2.3
July	4.78	-0.35	7.38	2.26
August	0.92	-3.15	1.97	-1.49
September	3.84	-0.07	3.17	-1.08
October	3.34	0.1	5.34	2.85
November	4.4	-0.83	4.5	0.65
December	3.03	-2.13	2.11	-3.41
Totals	38.5	-18.6	42.94	-10.42

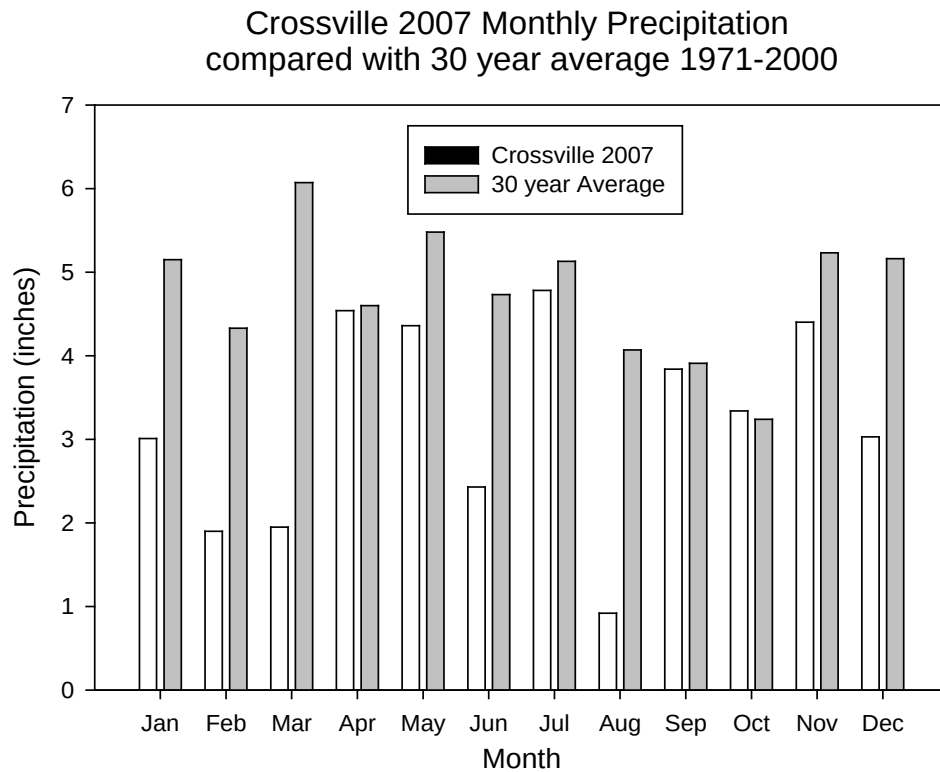
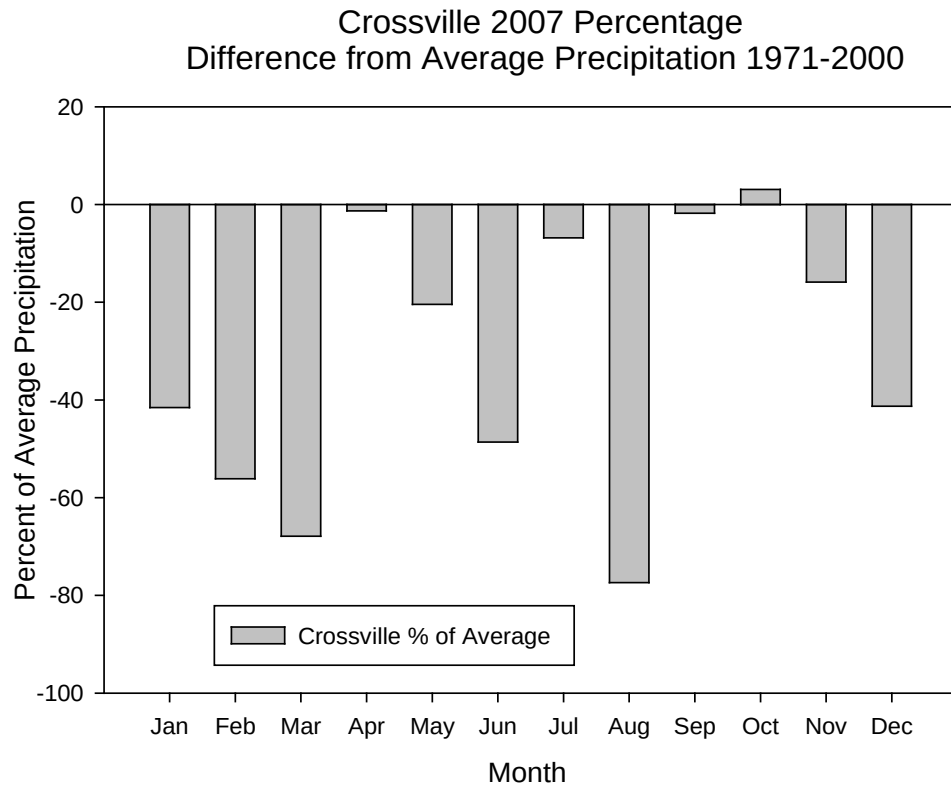


Figure 4. Comparison of 2007 average monthly precipitation with monthly averages for the Climatological Normal (1971-2000) for Crossville: a) percentage differences and b) absolute differences.

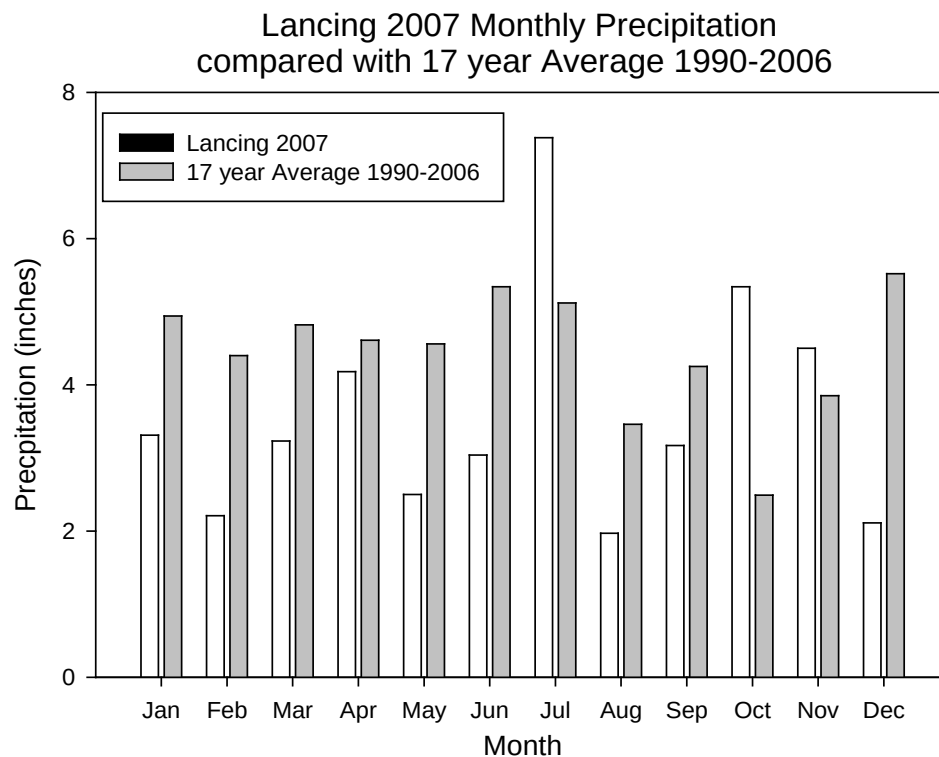
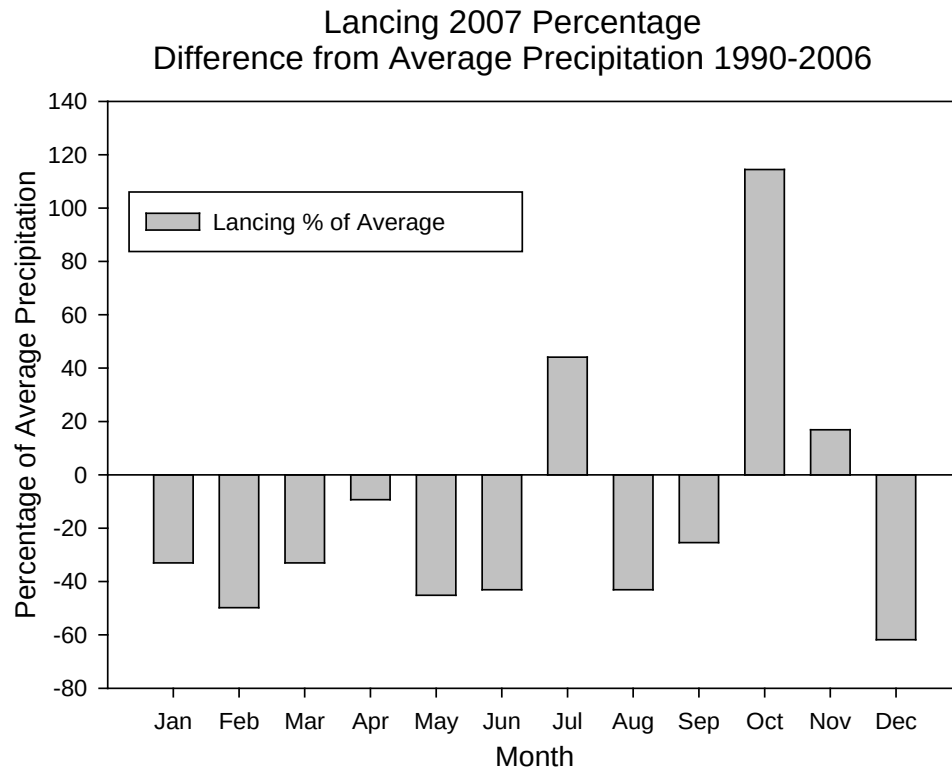


Figure 5. Comparison of 2007 average monthly precipitation with monthly averages for the period of record (1990-2006) for Lancing: a) percentage differences and b) absolute differences.

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