

Range Cattle Research and Education Center

April 2024

Research Report RC-2024-1

CLIMATOLOGICAL REPORT 2023
Range Cattle Research and Education Center

Brent Sellers

Weather conditions strongly influence agricultural operations from planting through harvesting. Knowledge of annual rainfall and temperature cycles, along with their extremes, help producers determine optimum times to prepare and plant seedbeds, fertilize pastures, apply herbicides, control water, and supplement cattle on pasture or range. Weather conditions influence forage seed germination, growth and development, palatability, and nutritive value.

This research report presents a summary of weather conditions observed during 2023 at the Range Cattle Research and Education Center (RCREC), Ona, Florida. The center is located 81° 56.406' W and 27° 23.733' N in south central Florida approximately 45 miles (72 km) east of the Gulf of Mexico and 100 miles (160 km) west of the Atlantic Ocean. Weather observations were collected with a Weather Watch 2000 (Campbell Scientific, Inc.) from 1997 until 2005. Beginning in 2006, observations were collected using the Florida Automated Weather Network (FAWN). Measurements reported prior to 2006 were recorded at 0900 h; thus, data on a given day represented the previous 24-hour period. Beginning in 2006, measurements were recorded for an entire 24-h period beginning at midnight.

Daily observations of rainfall, temperature, and solar radiation are summarized in Table 1. These data are then compared to an 82-year summary of rainfall data and an 80-year summary of temperature data collected at this location. In addition, monthly evapotranspiration and freeze hazard information are reported.

Table 1. Daily maximum and minimum temperature, precipitation, and solar radiation for 2023, Range Cattle REC.

Day	January				February				March				April			
	Max °F	Min °F	Rain inch	S Rad MJ/m ²	Max °F	Min °F	Rain inch	S Rad MJ/m ²	Max °F	Min °F	Rain inch	S Rad MJ/m ²	Max °F	Min °F	Rain inch	S Rad MJ/m ²
1	83.77	65.84	0.00	8.40	85.80	59.47	0.00	10.27	86.72	56.48	0.01	18.19	88.79	56.95	0.00	19.50
2	84.18	63.07	0.00	11.15	84.40	60.91	0.00	14.34	87.13	53.38	0.00	19.54	90.59	63.23	0.00	19.31
3	83.93	60.66	0.00	10.54	81.23	54.16	0.01	7.98	86.20	63.25	0.00	18.35	90.93	58.66	0.00	20.87
4	84.72	65.03	0.00	9.81	77.07	50.90	0.00	14.14	86.77	63.03	0.00	17.19	91.49	59.54	0.00	21.43
5	83.07	63.99	0.21	10.01	81.09	56.66	0.00	12.98	89.20	61.54	0.00	13.96	90.50	63.10	0.00	20.99
6	73.06	48.06	0.00	14.96	79.70	54.72	0.00	16.65	90.43	64.89	0.00	17.31	91.00	65.37	0.00	21.32
7	74.86	40.09	0.00	14.66	80.40	52.68	0.00	16.77	86.68	61.03	0.00	18.85	92.59	62.13	0.00	19.39
8	78.31	48.65	0.00	12.63	81.75	52.95	0.00	16.65	87.62	60.82	0.00	16.32	90.79	58.24	0.00	20.43
9	79.11	50.31	0.00	14.24	86.56	56.10	0.87	14.90	82.54	59.52	0.00	17.54	80.22	66.56	0.22	7.22
10	74.34	45.68	0.00	13.59	84.49	62.58	0.01	14.58	84.06	52.50	0.01	18.81	82.08	65.75	0.00	17.92
11	77.81	39.60	0.00	14.74	84.97	63.16	0.00	13.03	84.42	55.29	0.00	19.66	81.55	60.08	0.00	16.45
12	79.70	43.95	0.00	14.53	70.38	56.35	0.01	11.10	85.37	49.37	0.00	20.74	74.12	66.60	0.09	5.70
13	67.42	51.08	0.34	9.33	72.03	45.45	0.00	18.25	81.77	64.08	0.15	8.68	89.06	64.69	0.00	20.05
14	57.43	39.09	0.00	15.08	79.32	40.72	0.00	17.99	78.98	56.70	0.00	20.30	90.32	64.42	0.00	21.31
15	63.73	31.39	0.00	15.54	83.77	52.12	0.00	17.81	68.94	52.30	0.02	13.22	93.85	62.96	0.00	20.34
16	72.03	32.04	0.00	15.52	84.56	56.89	0.00	15.94	77.74	48.51	0.00	20.66	93.04	66.07	0.85	18.82
17	75.94	38.06	0.00	14.96	87.87	57.11	0.00	17.01	83.48	48.60	0.00	20.35	80.65	56.43	0.47	15.91
18	80.69	46.87	0.04	14.01	76.05	56.82	0.00	17.57	86.79	59.22	0.00	17.43	82.42	48.63	0.00	25.67
19	83.53	51.06	0.01	12.57	84.02	58.96	0.00	12.44	67.30	53.56	0.00	6.85	84.60	55.63	0.00	17.18
20	83.59	62.22	0.02	10.25	83.71	55.17	0.00	17.37	71.37	47.30	0.00	22.52	86.11	60.13	0.00	68.04
21	77.58	62.04	0.00	7.12	83.37	57.97	0.00	14.94	81.97	39.34	0.00	22.55	89.71	62.89	0.00	58.00
22	82.60	57.97	0.00	9.89	87.21	55.76	0.00	18.42	85.53	48.58	0.00	19.52	88.65	62.60	0.00	57.04
23	72.70	49.91	0.07	10.86	88.23	61.70	0.00	14.79	86.65	53.96	0.00	22.23	89.67	68.67	0.00	64.90
24	76.84	46.80	0.00	11.23	88.99	59.92	0.00	17.56	88.65	51.26	0.00	22.07	88.95	71.53	0.00	42.02
25	84.83	62.85	0.00	13.59	89.02	60.37	0.00	18.37	90.68	62.19	0.00	18.66	88.41	69.49	0.00	58.92
26	69.98	49.62	0.04	11.40	85.60	55.49	0.00	19.46	91.92	63.91	0.00	18.80	89.64	65.39	0.01	62.76
27	67.35	44.65	0.00	15.42	83.43	54.05	0.00	18.23	91.51	64.36	0.00	20.24	90.95	69.62	0.00	65.77
28	72.34	53.53	0.00	7.27	83.93	57.96	0.00	18.35	89.89	63.14	0.03	16.56	90.81	69.53	0.00	49.03
29	84.83	57.96	0.00	15.04					85.59	61.99	0.00	16.73	88.79	73.35	0.00	36.09
30	86.14	59.70	0.00	11.79					85.75	59.09	0.00	21.03	80.73	69.84	0.00	64.70
31	84.81	57.74	0.00	14.69					86.32	56.44	0.00	21.57				
Avg	77.46	51.27	0.02	12.41	82.82	55.97	0.03	15.64	84.45	56.63	0.01	18.27	87.70	63.60	0.05	32.57
Max	86.14	65.84	0.34	15.54	89.02	63.16	0.87	19.46	91.92	64.89	0.15	22.55	93.85	73.35	0.85	68.04
Min	57.43	31.39	0.00	7.12	70.38	40.72	0.00	7.98	84.45	39.34	0.00	6.84	74.12	48.63	0.00	5.70
Total			0.73	384.84			0.90	437.88			0.22	566.42			1.64	977.08

Table 1. Continued.

Day	May				June				July				August			
	Max °F	Min °F	Rain inch	S Rad MJ/m ²	Max °F	Min °F	Rain inch	S Rad MJ/m ²	Max °F	Min °F	Rain inch	S Rad MJ/m ²	Max °F	Min °F	Rain inch	S Rad MJ/m ²
1	83.77	60.85	0.00	67.99	90.05	67.87	0.34	21.06	94.44	70.20	0.00	30.83	92.55	70.61	0.00	19.45
2	85.62	49.26	0.00	67.21	87.82	67.46	0.28	19.24	97.00	70.84	0.00	29.28	96.89	72.41	0.95	24.21
3	85.35	57.81	0.00	42.29	88.99	67.15	0.34	22.46	95.50	73.74	0.34	23.62	94.46	73.36	0.01	25.09
4	89.17	51.44	0.00	30.67	90.36	66.67	0.12	25.21	97.99	72.90	0.00	30.99	96.80	72.48	0.00	27.90
5	90.91	53.80	0.00	27.43	87.57	66.13	0.01	22.02	96.21	74.19	0.25	15.91	98.19	72.46	0.28	25.04
6	90.25	63.90	0.00	24.12	89.85	64.11	0.00	31.14	95.05	71.85	0.38	26.32	95.97	74.23	0.14	21.93
7	87.19	64.17	0.00	29.94	88.56	68.74	0.15	25.17	93.29	74.70	0.01	23.41	97.30	75.25	0.00	25.07
8	89.65	54.01	0.00	31.55	89.38	67.80	0.47	24.72	90.86	75.00	0.05	24.00	97.20	75.94	0.19	19.18
9	92.35	59.67	0.04	26.46	90.61	69.40	0.00	30.09	95.22	73.44	0.00	28.19	96.37	75.04	1.28	25.86
10	95.14	60.64	0.00	28.54	92.50	68.32	0.00	27.44	92.93	72.30	0.00	25.17	96.48	76.42	0.00	28.72
11	92.32	64.13	0.00	27.51	91.92	67.95	0.00	29.13	94.69	71.53	0.10	27.38	98.71	75.40	0.00	27.96
12	92.05	64.92	0.00	28.00	92.26	67.55	0.00	27.13	96.30	72.81	0.00	26.78	99.52	75.96	0.21	30.05
13	88.99	68.50	0.03	22.99	92.80	69.49	0.00	25.99	96.22	72.73	0.04	28.81	97.68	76.03	0.02	27.64
14	90.43	63.72	0.00	26.49	93.27	70.14	0.00	24.39	95.76	72.64	0.01	24.54	90.63	76.30	0.09	13.04
15	93.40	60.10	0.00	31.05	94.66	70.05	0.00	29.52	92.98	71.46	0.00	21.41	95.74	73.38	0.00	26.08
16	92.28	62.89	0.00	27.30	91.04	72.05	0.44	17.30	92.93	71.62	0.29	20.61	95.38	71.51	0.41	17.60
17	91.71	65.88	0.00	26.77	91.65	72.79	0.12	23.27	91.69	74.30	0.30	9.91	91.36	73.90	1.56	14.19
18	91.08	61.38	0.06	23.91	90.50	70.84	2.03	22.17	92.86	73.20	0.27	16.72	91.60	71.73	0.05	21.72
19	94.69	62.49	0.00	31.22	93.09	72.37	0.00	29.29	93.24	72.36	0.20	18.99	94.80	73.00	0.66	24.89
20	94.95	67.05	0.03	22.36	91.76	72.05	0.00	24.47	96.39	74.43	0.00	25.27	91.80	74.16	0.03	22.82
21	90.46	69.48	1.36	16.99	89.04	69.67	1.01	17.66	96.87	73.96	0.00	23.69	93.18	73.94	0.06	25.26
22	94.06	67.91	0.00	27.35	87.91	69.19	0.01	20.93	94.23	74.64	0.00	26.93	94.23	73.72	0.00	27.71
23	92.50	66.85	1.16	22.56	94.50	73.29	0.00	22.57	94.23	72.79	0.00	23.22	94.42	71.94	0.00	25.32
24	87.53	66.60	0.15	15.99	92.82	71.78	0.28	23.57	93.09	71.83	0.00	18.70	93.04	72.61	0.00	22.01
25	86.68	65.97	0.02	21.05	91.06	71.06	0.00	23.51	95.81	70.41	0.00	27.80	93.88	69.67	0.00	27.84
26	88.83	66.65	0.00	28.59	93.97	70.05	0.00	25.27	93.83	70.75	0.53	20.25	94.14	69.60	0.00	26.66
27	87.51	63.10	0.00	32.71	93.96	68.59	0.00	31.55	89.37	72.30	0.01	13.95	95.00	70.47	0.14	19.62
28	89.44	64.02	0.00	27.72	92.46	71.85	0.03	22.86	88.61	72.30	0.10	16.38	95.65	74.98	0.00	20.62
29	88.30	64.04	0.00	27.92	97.21	75.11	0.07	27.75	94.26	72.93	0.00	23.38	87.21	75.02	0.73	7.35
30	89.60	62.96	0.00	25.40	94.24	71.53	0.00	29.39	97.23	73.87	0.00	26.32	84.97	75.83	3.91	6.81
31	88.70	68.77	3.57	17.19					95.77	71.60	0.00	19.53	90.46	75.02	0.27	17.63
<u>Avg</u>	90.16	62.68	0.21	29.27	91.53	69.70	0.19	24.88	94.35	72.69	0.09	23.17	94.37	73.62	0.35	22.43
<u>Max</u>	95.14	69.48	3.57	67.99	97.21	75.11	2.03	31.55	97.99	75.00	0.53	30.99	99.52	76.42	3.91	30.05
<u>Min</u>	83.77	49.26	0.00	15.99	87.57	64.11	0.00	17.30	88.61	70.20	0.00	9.91	84.97	69.60	0.00	6.81
<u>Total</u>			6.42	907.27			5.70	746.25			2.88	718.29			10.99	695.27

Table 1. Continued.

Day	September				October				November				December			
	Max °F	Min °F	Rain inch	S Rad MJ/m ²	Max °F	Min °F	Rain inch	S Rad MJ/m ²	Max °F	Min °F	Rain inch	S Rad MJ/m ²	Max °F	Min °F	Rain inch	S Rad MJ/m ²
1	96.48	74.62	1.08	23.38	89.80	74.97	0.07	20.29	77.23	58.42	0.00	18.22	84.60	56.79	0.00	11.71
2	90.61	73.62	0.00	22.79	88.25	71.56	0.00	22.85	79.93	55.74	0.07	19.73	86.09	66.96	0.00	8.97
3	89.96	70.07	0.00	27.36	87.21	69.89	0.00	20.41	83.17	57.38	0.00	18.07	87.24	66.72	0.00	10.89
4	88.57	69.58	0.00	26.78	86.76	70.48	0.02	20.15	82.92	59.79	0.00	19.93	84.78	56.48	0.00	10.06
5	93.38	70.14	0.00	27.73	90.48	72.07	0.00	21.28	82.08	51.82	0.00	17.96	78.17	49.44	0.00	12.26
6	92.32	69.75	0.00	22.51	91.53	70.77	0.00	23.25	83.86	44.38	0.00	19.28	69.37	40.34	0.00	15.76
7	95.00	69.35	0.00	24.75	90.72	71.58	0.06	14.00	86.56	55.38	0.00	19.09	73.49	38.74	0.00	15.59
8	87.87	69.17	0.67	13.67	79.05	66.96	0.00	12.80	86.14	58.59	0.00	18.40	78.30	51.08	0.00	10.23
9	93.27	66.69	0.00	25.21	80.67	62.13	0.00	12.86	86.58	59.92	0.00	16.65	84.07	58.77	0.00	13.06
10	93.65	70.86	0.00	22.29	85.95	66.58	0.00	17.38	90.19	65.26	0.00	14.81	84.60	61.07	0.20	12.64
11	95.36	71.56	0.00	24.50	89.01	71.33	0.14	11.91	91.00	63.86	0.00	15.18	65.48	42.35	0.01	12.80
12	95.61	69.93	1.45	22.45	90.30	77.11	0.35	11.88	89.20	68.68	0.00	12.10	73.09	40.78	0.00	13.34
13	93.97	73.44	0.01	26.44	90.88	76.39	0.00	14.75	81.93	68.86	0.00	8.52	75.67	59.50	0.00	6.70
14	94.66	73.63	0.00	24.80	86.47	68.38	0.00	19.29	78.58	68.09	0.27	6.15	73.17	60.48	0.00	6.40
15	94.44	73.40	0.00	24.85	82.65	63.45	0.00	20.49	74.91	67.60	0.50	2.05	75.36	61.93	0.00	6.59
16	93.34	73.15	0.02	23.78	74.26	54.73	0.00	18.86	76.75	68.23	0.02	5.84	70.48	64.85	1.22	2.24
17	92.89	74.05	0.00	21.58	73.62	50.13	0.00	22.81	81.14	67.19	0.00	12.86	72.30	60.04	0.70	9.23
18	92.77	73.45	0.38	21.32	80.26	50.23	0.00	22.58	80.38	63.90	0.00	12.52	68.77	46.98	0.00	16.11
19	87.58	72.81	0.01	13.38	83.53	58.48	0.00	18.75	84.00	57.31	0.00	16.91	65.59	42.32	0.00	16.45
20	90.84	71.37	0.17	18.70	84.15	58.39	0.00	18.96	85.93	58.33	0.00	16.34	70.70	45.31	0.00	10.15
21	90.75	69.42	0.00	19.49	87.89	62.53	0.00	21.73	85.24	63.72	0.00	14.91	73.78	52.65	0.00	14.45
22	89.55	68.63	0.00	23.75	86.34	60.04	0.00	19.34	84.65	61.84	0.00	11.68	70.92	52.57	0.00	6.71
23	88.21	65.62	0.00	25.34	87.75	56.66	0.00	21.18	74.86	54.79	0.00	13.94	77.16	55.54	0.00	11.65
24	89.19	67.33	0.30	18.92	86.11	63.28	0.00	19.27	70.16	53.11	0.00	8.74	76.03	54.28	0.00	7.42
25	91.35	70.36	0.37	20.66	83.97	62.20	0.00	15.94	79.07	57.74	0.00	13.62	72.59	64.67	0.04	3.15
26	89.92	72.91	0.00	13.39	86.95	66.07	0.00	19.52	82.58	64.42	0.08	7.39	77.90	60.67	0.15	8.52
27	89.28	74.82	0.89	16.45	87.51	63.36	0.00	19.99	73.65	49.30	0.01	11.35	75.27	56.98	0.00	9.67
28	90.34	73.29	0.00	20.64	86.92	65.52	0.00	19.44	59.45	45.40	0.00	6.35	70.18	55.78	0.19	6.67
29	89.87	75.06	0.34	13.69	86.97	63.97	0.00	19.10	73.04	42.01	0.00	16.58	64.51	47.55	0.01	13.88
30	93.07	74.70	0.70	21.37	86.00	63.16	0.00	16.78	79.48	46.37	0.00	15.69	65.59	43.07	0.00	9.66
31					88.47	64.74	0.00	20.62					71.64	39.71	0.00	15.69
Avg	91.80	71.43	0.21	21.73	85.82	65.07	0.02	18.66	80.82	58.58	0.03	13.69	74.74	53.37	0.08	10.60
Max	96.48	75.06	1.45	27.73	91.53	77.11	0.35	22.25	91.00	68.86	0.50	19.93	87.24	66.96	1.22	16.45
Min	87.58	65.62	0.00	13.38	73.62	50.13	0.00	11.88	59.45	42.01	0.00	2.05	64.51	38.74	0.00	2.24
Total			6.39	651.95			0.64	578.48			0.95	410.84			2.52	328.64

Rainfall

Daily rainfall equaled or exceeded 1, 2, and 3 inches of rainfall on 11, 3, and 2 separate occasions, respectively in 2023 with a daily total rainfall maximum of 3.91 inches on 30 August (Table 1). Annual rainfall for 2023 totaled 39.98 inches, which was 13.01 inches lower than the 82-year average of 52.99 inches (Table 2). The lowest annual total on record was observed in 2000 when 32.02 inches were measured, and the greatest annual rainfall total observed was in 1959 when 78.82 inches were recorded. Rainfall was below normal in all months except May, August, and December. Monthly rainfall during 2023 is graphically compared to historical mean, median, maximum, and minimum rainfall in Figure 1.

Table 2. Summary of rainfall by months. Range Cattle REC, 2023.

Month	1942 to 2023		82-year average†	2023	Difference from 82-year average
	Maximum / month	Minimum / month		Total	
	-----inches*-----				
January	8.45	0.03	2.09	0.73	- 1.36
February	9.59	0.02	2.41	0.90	- 1.51
March	12.34	0.01	2.85	0.22	- 2.63
April	11.91	0.00	2.50	1.64	- 0.86
May	13.55	0.00	3.80	6.42	2.62
June	18.99	2.79	8.52	5.70	- 2.82
July	19.74	1.87	8.22	2.88	- 5.34
August	16.10	3.13	8.45	10.99	2.54
September	28.74	0.89	7.44	6.39	- 1.05
October	11.23	0.00	2.86	0.64	- 2.22
November	11.22	0.07	1.89	0.95	- 0.94
December	8.61	0.07	1.96	2.52	0.56
Year total			52.99	39.98	- 13.01

*Inches x 2.54 = cm.

† Since rainfall records began in July 1942, means for January to June are 81-year means.

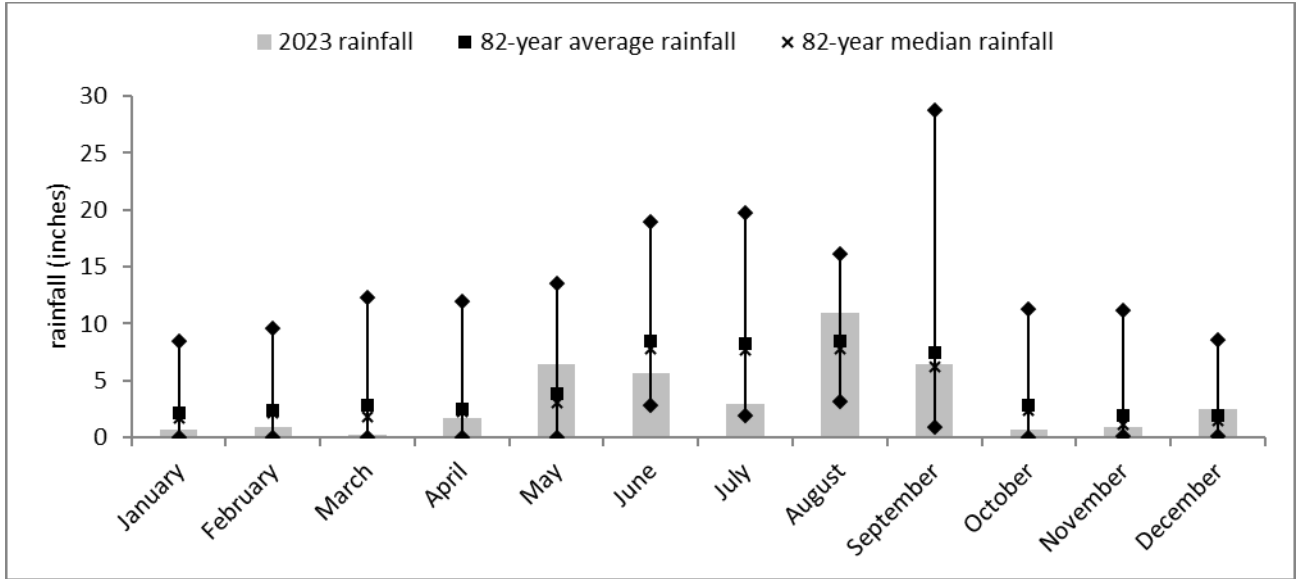


Figure 1. Monthly rainfall at the Range Cattle REC during 2023 relative to historical average, median, minimum, and maximum monthly rainfall. Current rainfall is indicated by the gray bars, historical average and median rainfall are indicated by squares (■) and “X’s” (x), respectively. Historical high and low rainfall are indicated by diamonds (◆).

Evapotranspiration

Evapotranspiration is the total amount of water transferred from the earth to the atmosphere. Monthly evaporation in 2023 was 1.98 inches greater than the 18-year average (Table 3). Evapotranspiration exceeded rainfall in January through April, July, October, and November (Figure 2). It is normal for evapotranspiration to exceed rainfall in January, February, March, and December.

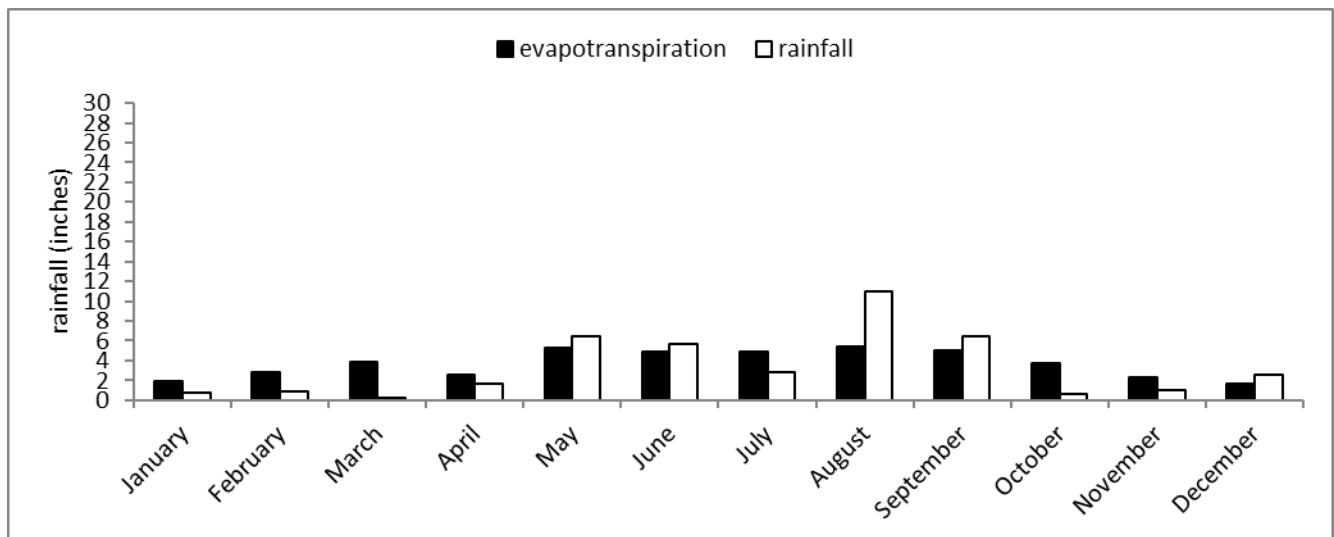


Figure 2. Comparison of monthly evapotranspiration and rainfall at the Range Cattle REC during 2023.

Solar Radiation

Total solar radiation for 2023 was 7403.21 MJ. Daily solar radiation is shown in Table 1, and 2023 total monthly solar radiation can be seen in Table 3. If soil water, temperature, and fertility are not limiting and vegetative cover is complete, 1 MJ results in about 14.3 lb/A of plant dry matter. Theoretically, enough solar radiation was received in April 2023 (907.27 MJ) to produce approximately 12,974 lb/A of plant dry matter.

Table 3. Monthly solar radiation and evapotranspiration at the Range Cattle REC in 2023.

Month	2006-2023	2023	2006-2023	2023
	Evapotranspiration		Solar radiation	
	-----inches-----		-----MJ/m ² -----	
January	1.88	1.97	411.75	384.84
February	2.54	2.88	456.04	437.88
March	3.48	3.82	637.87	566.42
April	4.26	2.56	714.02	977.08
May	5.23	5.33	774.38	907.27
June	4.89	4.91	653.76	746.25
July	4.74	4.91	653.87	718.29
August	4.63	5.37	592.38	695.27
September	4.02	5.09	531.42	651.95
October	3.23	3.69	503.82	578.48
November	2.04	2.30	396.02	410.84
December	1.60	1.69	370.57	328.64
<i>Total</i>	<i>42.54</i>	<i>44.52</i>	<i>6695.90</i>	<i>7403.21</i>

Temperature

The highest temperature observed during 2023 was 99.5° F on 12 August (Table 1). Monthly average-high temperatures were at or exceeded the 80-year average in all months (Table 4). New record highs were recorded in August and September. Monthly average low temperatures were above the 80-year average in all months except May (Table 5). Daily low temperatures fell to less than 32 °F only on 15 January (Table 1). Scattered frost begins to occur when air temperature drops to near 35° F; therefore, scattered frost likely occurred only two times in 2023. Overall, mean low temperature for 2023 was 1.7 degrees greater than the 80-year mean.

Table 4. Summary of average maximum temperature* during 2023 by month, Range Cattle REC.

Month	Shelter†				Ground level‡		
	1944-2023 Avg. high	2023 Avg. high	1944-2023 Extreme high	2023 Year	2023 Extreme high	2023 Avg. high	2023 Extreme high
-----°F-----						-----°F-----	
January	73.3	77.5	90.0	1982	86.1	67.2	72.3
February	75.6	82.8	91.0	1962	89.0	71.6	76.6
March	79.4	84.5	94.0	1946	91.9	76.8	82.0
April	83.7	87.7	97.0	1945	93.9	81.8	85.3
May	88.2	90.2	103.0	1945	95.1	85.3	88.3
June	90.2	91.5	103.0	1945	97.2	84.8	88.8
July	91.0	94.4	101.0	1972	98.0	87.9	90.3
August	91.2	94.4	99.5	2023	99.5	87.3	91.2
September	89.6	91.8	96.5	2023	96.5	85.4	87.6
October	85.2	85.8	96.5	2015	91.5	79.8	85.7
November	79.3	80.8	94.0	1990	91.0	75.3	79.8
December	74.7	74.7	89.0	1945	87.2	68.7	75.9
<i>Average</i>	<i>83.5</i>	<i>86.3</i>				<i>79.3</i>	

*°C = (°F – 32) x 0.555

† Prior to 2006, air temperature is measured using a thermometer in an instrument shelter designed to protect meteorological equipment from exposure to direct sunlight, precipitation, and condensation, while allowing for adequate ventilation so that the instruments measure environmental parameters accurately.

‡ Ground level temperature is measured with a soil probe, which measures the temperature 4 inches below the soil surface.

Table 5. Summary of minimum temperature* for 2023 by month, Range Cattle REC.

Month	Shelter†					Ground level‡	
	1944-2023	2023	1944-2023	2023	2023		
	Avg. low	Avg. low	Extreme low	Year	Extreme low	Avg. low	Extreme low
	-----°F-----					-----°F-----	
January	49.2	51.3	18.0	1981	31.4	63.0	55.1
February	51.0	56.0	23.8	2009	40.7	66.2	60.9
March	54.3	56.6	26.0	1980	39.3	69.5	63.1
April	58.3	63.6	34.0	1971	48.6	72.9	64.6
May	63.4	62.7	43.0	1945	49.3	75.7	58.6
June	69.2	69.7	52.0	1984	64.1	78.6	74.3
July	71.4	72.7	62.0	several	70.2	81.8	80.1
August	72.1	73.6	61.0	1977	69.6	81.9	78.8
September	71.2	71.4	51.0	1962	65.6	80.0	77.5
October	65.0	65.1	37.5	2008	50.1	75.4	69.2
November	57.1	58.6	25.0	1970	42.0	70.5	61.2
December	51.8	53.4	20.0	1962	38.7	64.5	57.1
Average	61.2	62.9				73.3	

*°C = (°F – 32) x 0.555

† Prior to 2006, air temperature is measured using a thermometer in an instrument shelter designed to protect meteorological equipment from exposure to direct sunlight, precipitation, and condensations, while allowing for adequate ventilation so that the instruments measure environmental parameters accurately.

‡ Ground level temperature is measured with a soil probe, which measures the temperature 4 inches below the soil surface.

Freeze hazard

The fall and spring freeze hazards for the Range Cattle REC are shown in Figure 3. The spring freeze hazard estimates the likelihood of temperatures reaching below the critical temperature after a selected date, while the fall freeze hazard estimates the likelihood of experiencing the first attainment of a critical temperature before a selected date. Based on records from 1964 to 2017, these data will not predict what will occur in a given year, but what can be expected over a period of years. In an example using the spring freeze hazard, one should expect approximately a 30% chance of a frost (assuming 35 °F) occurring before the 1st of March (Figure 4C). A grower has a significant likelihood of experiencing three frosts over ten years after the 1st of March; however, the likelihood drops to approximately 10% by March 20th.

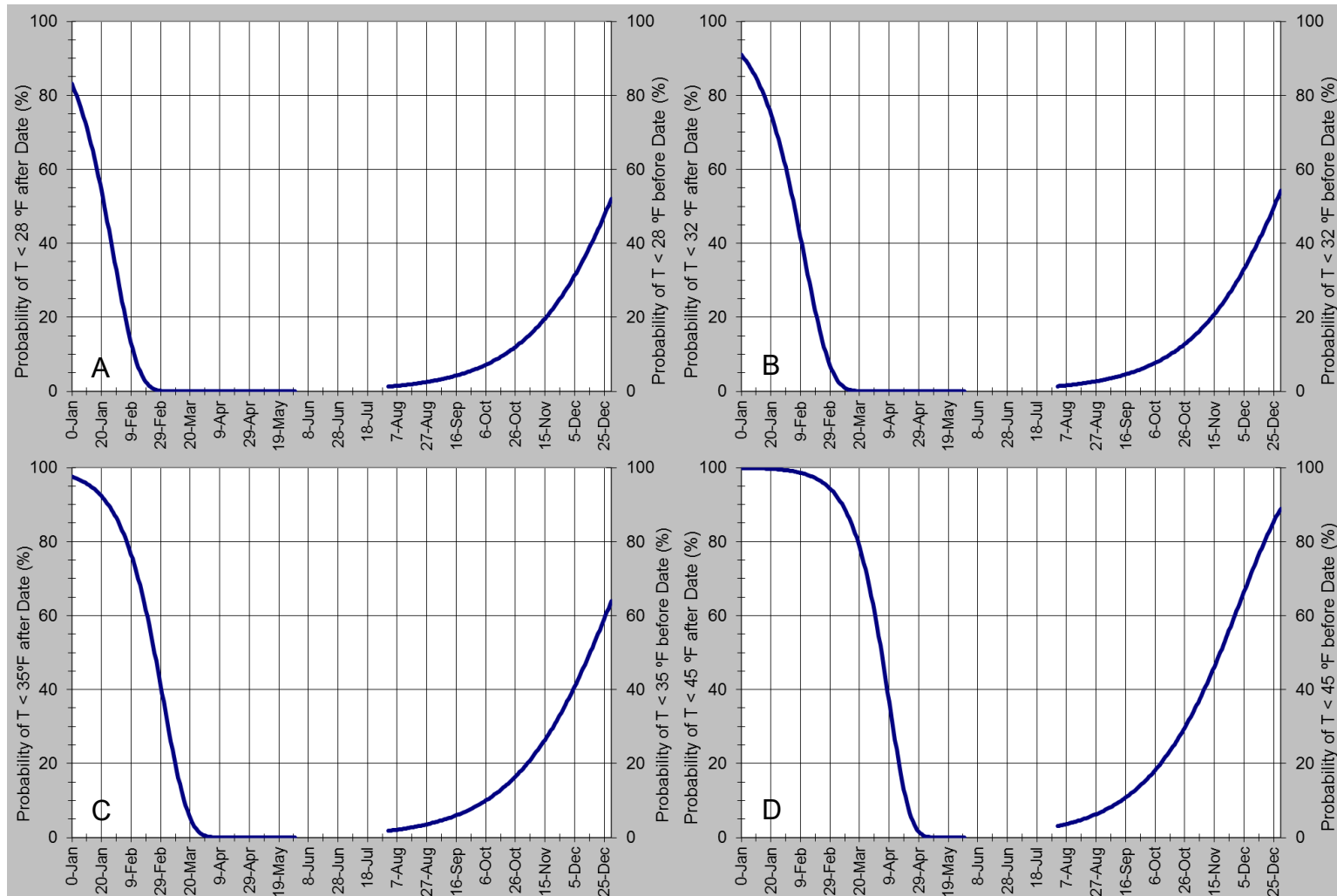


Figure 3. Spring and fall freeze hazard showing temperature probabilities after a given spring date and before a given fall date. Trend lines for temperature probabilities <28 °F (A), <32 °F (B), <35 °F (C), and <45 °F (D). Graphs were constructed using minimum temperature data from 1960 – 2010 using FRISKNH as developed by R. Snyder and J. Paulo de Melo-Abreu.