

# Weather Station Data: How to obtain and analyze precipitation data from the Western Regional Climate Center

(AACD Technical Reference #C-3A)

E. Lamar Smith, PhD



*First Written October 2021*

*Copyright © 2022*

*Arizona Association of Conservation Districts*

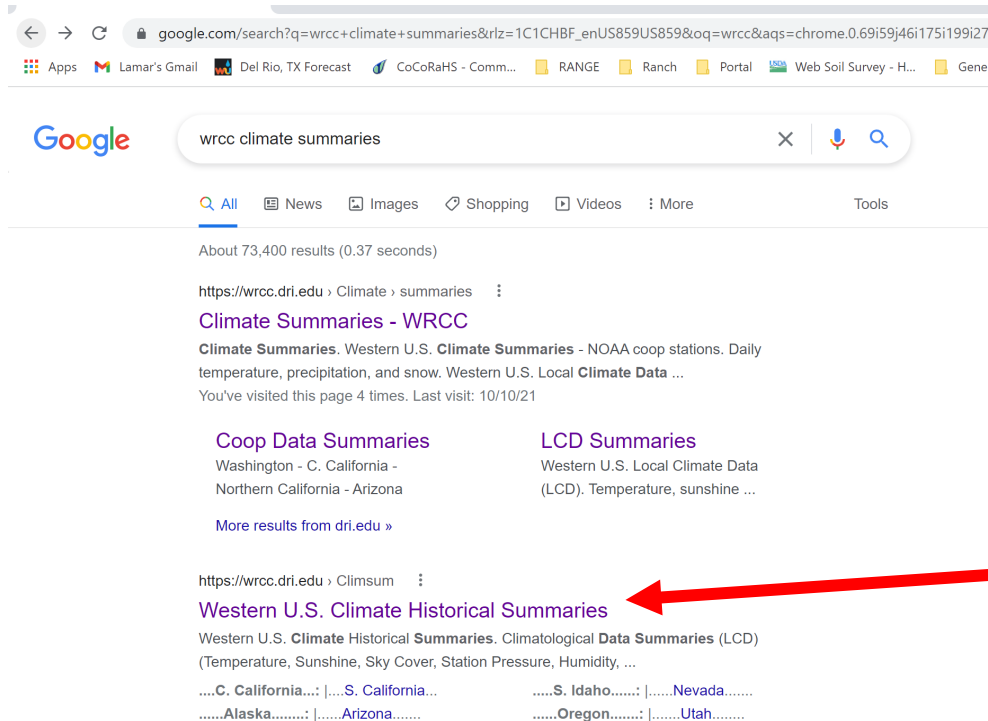
*All rights reserved. No portion of this article may be reproduced in any form without permission from the publisher, except as permitted by U.S. copyright law.*

*For permissions contact the Arizona Association of Conservation Districts at:  
information.aacd@gmail.com*

This has been prepared to show how precipitation data can be analyzed to help make management decisions and interpret data. There are other approaches that can be used such as looking at drought indices over time and some remote sensing of vegetation cover or production. And for some purposes, a simpler approach may be adequate.

This is an example of how to obtain precipitation data from the Western Regional Climate Center (WRCC). The example shown is for Kingman, Arizona and was done for the Big Sandy NRCDC Conservation Plan. Kingman was chosen because it is fairly central in the District and probably has the best rainfall records of any station that is representative of the District. Big Sandy covers more than 5 million acres, so there is a lot of variation in precipitation annually and seasonally. Any one station is no more than a general indicator of wet and dry years.

To access WRCC, log onto the website (<https://wrcc.dri.edu/>), which will bring up the page below:



Select Western U.S. Climate Historical Summaries.

This is the next page you will see. Select Arizona.

---

## Western U.S. Climate Historical Summaries

---

### Climatological Data Summaries (LCD)

(Temperature, Sunshine, Sky Cover, Station Pressure, Humidity, Precipitation and Wind.)

Available for most major airports and cities with NWS offices.

[Local Climate Data \(LCD\) Summaries for Western U.S. \(1997\)](#)

[Local Climate Data \(LCD\) Summaries for Western U.S. \(2008\)](#)

[Local Climate Data \(LCD\) Summaries for Alaska \(1998\)](#)

[Local Climate Data \(LCD\) Summaries for Alaska \(2008\)](#)

[Local Climate Data \(LCD\) Summaries for Hawaii and the Pacific Islands \(1998\)](#)

[Local Climate Data \(LCD\) Summaries for Hawaii and the Pacific Islands 2008\)](#)

---

### Climatological Data Summaries

(Temperature and Precipitation)

## New Selection Tool

Available for more than 2800 sites. Browse by state, or zoom in to show stations in an area.



---

The old selection method will remain available below.

Click the desired state on the map or the list.



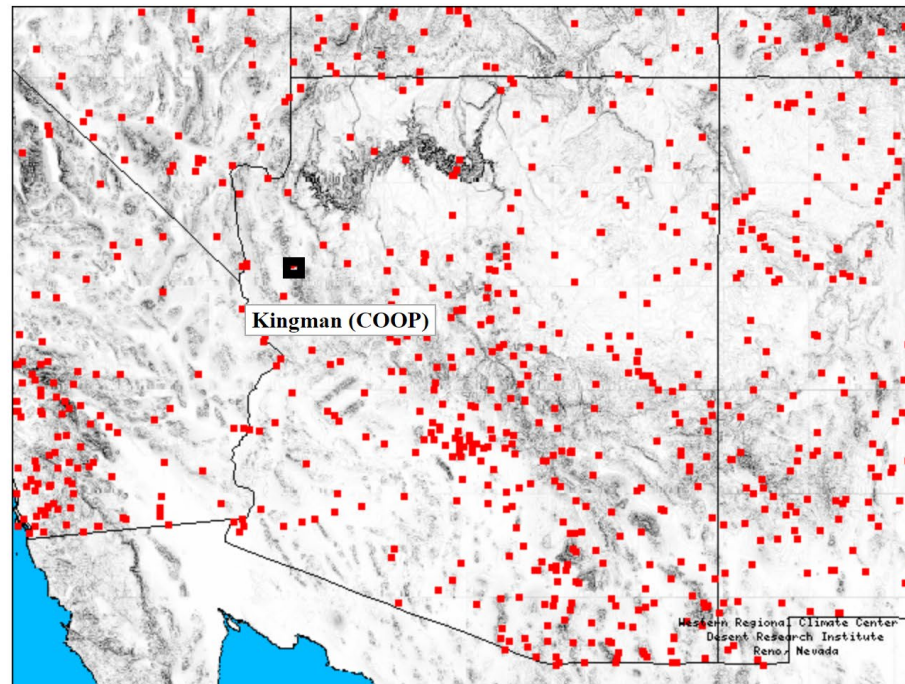
<a href="#">.....Alaska.....</a>	<a href="#">.....Arizona.....</a>	<a href="#">.....N. California...</a>
<a href="#">.....C. California...</a>	<a href="#">.....S. California...</a>	<a href="#">.....Colorado.....</a>
<a href="#">.....Hawaii.....</a>	<a href="#">N. Idaho/W. Montana</a>	<a href="#">.....E. Montana...</a>
<a href="#">.....S. Idaho.....</a>	<a href="#">.....Nevada.....</a>	<a href="#">.....New Mexico...</a>
<a href="#">.....Oregon.....</a>	<a href="#">.....Utah.....</a>	<a href="#">.....Washington.....</a>
<a href="#">.....Wyoming.....</a>		

Selecting Arizona will bring up the screen below with all the weather stations in Arizona shown on the map and in the list to the left. Select Kingman. Note that there are 2 Kingman stations because the location was changed in about 1967. You will need both of them to get a complete record.

[Hillside 4 Nne](#)  
[Hollbrook](#)  
[Horseshoe Dam](#)  
[Inner Canyon Usgs](#)  
[Intake](#)  
[Irving](#)  
[Jacob Lake](#)  
[Jeddito](#)  
[Jerome](#)  
[Junipine](#)  
[Kaibito](#)  
[Kayenta](#)  
[Keams Canyon](#)  
[Kearny](#)  
[Ketchikan](#)  
[Kingman](#)  
[Kingman No 2](#)  
[Kittling](#)  
[Klagetoh](#)  
[Klagetoh 12 Wnw](#)  
[Klondyke 3 Se](#)  
[Kofa Mine](#)  
[Lake Havasu](#)  
[Lake Havasu City](#)  
[Lake Pleasant](#)  
[Lakeside Ranger Stn](#)  
[Laveen 3 Sse](#)  
[Lees Ferry](#)  
[Leslie Canyon](#)  
[Leupp](#)  
[Litchfield Park](#)  
[Littlefield](#)  
[Lookout Ranch](#)  
[Lukachukai](#)  
[Many Farms School](#)  
[Maricopa 4 N](#)  
[Maricopa 9 Ssw](#)  
[Marinette](#)

Select a site by placing mouse cursor over a site. Site name will appear in location box below the map if bro  
Large boxes indicate stations that had reported during the month when these maps were last genera  
Map last generated on 04/11/06.

If a location has multiple stations or more than one platform in the near vicinity, overlapping boxes may create diffic  
cases.



When you select Kingman, this page will appear. It shows long term monthly average precipitation from 1901 to 1967 when the station was moved.

- [Daily Temp. & Precip.](#)
- [Daily Tabular data \(~23 KB\)](#)
- [Monthly Tabular data \(~1 KB\)](#)
- [NCDC 1961-1990 Normals \(~3 KB\)](#)

### Period of Record

- [Station Metadata](#)
- [Station Metadata Graphics](#)

### General Climate Summary Tables

- [Temperature](#)
- [Precipitation](#)
- [Heating Degree Days](#)
- [Cooling Degree Days](#)
- [Growing Degree Days](#)

### Temperature

- [Daily Extremes and Averages](#)
- [Spring 'Freeze' Probabilities](#)
- [Fall 'Freeze' Probabilities](#)
- ['Freeze Free' Probabilities](#)
- Monthly Temperature Listings
  - [Average](#)
  - [Average Maximum](#)
  - [Average Minimum](#)
  - [Extreme Maximum](#)
  - [Extreme Minimum](#)

### Precipitation

- [Monthly Average](#)
- [Daily Extreme and Average](#)
- [Daily Average](#)
- [Precipitation Probability by Duration.](#)
- [Precipitation Probability by Quantity.](#)
- Monthly Precipitation Listings
  - [Monthly Totals](#)
  - [Daily Extreme](#)

## KINGMAN, ARIZONA (024639)

### Period of Record Monthly Climate Summary

Period of Record : 05/01/1901 to 07/31/1967

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	56.0	60.0	65.8	74.2	82.7	92.8	97.8	95.4	90.4	79.0	66.4	56.6	76.4
Average Min. Temperature (F)	31.1	33.5	36.9	43.2	49.8	58.2	67.3	65.6	58.2	47.6	37.8	32.1	46.8
Average Total Precipitation (in.)	1.06	1.30	1.05	0.66	0.25	0.15	0.91	1.41	0.98	0.66	0.72	1.17	10.32
Average Total SnowFall (in.)	1.3	0.3	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.0	3.7
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record.

Max. Temp.: 91.8% Min. Temp.: 92.2% Precipitation: 96.3% Snowfall: 96.3% Snow Depth: 95.9%

Check [Station Metadata](#) or [Metadata graphics](#) for more detail about data completeness.

Western Regional Climate Center; [wrc@dr.edu](mailto:wrc@dr.edu)

Selecting Precipitation – Monthly Average will produce this page which shows precipitation by month for the period of record (1901-1967). For most stations, this graph would show the entire record and could be used in the discussion about climate in the General Description chapter of the District Plan.

- [Daily Temp. & Precip.](#)
- [Daily Tabular data \(~23 KB\)](#)
- [Monthly Tabular data \(~1 KB\)](#)
- [NCDC 1961-1990 Normals \(~3 KB\)](#)

#### Period of Record

- [Station Metadata](#)
- [Station Metadata Graphics](#)

#### General Climate Summary Tables

- [Temperature](#)
- [Precipitation](#)
- [Heating Degree Days](#)
- [Cooling Degree Days](#)
- [Growing Degree Days](#)

#### Temperature

- [Daily Extremes and Averages](#)
- [Spring 'Freeze' Probabilities](#)
- [Fall 'Freeze' Probabilities](#)
- ['Freeze Free' Probabilities](#)
- Monthly Temperature Listings
  - [Average](#)
  - [Average Maximum](#)
  - [Average Minimum](#)
  - [Extreme Maximum](#)
  - [Extreme Minimum](#)

#### Precipitation

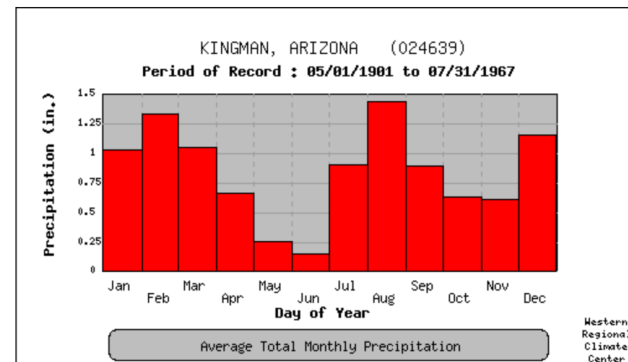
- [Monthly Average](#)
- [Daily Extreme and Average](#)
- [Daily Average](#)
- [Precipitation Probability by Duration](#)
- [Precipitation Probability by Quantity](#)
- Monthly Precipitation Listings
  - [Monthly Totals](#)
  - [Daily Extreme](#)

#### Snowfall

- [Daily Extreme and Average](#)
- [Daily Average](#)
- Monthly Snowfall Listings
  - [Monthly Totals](#)

## KINGMAN, ARIZONA

### POR - Monthly Average Total Precipitation



■ - Average precipitation recorded for the month.

Selecting General Climate Summary Tables – Precipitation will produce the table below. It summarizes precipitation by month and also gives seasonal totals. These are not the same seasons as used later in this discussion. The data are for the period of record of this station (1901-1967).

- [Daily Tabular data \(~23 KB\)](#)
- [Monthly Tabular data \(~1 KB\)](#)
- [NCDC 1961-1990 Normals \(~3 KB\)](#)

#### Period of Record

- [Station Metadata](#)
- [Station Metadata Graphics](#)

#### General Climate Summary Tables

- [Temperature](#)
- [Precipitation](#)
- [Freeze Degree Days](#)
- [Cooling Degree Days](#)
- [Growing Degree Days](#)
- **Temperature**
- [Daily Extremes and Averages](#)
- [Spring 'Freeze' Probabilities](#)
- [Fall 'Freeze' Probabilities](#)
- ['Freeze Free' Probabilities](#)
- Monthly Temperature Listings
  - [Average](#)
  - [Average Maximum](#)
  - [Average Minimum](#)
  - [Extreme Maximum](#)
  - [Extreme Minimum](#)

#### Precipitation

- [Monthly Average](#)
- [Daily Extreme and Average](#)
- [Daily Average](#)
- [Precipitation Probability by Duration](#)
- [Precipitation Probability by Quantity](#)
- Monthly Precipitation Listings
  - [Monthly Totals](#)
  - [Daily Extreme](#)

#### Snowfall

- [Daily Extreme and Average](#)
- [Daily Average](#)
- Monthly Snowfall Listings
  - [Monthly Totals](#)

## KINGMAN, ARIZONA

### Period of Record General Climate Summary - Precipitation

Station:(024639) KINGMAN														
From Year=1901 To Year=2012														
	Precipitation										Total Snowfall			
	Mean	High	Year	Low	Year	1 Day Max.	>= 0.01 in.	>= 0.10 in.	>= 0.50 in.	>= 1.00 in.	Mean	High	Year	
	in.	in.	-	in.	-	in.	dd/yyyy or yyyyymmdd	# Days	# Days	# Days	# Days	in.	in.	-
January	1.06	4.34	1921	0.00	1904	1.62	13/1949	4	3	1	0	1.3	12.0	1905
February	1.30	4.48	1932	0.00	1912	2.24	05/1931	4	3	1	0	0.3	4.0	1966
March	1.05	3.60	1941	0.00	1914	1.45	03/1938	4	2	1	0	0.7	10.0	1952
April	0.66	4.04	1965	0.00	1902	2.50	20/1933	3	2	0	0	0.1	3.0	1967
May	0.25	1.52	1916	0.00	1902	1.52	19/1916	1	1	0	0	0.0	0.0	1901
June	0.15	3.00	1920	0.00	1901	2.20	26/1920	1	0	0	0	0.0	0.0	1901
July	0.91	5.15	1919	0.00	1902	1.78	25/1956	4	2	0	0	0.0	0.0	1901
August	1.41	6.57	1931	0.00	1906	2.27	31/1909	5	3	1	0	0.0	2.0	1920
September	0.98	9.85	1939	0.00	1901	2.78	02/1940	3	2	1	0	0.0	0.0	1901
October	0.66	3.11	1907	0.00	1906	2.25	18/1936	2	1	0	0	0.0	0.5	1949
November	0.72	6.28	1919	0.00	1901	6.03	28/1919	2	1	0	0	0.3	7.5	1919
December	1.17	3.89	1936	0.00	1901	2.50	12/1932	4	3	1	0	1.0	14.0	1932
Annual	10.32	21.22	1919	3.58	1947	6.03	19191128	36	23	6	2	3.7	18.2	1949
Winter	3.54	8.65	1927	0.30	1964	2.50	19321212	12	8	2	1	2.5	20.0	1933
Spring	1.96	6.34	1905	0.00	1959	2.50	19330420	8	5	1	0	0.8	10.0	1952
Summer	2.47	8.02	1931	0.04	1928	2.27	19090831	10	6	1	0	0.0	2.0	1920
Fall	2.35	11.29	1919	0.05	1956	6.03	19191128	7	5	1	0	0.3	7.5	1919

Table updated on Oct 31, 2012

For monthly and annual means, thresholds, and sums:  
 Months with 5 or more missing days are not considered  
 Years with 1 or more missing months are not considered  
 Seasons are climatological not calendar seasons



Selecting Monthly Precipitation Listings – Monthly Totals will produce this table showing monthly totals for each calendar year from 1901 to 1967. The letters indicate missing data or other possible errors. Only the top part of this table is shown here.

- [Daily Temp. & Precip.](#)
- [Daily Tabular data \(~23 KB\)](#)
- [Monthly Tabular data \(~1 KB\)](#)
- [NCDC 1961-1990 Normals \(~3 KB\)](#)

**Period of Record**

- [Station Metadata](#)
- [Station Metadata Graphics](#)

**General Climate Summary Tables**

- [Temperature](#)
- [Precipitation](#)
- [Heating Degree Days](#)
- [Cooling Degree Days](#)
- [Growing Degree Days](#)

**Temperature**

- [Daily Extremes and Averages](#)
- [Spring 'Freeze' Probabilities](#)
- [Fall 'Freeze' Probabilities](#)
- ['Freeze Free' Probabilities](#)

- Monthly Temperature Listings

- [Average](#)
- [Average Maximum](#)
- [Average Minimum](#)
- [Extreme Maximum](#)
- [Extreme Minimum](#)

**Precipitation**

- [Monthly Average](#)
- [Daily Extreme and Average](#)
- [Daily Average](#)
- [Precipitation Probability by Duration](#)
- [Precipitation Probability by Quantity](#)

- Monthly Precipitation Listings
- [Monthly Totals](#)

**Snowfall**

- [Daily Extreme and Average](#)
- [Daily Average](#)
- Monthly Snowfall Listings
- [Monthly Totals](#)

## KINGMAN, AZ

### Total of Precipitation (Inches)

(024639)

File last updated on October 10, 2021

a = 1 day missing, b = 2 days missing, c = 3 days, ..etc...

z = 26 or more days missing, A = Accumulations present

Long-term means based on columns; thus, the monthly row may not sum (or average) to the long-term annual value.

MAXIMUM ALLOWABLE NUMBER OF MISSING DAYS : 5

Individual Months not used for annual or monthly statistics if more than 5 days are missing.

Individual Years not used for annual statistics if any month in that year has more than 5 days missing.

YEAR(S)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
1901	----z	----z	----z	----z	0.00k	0.00	0.50b	1.81	0.00	0.10	0.00	0.00	2.41e
1902	0.25	1.80	0.36	0.00	0.00	0.00	0.00	1.10	----z	----z	----z	----z	3.51d
1903	----z	----z	----z	----z	0.10	0.27	0.26	0.66	1.52	0.20	0.00	0.00	3.01d
1904	0.00	0.64	0.55	0.05	0.22	0.00	0.79	5.48	0.25	0.06	0.00	0.27	8.31
1905	1.77	4.47	3.05	2.42	0.87	0.00	0.15	1.43	1.40	0.45	1.86	0.81	18.68
1906	0.98	1.07	3.49	1.31	0.00	0.00	2.18	0.00	0.00	0.00	1.50	1.87	12.40
1907	3.74	1.41	1.21	0.28	0.31	0.14	0.20d	0.71	0.12	3.11	0.05	0.00	11.28
1908	2.32	2.58	1.38	0.38	0.28	0.00	1.68	2.39	2.82	0.37	0.22	2.27	16.69
1909	0.87	1.69	2.04	0.00	0.00	----z	----z	3.77	1.25	0.00	1.69	2.16	13.47b
1910	1.62	0.05	0.61	----z	----z	0.00a	0.85	1.92	1.11	0.65	2.48	0.42	9.71b
1911	1.66	----z	----z	----z	0.31	0.06	2.18	0.48	1.23	1.35	0.00	0.31	7.58c
1912	0.00	0.00	3.30	2.01	----z	1.01	0.09	0.57	0.00	1.12	0.00	0.30	8.40a
1913	0.70	0.41	0.02	0.07	0.00	0.00	0.06o	1.10	0.35	0.00	1.08	0.00	3.73a
1914	1.88	2.30	0.00	0.25	0.34	0.21	1.72	0.90	0.45	0.75	0.10	1.46	10.36
1915	2.11	2.80	0.55	0.60	0.70	0.00e	3.03	0.85	0.25	0.00	0.29j	2.21	13.10a
1916	2.70	0.64	0.83	0.18	1.52	0.00	1.27	1.57	0.72	0.71	0.00	1.30	11.44
1917	2.31	0.51	0.00	1.15	1.45	0.00	0.60	0.95	0.70	0.00	0.00	0.00	7.67
1918	1.10	1.75	2.90	0.75	0.00	0.30	1.00	1.48	0.92	0.54	0.47	1.79	13.00
1919	0.17	1.65	0.78	0.00	0.15	0.00	5.15	1.45	4.67	0.34	6.28a	0.58	21.22
1920	1.62a	4.13	0.97	0.00	1.17	3.00	2.08	0.74	0.00	1.13	0.00	0.01	14.85
1921	4.34a	0.11	0.71	0.09	1.18	0.00	0.90	1.31	0.97	1.24	0.16	2.79	13.80
1922	1.67	1.14	0.93	0.29	0.34	0.22	0.58	3.12	1.17	0.32	1.17	0.59	11.54
1923	1.39	0.48	0.50	0.96	0.00	0.00	0.31	0.37	0.97	0.03	2.32	1.96	9.29
1924	0.10	0.00	1.14	0.51	0.04	0.00	0.13	0.15	0.25	0.04	0.00	2.31	4.67

This is the bottom part of the previous table. At the end, it shows the long-term average precipitation by month and calendar year, along with other data.

<a href="#">Daily Temp. &amp; Precip.</a>	1934	0.39	0.65	0.00	0.40	0.00	0.19	0.00	2.15	0.00	0.31	0.46	2.15	6.70
• <a href="#">Daily Tabular data (~23 KB)</a>	1935	1.84	2.88	1.62	0.08	0.11	0.00	0.13	3.32	2.55	0.00	0.00	0.37	12.90
• <a href="#">Monthly Tabular data (~1 KB)</a>	1936	0.10	2.47	0.85	0.05	0.00	0.15	----z	----z	----z	2.64	0.00	3.89	10.15 c
• <a href="#">NCDC 1961-1990 Normals (~3 KB)</a>	1937	1.33	1.27	2.59	0.15	0.00	0.11	1.93	0.25	1.04	0.00	0.00	1.10	9.77
	1938	0.37	1.31	1.91	0.00	0.14	0.23	1.40	----z	0.12	0.12	0.00	3.07	8.67 a
<b>Period of Record</b>	1939	2.08	0.00 e	0.65	0.99	0.00	0.00	0.87	----z	9.85	0.29	0.95	0.16	15.84 a
	1940	1.40	2.26	0.05	1.41	0.14	0.25	0.04	0.40	5.08	0.65	0.51	3.12	15.31
• <a href="#">Station Metadata</a>	1941	0.75	3.66	3.60	2.31	0.16	0.11	0.57	1.16	0.29	1.37	1.10	1.00	16.08
• <a href="#">Station Metadata Graphics</a>	1942	0.16	0.18	0.11	1.22	0.02	0.00	0.17	1.55	0.00	0.04	0.12	1.26	4.83
	1943	1.98	0.78	0.95	1.16	0.03	0.00	0.77	0.88	1.56	0.42	0.00	1.76	10.29
<b>General Climate Summary</b>	1944	0.66	3.02	0.65	0.57	----z	----z	----z	----z	----z	----z	3.26	1.09	9.25 f
<b>Tables</b>	1945	0.53 a	0.71	2.69	0.04	0.02	0.00	0.29	0.27	0.50	0.60	0.08	1.66	7.39
• <a href="#">Temperature</a>	1946	0.10	0.06	0.59	0.30	0.03	0.03	2.08	1.27	0.98	1.83	2.06	1.12	10.45
• <a href="#">Precipitation</a>	1947	0.02	0.08	0.01	0.08	0.24	0.00	0.46	1.04	0.00	0.66	0.18	0.81	3.58
• <a href="#">Heating Degree Days</a>	1948	0.00	1.26	0.81	0.02	0.00	0.08	0.59	1.51	0.67	1.09	0.00	2.02	8.05
• <a href="#">Cooling Degree Days</a>	1949	3.18 a	0.87	1.08	0.66	0.59	0.18	0.31	0.77	0.40	0.45	0.72	0.99	10.20
• <a href="#">Growing Degree Days</a>	1950	0.32	0.45	0.89	0.00	0.00	0.00	1.90	0.54	0.70	0.00	0.15	0.08	5.03
<b>Temperature</b>	1951	1.06	0.31	0.21	0.92	0.91	0.00	1.09	3.72	0.30	1.66	1.39	2.67	14.24
• <a href="#">Daily Extremes and Averages</a>	1952	1.69	0.00	3.29	1.18	0.00	0.45	0.28	0.40	0.26	0.00	1.04	1.51	10.10
• <a href="#">Spring 'Freeze' Probabilities</a>	1953	0.10	0.28	0.31	0.69	0.00	0.12	1.03	4.04	0.00	0.20	0.09	0.03	6.89
• <a href="#">Fall 'Freeze' Probabilities</a>	1954	2.20	1.85	3.22	0.00	0.08	0.70	1.73	0.14 d	0.37	0.00	0.18	0.50	10.97
• <a href="#">'Freeze Free' Probabilities</a>	1955	1.68	0.08	0.01	0.65	0.07	0.02	1.31	2.47	0.00	0.00	0.68	0.28	7.25
○ Monthly Temperature Listings	1956	1.17	0.06	0.00	0.15	0.00	0.00	2.43	0.08	0.00	0.05	0.00	0.00	3.94
<a href="#">Average</a>	1957	1.86	0.59	0.55	0.57	0.39	0.10	0.70	2.01	0.00	2.64	0.63	0.68	10.72
<a href="#">Average Maximum</a>	1958	0.90	1.86	2.92	1.85	0.90	0.09	0.42	1.15	1.68	0.57	1.00	0.00	13.34
<a href="#">Average Minimum</a>	1959	0.50	2.02	0.00	0.00	0.00	0.23	0.65	2.66	1.68	1.50	0.40	1.90	11.54
<a href="#">Extreme Maximum</a>	1960	1.32	1.11	0.36	0.22	0.30	0.00	0.43	0.09	1.88	0.60	1.32	0.05	7.68
<a href="#">Extreme Minimum</a>	1961	1.44	0.00	0.72	0.33	0.00	0.00	0.44	3.08	0.27	0.65	0.13	0.77	7.83
<b>Precipitation</b>	1962	1.34	2.80	0.34	0.00	0.00	0.09	0.05	1.26	1.79	0.39	0.03	0.85	8.94
• <a href="#">Monthly Average</a>	1963	0.23	1.89	1.25	0.70	0.00	0.00	0.03	0.72	2.03	1.07	1.54	0.02	9.48
• <a href="#">Daily Extreme and Average</a>	1964	0.26	0.02	1.90	0.67	0.75	0.93	0.38	0.89	0.42	0.00	0.00	0.72	6.94
• <a href="#">Daily Average</a>	1965	0.97	1.21	1.39	4.04	0.24	0.00	1.57	0.88	0.24	0.00	3.08	3.59	17.21
• <a href="#">Precipitation Probability by Duration</a>	1966	0.19	1.05	0.48	0.00	0.13	0.10	0.82	0.20	0.56	0.86	0.85	1.71	6.95
• <a href="#">Precipitation Probability by Quantity</a>	1967	0.22	0.00	0.30	0.00	0.05	0.00	0.22	0.07	----z	----z	----z	----z	2.61 e
○ Monthly Precipitation Listings														
<a href="#">Monthly Totals</a>														
<a href="#">Daily Extreme</a>														
<b>Snowfall</b>														
• <a href="#">Daily Extreme and Average</a>														
• <a href="#">Daily Average</a>														
○ Monthly Snowfall Listings														
<a href="#">Monthly Totals</a>														
<b>Snowdepth</b>														
	MEAN	1.11	1.30	1.06	0.66	0.25	0.15	0.91	1.45	0.94	0.65	0.71	1.18	10.34
	S.D.	0.95	1.30	1.04	0.80	0.38	0.41	0.90	1.30	1.52	0.77	1.07	1.08	4.05
	SKEW	1.04	1.03	1.06	1.84	1.83	5.54	2.00	1.77	3.85	1.50	2.76	0.79	0.56
	MAX	4.34	4.48	3.60	4.04	1.52	3.00	5.15	6.57	9.85	3.11	6.28	3.89	21.22
	MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.58
	YRS	65	64	64	63	63	65	63	62	63	64	64	65	53

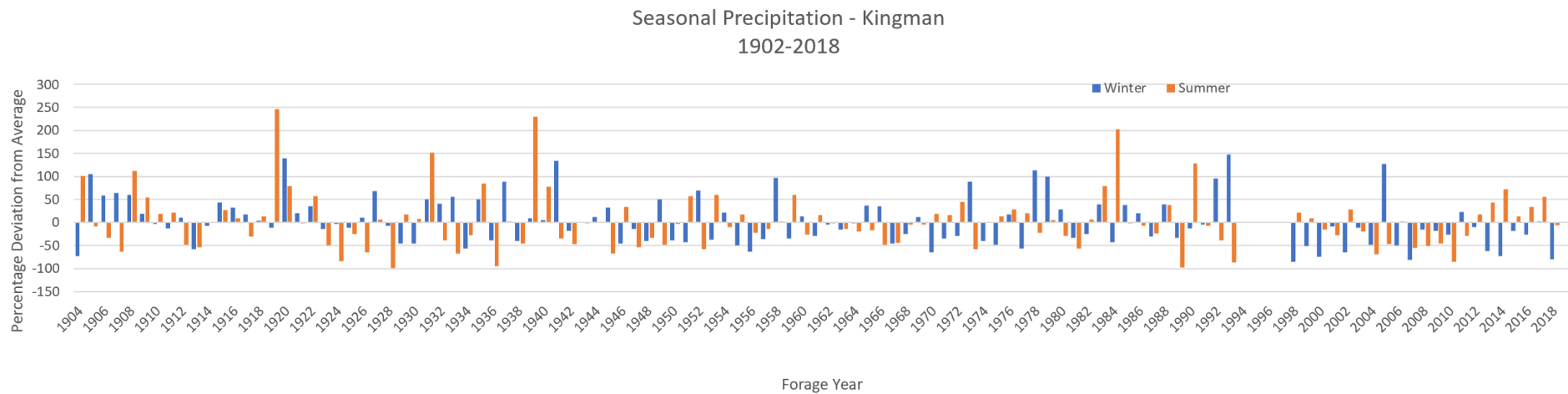
The table of monthly totals shown on the previous slide can then be downloaded as an Excel file on your computer so that the data can be analyzed. This table only shows a portion of the Excel file. Months with missing data are highlighted in red. Since Kingman had two stations it was necessary to combine the tables for both to get a complete record on the Excel file to allow calculation of average monthly values for the entire record.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	Kingman Combined Data															
2																
3	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual		
4	1901						0	0.5	1.81	0	0.1	0	0	2.41		
5	1902	0.25	1.8	0.36	0	0.00	0	0.00	0	1.10	0	M 30	M 31	M 30	M 31	3.51
6	1903	M 31	M 28	M 31	M 30	0.1	0.27	0.26	0.66	1.52	0.20	0	0.00	0	3.01	
7	1904	T	0.64	0.55	0.05	0.22	0	T	0.79	5.48	0.25	0.06	0	0.27	8.31	
8	1905	1.77	4.47	3.05	2.42	0.87	0	0.15	1.43	1.4	0.45	1.86	0.81	18.68		
9	1906	0.98	1.07	3.49	1.31	T	T	2.18	0	0	0	1.5	1.87	12.40		
10	1907	3.74	1.41	1.21	0.28	0.31	0.14	0.2	0.71	0.12	3.11	0.05	T	11.28		
11	1908	2.32	2.58	1.38	0.38	0.28	0	1.68	2.39	2.82	0.37	0.22	2.27	16.69		
12	1909	0.87	1.69	2.04	0	T	M 30	M 31	3.77	1.25	0	1.69	2.16	13.47		
13	1910	1.62	0.05	0.61	M 30	M 31	0	0.85	1.92	1.11	0.65	2.48	0.42	9.71		
14	1911	1.66	M 28	M 31	M 30	0.31	0.06	2.18	0.48	1.23	1.35	0	0.31	7.58		
15	1912	0	0	3.3	2.01	0.00	26	1.01	0.09	0.57	0	1.12	0	0.3	8.40	
16	1913	0.7	0.41	0.02	0.07	0	T	0.06	1.1	0.35	T	1.08	T	3.79		
17	1914	1.88	2.3	T	0.25	0.34	0.21	1.72	0.9	0.45	0.75	0.1	1.46	10.36		
18	1915	2.11	2.8	0.55	0.6	0.7	0	3.03	0.85	0.25	T	0.29	2.21	13.39		
19	1916	2.7	0.64	0.83	0.18	1.52	0	1.27	1.57	0.72	0.71	0	1.3	11.44		
20	1917	2.31	0.51	T	1.15	1.45	0	0.6	0.95	0.7	0	0	0	7.67		
21	1918	1.1	1.75	2.9	0.75	0	0.3	1	1.48	0.92	0.54	0.47	1.79	13.00		
22	1919	0.17	1.65	0.78	0	0.15	0	5.15	1.45	4.67	0.34	6.28	0.58	21.22		
23	1920	1.62	4.13	0.97	0	1.17	3	2.08	0.74	0	1.13	0	0.01	14.85		
24	1921	4.34	0.11	0.71	0.09	1.18	0	0.9	1.31	0.97	1.24	0.16	2.79	13.80		
25	1922	1.67	1.14	0.93	0.29	0.34	0.22	0.58	3.12	1.17	0.32	1.17	0.59	11.54		
26	1923	1.39	0.48	0.5	0.96	0	0	0.31	0.37	0.97	0.03	2.32	1.96	9.29		
27	1924	0.1	0	1.14	0.51	0.04	0	0.13	0.15	0.25	0.04	0	2.31	4.67		
28	1925	0.07	0.01	1.29	1.84	0	0.07	0.87	1.23	0.26	2.79	0.34	0.47	9.24		
29	1926	0.5	0.1	0.81	1.97	0	0	0	1.02	0.11	0	0.2	3.69	8.40		
30	1927	0.57	4.39	1.58	0.2	0	0.06	1.48	0.9	1	2.08	0.17	1.2	13.63		
31	1928	0.16	1.98	0.21	0.02	0	0	0	0.04	0	0.17	0.08	1.03	3.69		
32	1929	1	0.78	0.03	0.32	0	0	0.68	2.7	0.42	0.03	0	0	5.96		
33	1930	0.58	0.03	1.9	0.16	0.74	0.06	1.07	2.03	0.36	1.42	1.28	0	9.63		
34	1931	0.99	4.43	0.14	1	0.18	0.19	1.26	6.57	0.15	0.4	1.42	2.2	18.93		
35	1932	0.1	4.48	0	0	0.27	0.19	0.07	1.07	0.64	1.21	0	3.5	11.53		
36	1933	2.14	0.05	0	2.57	0.35	0	0.1	0.97	T	0.32	0.46	0.49	7.45		

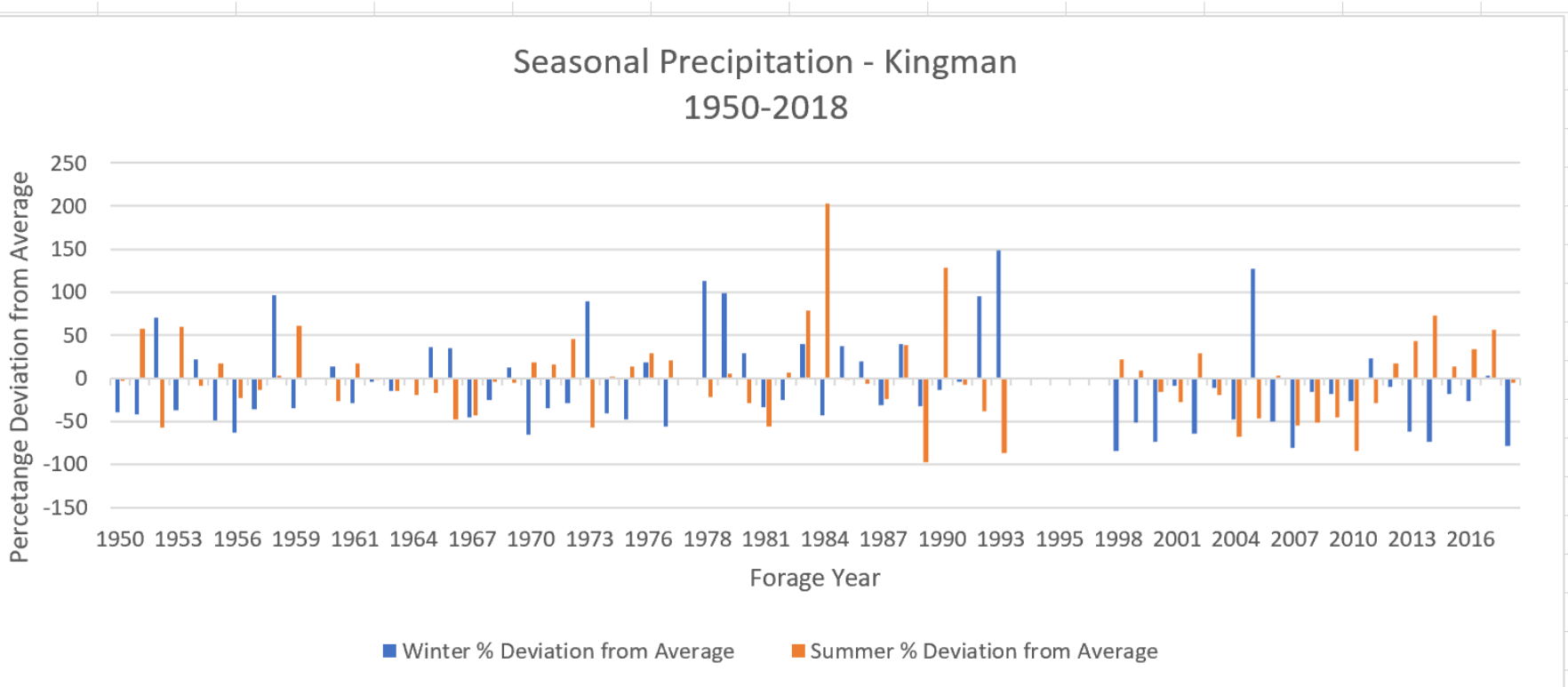
Reporting precipitation based on forage years or seasonal amounts helps the interpretation of data as was discussed earlier. The table below shows the combined Kingman data set re-arranged by forage year and seasonal totals. Note that forage year 1902 actually begins in Oct of 1901. The figures at the far right show the FY totals. Seasonal precipitation is shown as winter and summer totals and as a percent of average seasonal precipitation. To produce a graph of seasonal precipitation as a percentage of average, use the figures in the columns with red headings, i.e., forage year, winter, summer.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T		
1	Forage Year Calculations																					
2	Forage Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Winter Total	Winter %AVG	Jun	Jul	Aug	Sep	Summer total	Summer %AVG					
3	1901																					
4	1902	0.1	0	0	0.25	1.8	0.36	0	0	2.51	41.29	0	0	1.1	0	1.10	35.06			Annual	Year	
5	1903	0	0	0	0	0	0	0	0.1	0.10	1.65	0.27	0.26	0.66	1.52	2.71	86.37			3.51	1902	
6	1904	0.2	0	0	T	0.64	0.55	0.05	0.22	1.66	27.31	T	0.79	5.48	0.25	6.52	207.81			3.01	1903	
7	1905	0.06	0	0.27	1.77	4.47	3.05	2.42	0.87	12.91	212.39	0	0.15	1.43	1.4	2.98	94.98			8.31	1904	
8	1906	0.45	1.86	0.81	0.98	1.07	3.49	1.31	T	9.97	164.02	T	2.18	0	0	2.18	69.48			18.68	1905	
9	1907	0	1.5	1.87	3.74	1.41	1.21	0.28	0.31	10.32	169.78	0.14	0.2	0.71	0.12	1.17	37.29			12.40	1906	
10	1908	3.11	0.05	T	2.32	2.58	1.38	0.38	0.28	10.10	166.16	0	1.68	2.39	2.82	6.89	219.60			11.28	1907	
11	1909	0.37	0.22	2.27	0.87	1.69	2.04	0	T	7.46	122.73			3.77	1.25	5.02	160.00			16.69	1908	
12	1910	0	1.69	2.16	1.62	0.05	0.61			6.13	100.85	0	0.85	1.92	1.11	3.88	123.66			13.47	1909	
13	1911	0.65	2.48	0.42	1.66				0.31	5.52	90.81	0.06	2.18	0.48	1.23	3.95	125.90			9.71	1910	
14	1912	1.35	0	0.31	0	0	3.3	2.01		6.97	114.67	1.01	0.09	0.57	0	1.67	53.23			7.58	1911	
15	1913	1.12	0	0.3	0.7	0.41	0.02	0.07	0	2.62	43.10	T	0.06	1.1	0.35	1.51	48.13			8.40	1912	
16	1914	T	1.08	T	1.88	2.3	T	0.25	0.34	5.85	96.24	0.21	1.72	0.9	0.45	3.28	104.54			3.79	1913	
17	1915	0.75	0.1	1.46	2.11	2.8	0.55	0.6	0.7	9.07	149.21	0	3.03	0.85	0.25	4.13	131.63			10.36	1914	
18	1916	T	0.29	2.21	2.7	0.64	0.83	0.18	1.52	8.37	137.70	0	1.27	1.57	0.72	3.56	113.47			13.39	1915	
19	1917	0.71	0	1.3	2.31	0.51	T	1.15	1.45	7.43	122.23	0	0.6	0.95	0.7	2.25	71.71			11.44	1916	
20	1918	0	0	0	1.1	1.75	2.9	0.75	0	6.50	106.93	0.3	1	1.48	0.92	3.70	117.93			7.67	1917	
21	1919	0.54	0.47	1.79	0.17	1.65	0.78	0	0.15	5.55	91.30	0	5.15	1.45	4.67	11.27	359.20			13.00	1918	
22	1920	0.34	6.28	0.58	1.62	4.13	0.97	0	1.17	15.09	248.25	3	2.08	0.74	0	5.82	185.50			21.22	1919	
23	1921	1.13	0	0.01	4.34	0.11	0.71	0.09	1.18	7.57	124.54	0	0.9	1.31	0.97	3.18	101.35			14.85	1920	
24	1922	1.24	0.16	2.79	1.67	1.14	0.93	0.29	0.34	8.56	140.82	0.22	0.58	3.12	1.17	5.09	162.23			13.80	1921	
25	1923	0.32	1.17	0.59	1.39	0.48	0.5	0.96	0	5.41	89.00	0	0.31	0.37	0.97	1.65	52.59			11.54	1922	
26	1924	0.03	2.32	1.96	0.1	0	1.14	0.51	0.04	6.10	100.35	0	0.13	0.15	0.25	0.53	16.89			9.29	1923	
27	1925	0.04	0	2.31	0.07	0.01	1.29	1.84	0	5.56	91.47	0.07	0.87	1.23	0.26	2.43	77.45			4.67	1924	
28	1926	2.79	0.34	0.47	0.5	0.1	0.81	1.97	0	6.98	114.83	0	0	1.02	0.11	1.13	36.02			9.24	1925	
29	1927	0	0.2	3.69	0.57	4.39	1.58	0.2	0	10.63	174.88	0.06	1.48	0.9	1	3.44	109.64			8.40	1926	
30	1928	2.08	0.17	1.2	0.16	1.98	0.21	0.02	0	5.82	95.75	0	0	0.04	0	0.04	1.27			13.63	1927	
31	1929	0.17	0.08	1.03	1	0.78	0.03	0.32	0	3.41	56.10	0	0.68	2.7	0.42	3.80	121.11			3.69	1928	
32	1930	0.03	0	0	0.58	0.03	1.9	0.16	0.74	3.44	56.59	0.06	1.07	2.03	0.36	3.52	112.19			5.96	1929	

The graph below shows the monthly data by season for the entire period of record 1901-2018. Data are shown as deviation from the seasonal average, i.e., the percentage above or below average. The zero line indicates an average season. This record is very long and probably not too useful for interpreting range trends or current conditions – usually only use the past 10-30 years for that.

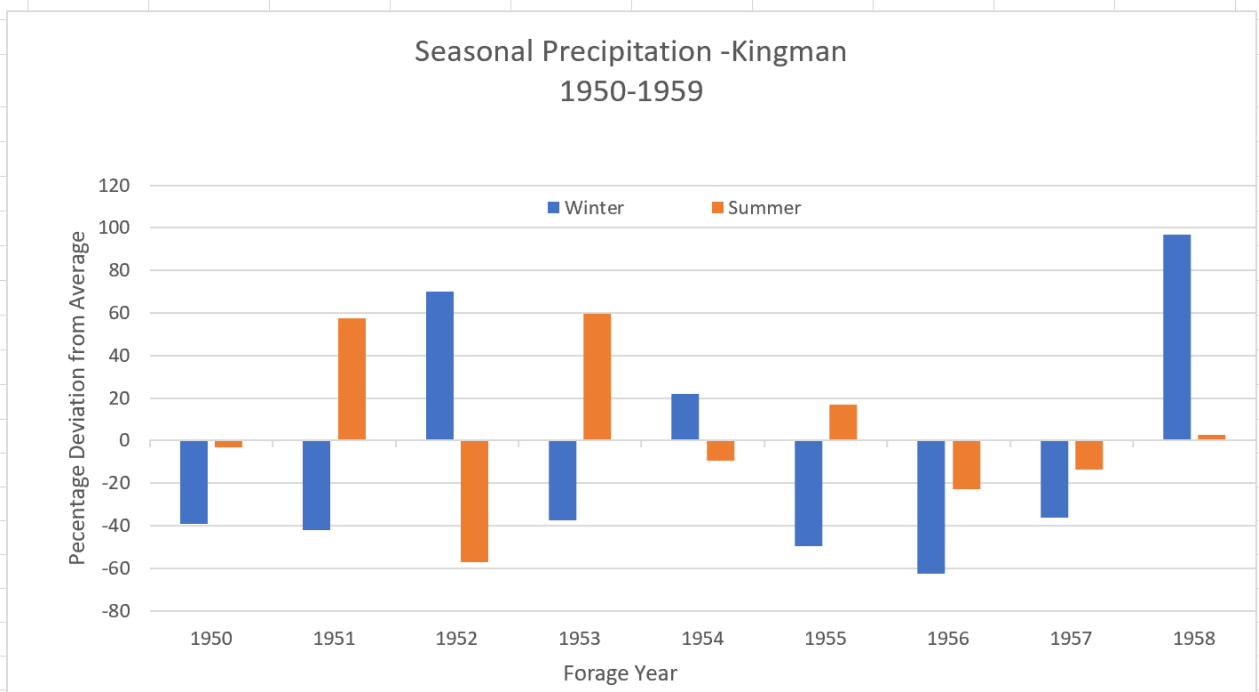


This graph shows seasonal precipitation as a deviation from average for the period of 1950 -2018. Most of the monitoring data available were collected since the 1950s and 1960s. This record was visually divided into several periods which appeared to represent weather cycles. Note there is a period of missing data in the mid-90s.



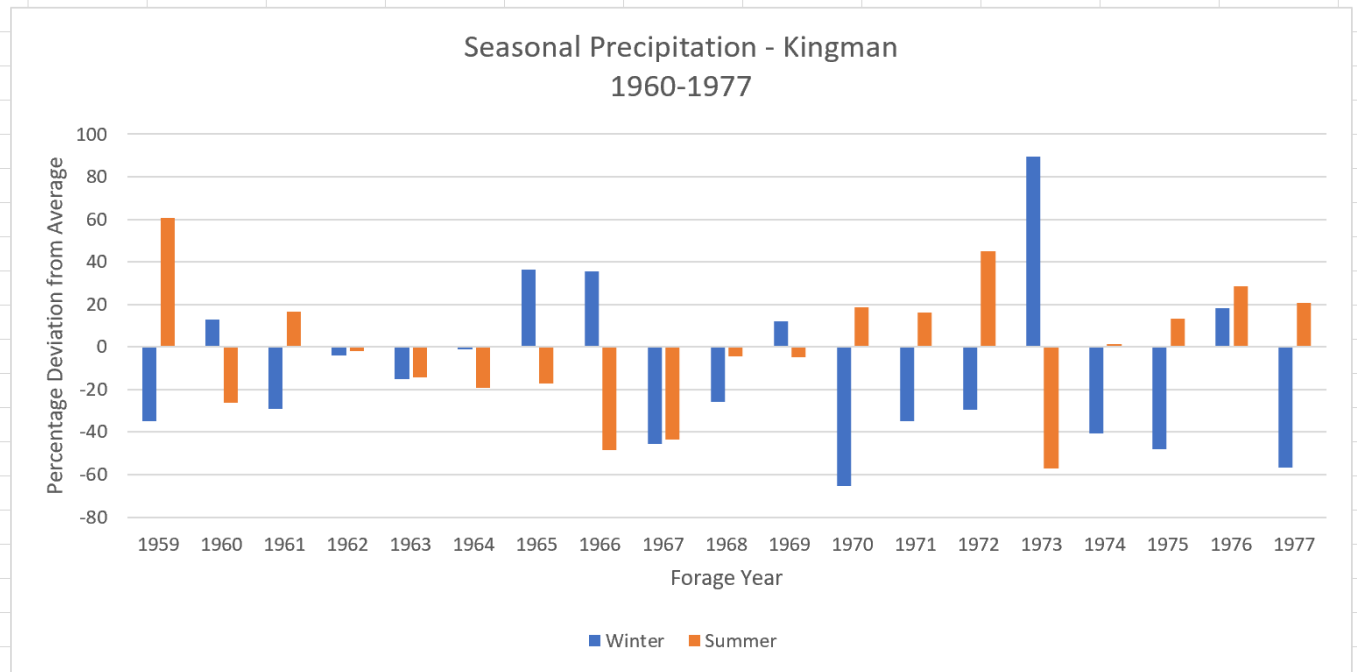
This 10-year period includes the 1950s drought and had 7 dry winters, 2 wet winters, 1 dry summer and 3 wet summers. Overall, it could be characterized as a period of generally dry winters and dry to average summers. The period from 1954 to 1957 had consecutive seasons which were mostly below average. That is what usually causes not only reduced production but also plant mortality which can take a long time to recover. The data are shown at left.

Forage Year	Winter	Summer
1950	-39	-3
1951	-42	57
1952	70	-57
1953	-38	60
1954	22	-9
1955	-50	17
1956	-63	-23
1957	-36	-14
1958	97	3



This 18-year period had 9 dry winters and 3 wet ones; it had 4 dry summers and 2 wet ones. It had no extremely wet summers and only 1 extremely dry summer. It had 1 extremely wet winter and 2 extremely dry winters. Overall, it is about average but highly variable, which IS average for our climate. In general there were a lot of dry summers in the first portion and a lot of dry winters in the second, but long-term sequences of consecutive wet or dry seasons were not too common. That might indicate that drought effects were present but not as severe as in some other periods.

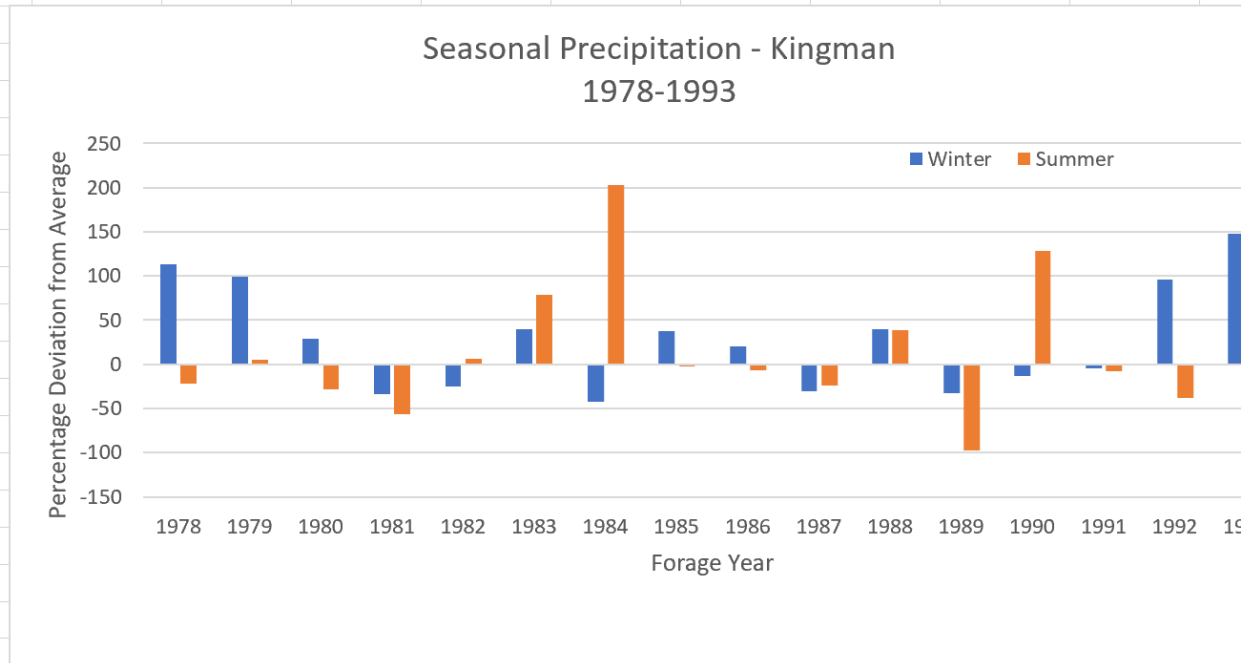
Forage Year	Winter	Summer
1959	-35	61
1960	13	-26
1961	-29	17
1962	-4	-2
1963	-15	-14
1964	-1	-19
1965	36	-17
1966	35	-48
1967	-46	-44
1968	-26	-5
1969	12	-5
1970	-65	19
1971	-35	16
1972	-30	45
1973	89	-57
1974	-41	1
1975	-48	13
1976	18	28
1977	-57	21





This 16-year period was fairly favorable. There were 5 dry winters and 8 wet ones. There were 5 dry summers and 4 wet ones. There were 3 extremely wet summers and 3 extremely dry summers. There were 4 extremely wet winters and no extremely dry winters. There are few extended dry seasons back to back and the ones that do occur were only slightly below average. So, it was a better than average period, especially in terms of winter rain. That is similar to what happened elsewhere in Arizona. The 1980s “wet” period resulted in considerable increase in plant cover, especially shrubs and riparian vegetation.

Forage Year	Winter	Summer
1978	113	-22
1979	99	5
1980	29	-29
1981	-34	-56
1982	-25	7
1983	40	79
1984	-43	203
1985	37	-2
1986	20	-7
1987	-31	-24
1988	40	38
1989	-33	-97
1990	-13	128
1991	-4	-7
1992	96	-38
1993	148	-87



This 21-year period is probably the worst since records were kept. There have been 12 dry winters and only 1 wet one. There have been 8 dry summers and 5 wet ones. There have been 2 extremely wet summers, both in the last few years and 4 extremely dry summers, from 2004 to 2010. There were 8 extremely dry winters and only 1 extremely wet winter (2005). Particularly in the period from 1998-2010, there were many consecutive seasons of below average to very dry conditions. Since 2015, there has been a pretty good run of summers, but dry winters continue. Thus, any monitoring or other data collected during this period may not represent the long-term situation unless we have in fact entered into a new “normal” due to climate change as some believe. The effects of this drought and the prospects for improvement should be carefully considered in projecting management needs.

Forage Year	Winter	Summer
1998	-85	22
1999	-51	9
2000	-74	-16
2001	-9	-27
2002	-64	29
2003	-11	-19
2004	-48	-68
2005	128	-46
2006	-50	3
2007	-81	-56
2008	-15	-52
2009	-18	-46
2010	-27	-85
2011	23	-29
2012	-10	17
2013	-63	43
2014	-73	72
2015	-19	14
2016	-27	34
2017	2	56
2018	-79	-5

