

Using PRISM Data: How to Get and Use PRISM Estimates of Precipitation for Your Location

(AACD Technical Reference #C-3B)

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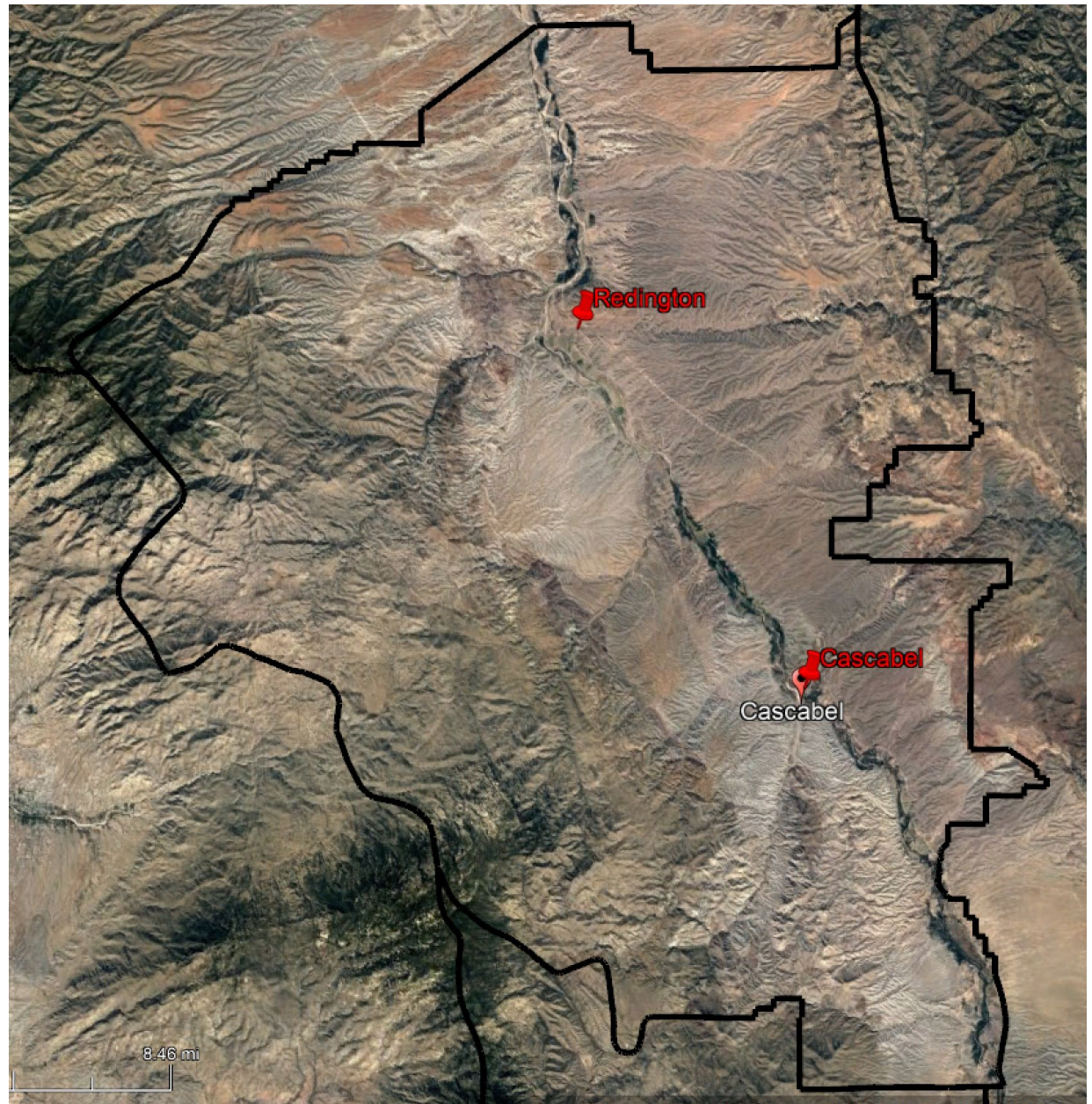
Arizona Association of Conservation Districts

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This example is how to obtain precipitation data using PRISM. PRISM data can be obtained for any given point. It is based on extrapolation and interpolation among nearby weather stations with adjustments for topography, elevation, etc.

For this example, I used Cascabel, Arizona as the point to be described. Cascabel is located in the Redington NRC District but there is no official weather station currently there. There may be some private records. There is an official station at Redington which is also in the Redington District, but at an elevation lower than most of the District. Cascabel may be more representative of the District. Or you could use both locations or choose one at a higher altitude.



The first step is to log into PRISM (<https://prism.oregonstate.edu/>).

The first screen will look like the one below:

The screenshot shows the PRISM Climate Data website. At the top is a dark blue header with the text "Northwest Alliance for Computational Science and Engineering" in white. Below the header is a navigation menu with buttons for "Home", "Normals", "Comparisons", "This Month", "Prior 6 Months", "Recent Years", "Historical Past", "Projects", "Explorer", and "FAQ". The "Home" button is highlighted in yellow. The main content area has a light yellow background and is titled "PRISM Climate Data". Below the title is a paragraph describing the PRISM Climate Group's work. To the right of this paragraph is a list of links. Below the list is a box titled "High-Resolution Data Available" containing text about data resolution. At the bottom of the page are several sections with blue underlined headers and black text, providing details about 30-year normals, comparisons, this month's data, prior 6 months, recent years, historical past, projects, data explorer, and FAQ. The RMA logo is at the bottom left, and a support statement is at the bottom center. The footer contains contact information for questions.

Northwest Alliance for Computational Science and Engineering

Home Normals Comparisons This Month Prior 6 Months Recent Years Historical Past Projects Explorer FAQ

PRISM Climate Data

The **PRISM Climate Group** gathers climate observations from a wide range of monitoring networks, applies sophisticated quality control measures, and develops spatial climate datasets to reveal **short- and long-term climate patterns**. The resulting datasets incorporate a variety of modeling techniques and are available at multiple spatial/temporal resolutions, covering the period from **1895 to the present**. Whenever possible, we offer these datasets to the public, either free of charge or for a fee (depending on dataset size/complexity and funding available for the activity).

- Methods used by the [PRISM model](#)
- Descriptions of the [PRISM datasets](#)
- [How we developed](#) the PRISM model
- [Publications](#) about PRISM
- Calendar of PRISM [dataset updates](#)
- [What's new](#) at PRISM
- [PRISM-Updates mailing list](#)

High-Resolution Data Available

The native grid resolution of the PRISM datasets is 800m, but they have been filtered to 4km resolution for easier downloading and manipulation on this website. The native 800m versions of all PRISM datasets are available to users for a fee. For information and pricing, please contact prism_orders@nacse.org. Descriptions of all PRISM datasets, including those not found on this website, can be found [here](#).

30-Year Normals: At the end of each decade, average values for temperature and precipitation are computed over the preceding 30 years. The current set of 30-year normals covers the period 1981-2010.

Comparisons: Maps showing how observed values have been deviating from long-term conditions (also known as anomalies) - includes the new Drought Indicator tool.

This Month: Although still very preliminary, results based on daily data readings are available for the month-in-progress.

Prior 6 Months: Provisional results based on both monthly and daily data are available for the 6 most recently completed months.


Recent Years: Daily and monthly observations become stabilized after 6 months. At that point the time series datasets are posted in this section, along with annual values computed at the end of each year.

Historical Past: Values prior to 1981 are based on less extensive observations. Time series datasets computed using monthly modeling are available for the years 1895-1990.

Projects: Map images and data prepared for outside agencies but now released for public use. Includes USDA Plant Hardiness Zone Maps, climate data for areas outside the continental U.S., and map images for individual states.

Data Explorer: analyze and download time-series data for a single location.

FAQ: Answers to frequently asked questions

 This website is supported by the [USDA Risk Management Agency](#)

Questions to prism-questions@nacse.org

You can locate a point using the State and County or by using coordinates. For this example, I used Arizona and Cochise County. That produced a map of Cochise County which you use to set a pin (the red dot) where you want it. You can also get temperature and dewpoint data if you want. I chose the 4 km resolution. I selected the 10 years from October 1, 2010, through September 30, 2020, i.e., the last 10 forage years. You can select any interval you want.

State & County: Arizona | Cochise

Coordinates: Latitude: 32.2910 | Longitude: -110.3793 | Elevation: 3245ft (989m)

Data Settings

- Precipitation
- Mean dewpoint temp
- Minimum temp
- Minimum VPD
- Mean temp
- Maximum VPD
- Maximum temp

30-year normals, 1981-2010 (monthly and annual)

Resolution: 4km 800m

Annual values

start 2000 | end 2019

Single month values

January

start 2017 | end 2017

Monthly values

start October | 2005

end September | 2020

Daily values

start 01 | January | 2017

end 01 | January | 2017

stable (unlikely to change)
Data Stability: (based on selected end date)

Units: English SI (metric)

Interpolate grid cell values (see text)

Controls

Retrieve Time Series | Download Time Series | Restore Previous Settings

Once settings are complete, **retrieve** the results

Click to select. Click & drag to pan. Use mouse wheel to zoom.

CASGABEL

RMA

Questions to prism-questions@nacse.org

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The forage year long term average by month is shown at the bottom of the screen. Select “Download Time Series” and an excel file containing these data will download to your computer (see next slide).

start 2000 end 2019

Single month values January

start 2017 end 2017

Monthly values

start October 2005

end September 2020

Daily values

start 01 January 2017

end 01 January 2017

stable (unlikely to change)
Data Stability: (based on selected end date)

Units: English SI (metric)

Interpolate grid cell values (see text)

Controls

Retrieve Time Series **Download Time Series** Restore Previous Settings

Results can be **downloaded** or **change the location/settings** to examine a different time series

Latitude: 32.2910 Longitude: -110.3793 Elevation: 3245ft (989m) 4km PRISM cells / interpolated
Precipitation English units / 30-year normals
(the PRISM day spans 24 hours ending at 1200 UTC on the day shown) Data stability: stable

Precip (inches)

Month	Precip (inches)
Jan '10	1.0
Feb '10	1.0
Mar '10	0.8
Apr '10	0.2
May '10	0.2
Jun '10	0.2
Jul '10	2.2
Aug '10	2.5
Sep '10	1.2
Oct '10	1.0
Nov '10	0.5
Dec '10	1.0

Blue area on timeline shows which portion is plotted above; use sliders to adjust what's displayed

Repeat the process to get forage year monthly totals for the period of interest

Location

State & County: Arizona Coordinates: Latitude: 32.2910 Longitude: -110.3793 Elevation: 3245ft (989m)

Data Settings

Precipitation Mean dewpoint temp
 Minimum temp Minimum VPD
 Mean temp Maximum VPD
 Maximum temp

30-year normals, 1981-2010 (monthly and annual)
Resolution: 4km 800m

Annual values
start 2000 end 2019

Single month values
start 2017 end 2017
January

Monthly values
start October 2010
end September 2020

Daily values
start 01 January 2017
end 01 January 2017

provisional (likely to change)
Data Stability: (based on selected end date)

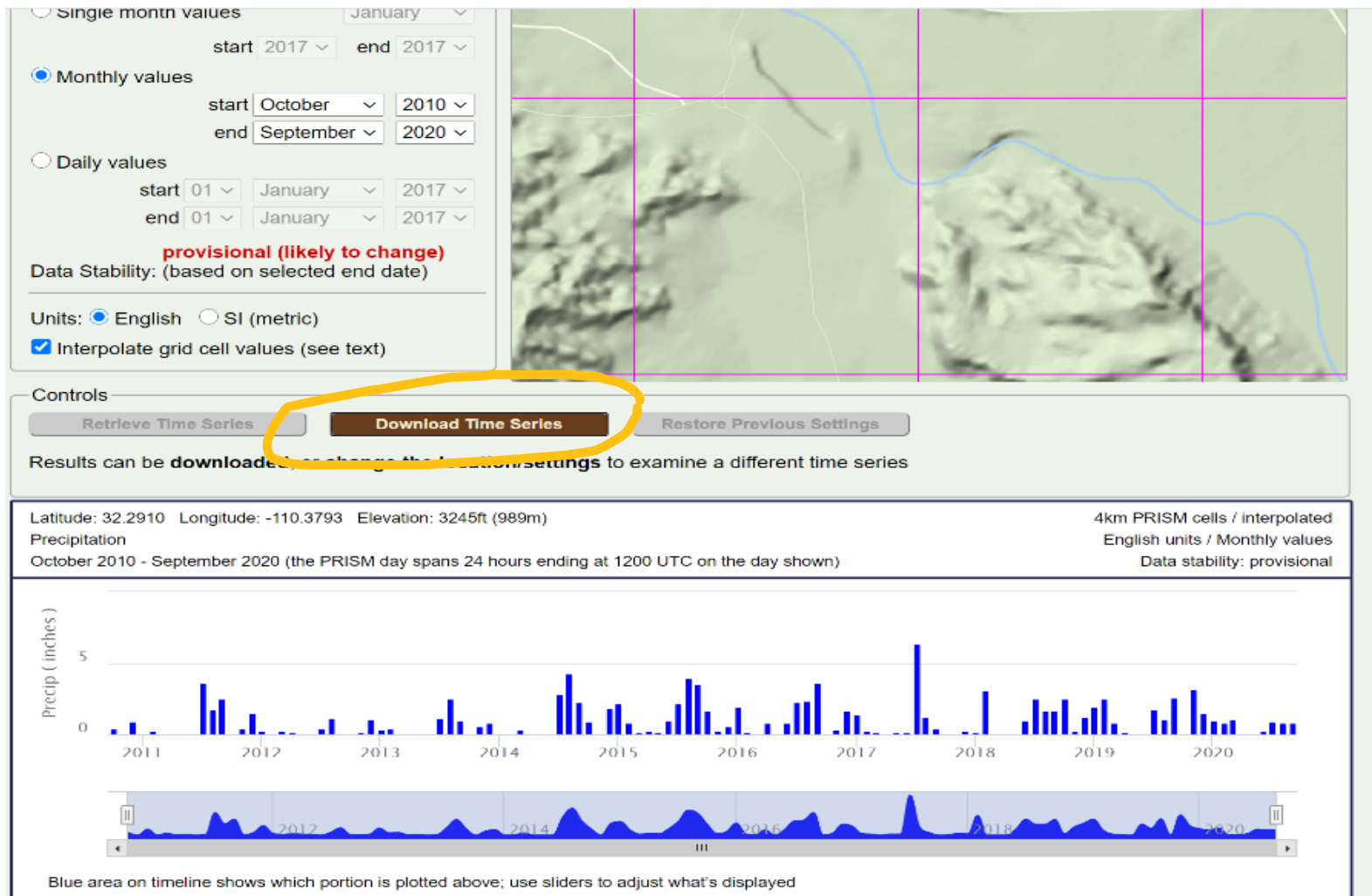
Units: English SI (metric)
 Interpolate grid cell values (see text)

Controls

Retrieve Time Series Download Time Series Restore Previous Settings

Once settings are complete, **retrieve** the results

This shows the monthly total rainfall for every month in the time period selected, i.e., Oct 2010 through Sept 2020. Selecting “Download Time Series” will produce an excel table with the rainfall amounts for each month.



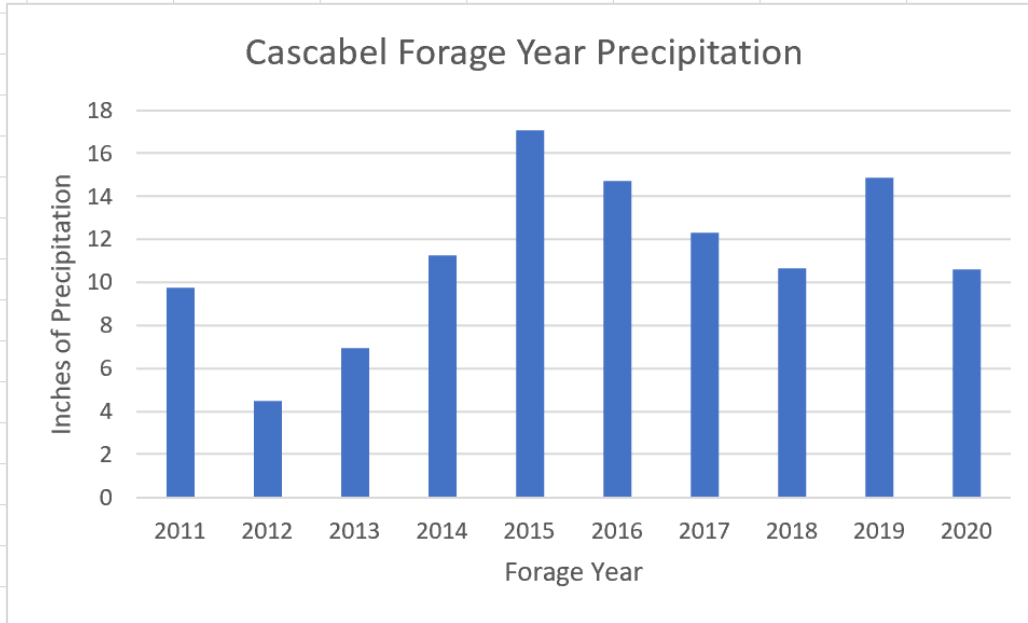
	A	B	C	D	E	F	G	H
1	PRISM Time Series Data							
2	Location: Lat: 32.2910 Lon: -110.3793 Elev: 3245ft							
3	Climate variable: ppt							
4	Spatial resolution: 4km							
5	Period: 2010-10 - 2020-09							
6	Dataset: AN81m							
7	PRISM day definition: 24 hours ending at 1200 UTC on the day shown							
8	Grid Cell Interpolation: On							
9	Time series generated: 2021-Feb-24							
10	Details: http://www.prism.oregonstate.edu/documents/PRISM_datasets.pdf							
11	Date	ppt (inches)						
12	2010-10	0.38						
13	2010-11	0						
14	2010-12	0.95						
15	2011-01	0						
16	2011-02	0.28						
17	2011-03	0.04						
18	2011-04	0.09						
19	2011-05	0						
20	2011-06	0.09						
21	2011-07	3.6						
22	2011-08	1.8						
23	2011-09	2.53						
24	2011-10	0.04						
25	2011-11	0.4						
26	2011-12	1.51						
27	2012-01	0.24						
28	2012-02	0.11						
29	2012-03	0.22						
30	2012-04	0.15						
31	2012-05	0.11						
32	2012-06	0						
33	2012-07	0.46						
34	2012-08	1.16						
35	2012-09	0.09						

The excel worksheet above lists the monthly totals for every month from October 2010 through September 2020. (Only a portion of the sheet is shown here.) Then, using the two excel sheets generated, cut and paste the data to provide estimates of forage year and seasonal precipitation.

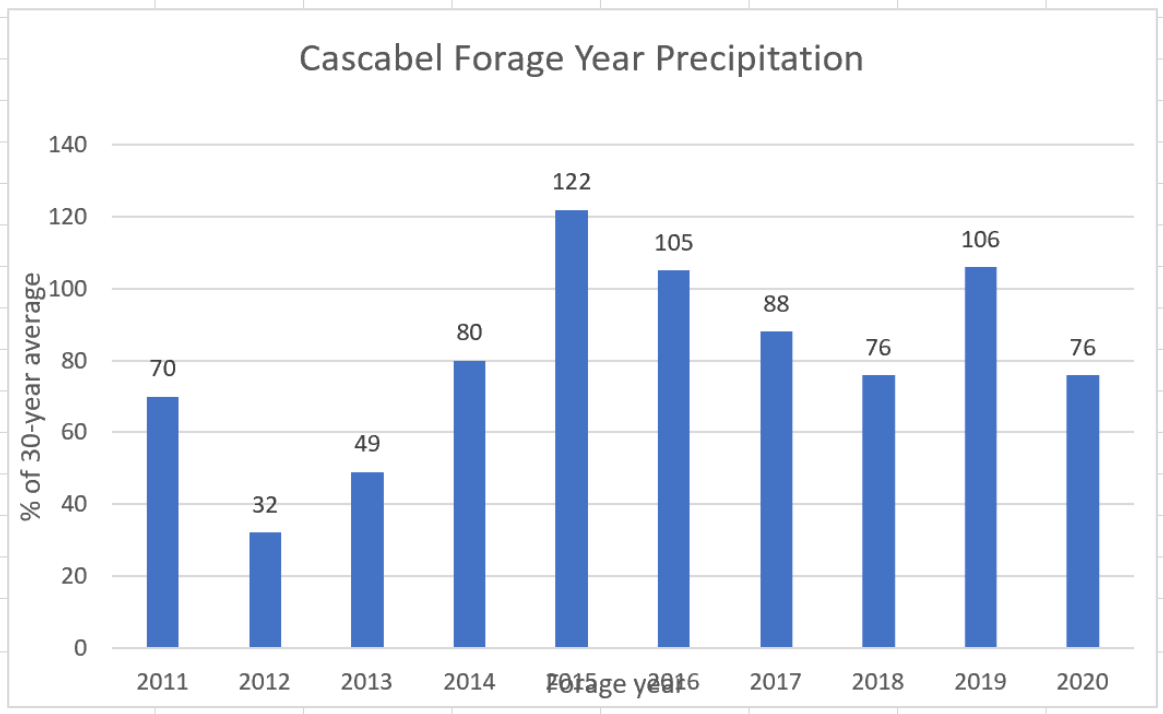
Monthly Precipitation Analysis by Forage Year for Cascabel 2011-2020 - PRISM

	Forage Year										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
October	0.38	0.04	0.03	0	0.95	1.71	0.04	0	2.49	0.02	
November	0	0.4	0.13	0.63	0	0.26	0.33	0.04	0.22	3.22	
December	0.95	1.51	1.12	0.86	1.86	0.57	1.72	0.28	1.29	1.49	
January	0	0.24	0.36	0	2.17	1.94	1.44	0.19	1.9	1.01	
February	0.28	0.11	0.41	0.03	0.81	0.19	0.25	3.15	2.53	0.82	
March	0.04	0.22	0.04	0.36	0.15	0.06	0.14	0	0.8	1.13	
April	0.09	0.15	0.06	0	0.26	0.83	0	0	0.15	0.04	
May	0	0.11	0	0	0.21	0	0.16	0	0.04	0.04	
June	0.09	0	0.08	0	1.02	0.88	0.14	1.02	0	0.25	
July	3.6	0.46	1.19	2.84	2.19	2.26	6.42	2.55	1.76	0.93	
August	1.8	1.16	2.49	4.28	3.99	2.39	1.27	1.72	1.08	0.8	
September	2.53	0.09	1.02	2.27	3.49	3.61	0.4	1.72	2.61	0.83	
Total	9.76	4.49	6.93	11.27	17.1	14.7	12.31	10.67	14.87	10.58	
			30-year average = 14.01								
% Avg	70	32	49	80	122	105	88	76	106	76	

The data for each month of the 10-year period downloaded from PRISM are then rearranged to provide a compact table of monthly values by year as shown above. The 30-year monthly averages can then be used to calculate the percentage of the average for each month, and this can also be converted to the deviation from the average in percent. For example, if the average winter rainfall for 2015 is 2 inches and the actual rainfall is 2.5 inches, then the percentage of average is 125% and the deviation is +25%. Likewise, if the actual rainfall is 1.5 inches, then the percentage of average is 75% and the deviation is -25%.

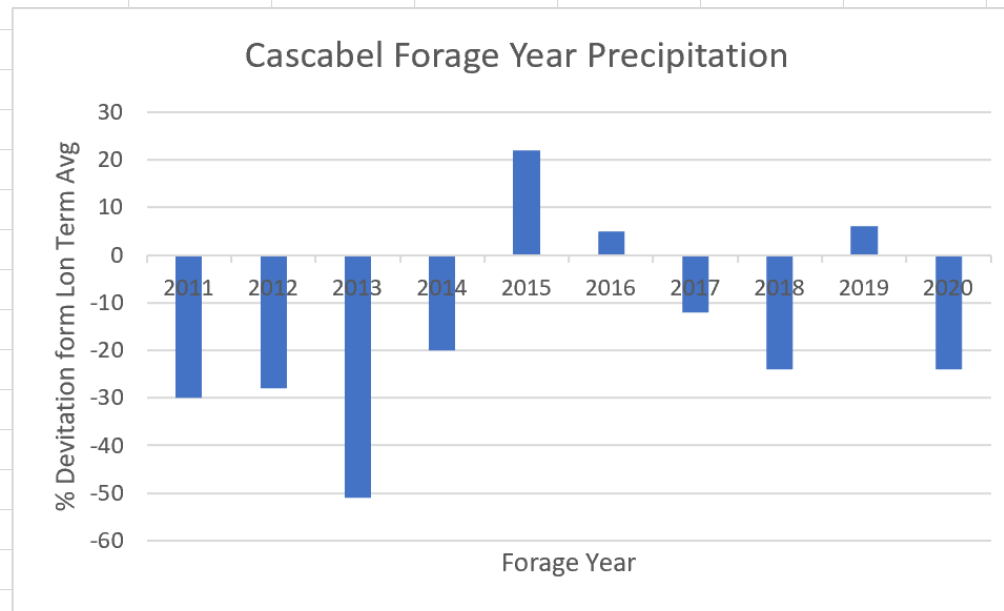


Forage Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Inches	9.76	4.49	6.93	11.27	17.1	14.7	12.31	10.67	14.87	10.58



Forage Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
% Avg	70	32	49	80	122	105	88	76	106	76

This chart shows that 2011, 2012, and 2013 would have been considered “drought years” using the 75% of average criterion. All other years are more or less average with one, 2014 approaching a “wet year” using the 125% criterion.



Forage Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Deviation	-30	-28	-51	-20	22	5	-12	-24	6	-24

Graphing precipitation as a deviation from average gives a better picture of actual conditions for the forage year. This shows that almost every year over the 10-year period was below average, some considerably below.

Analysis of Seasonal Precipitation for Cascabel 2011-2020 Forage Years

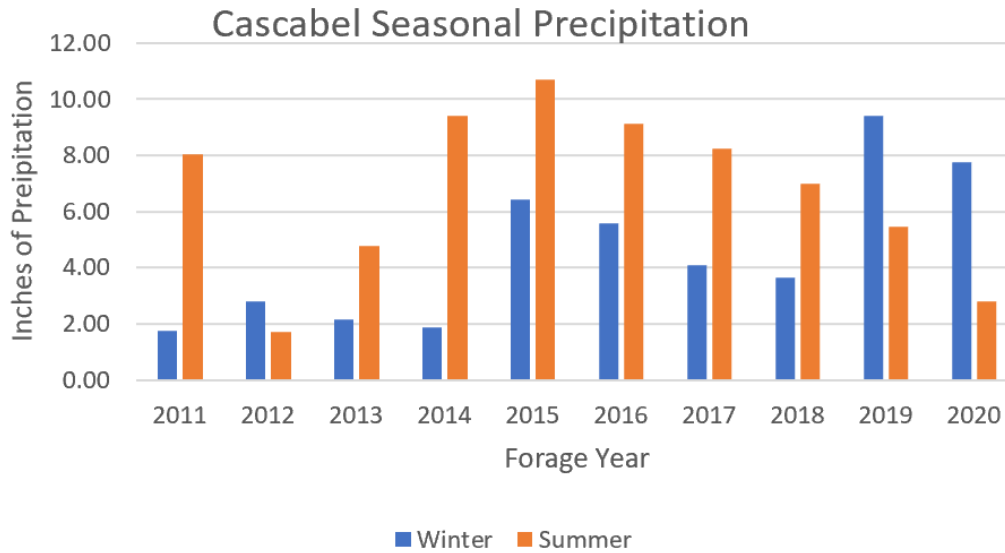
Forage Year

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
October	0.38	0.04	0.03	0	0.95	1.71	0.04	0	2.49	0.02
November	0	0.4	0.13	0.63	0	0.26	0.33	0.04	0.22	3.22
December	0.95	1.51	1.12	0.86	1.86	0.57	1.72	0.28	1.29	1.49
January	0	0.24	0.36	0	2.17	1.94	1.44	0.19	1.9	1.01
February	0.28	0.11	0.41	0.03	0.81	0.19	0.25	3.15	2.53	0.82
March	0.04	0.22	0.04	0.36	0.15	0.06	0.14	0	0.8	1.13
April	0.09	0.15	0.06	0	0.26	0.83	0	0	0.15	0.04
May	0	0.11	0	0	0.21	0	0.16	0	0.04	0.04
Winter	1.74	2.78	2.15	1.88	6.41	5.56	4.08	3.66	9.42	7.77
% Avg	25	40	31	27	92	80	58	52	135	111
Deviation	-75	-60	-69	-73	-8	-20	-42	-48	35	11

Winter Long Term Avg = 6.99

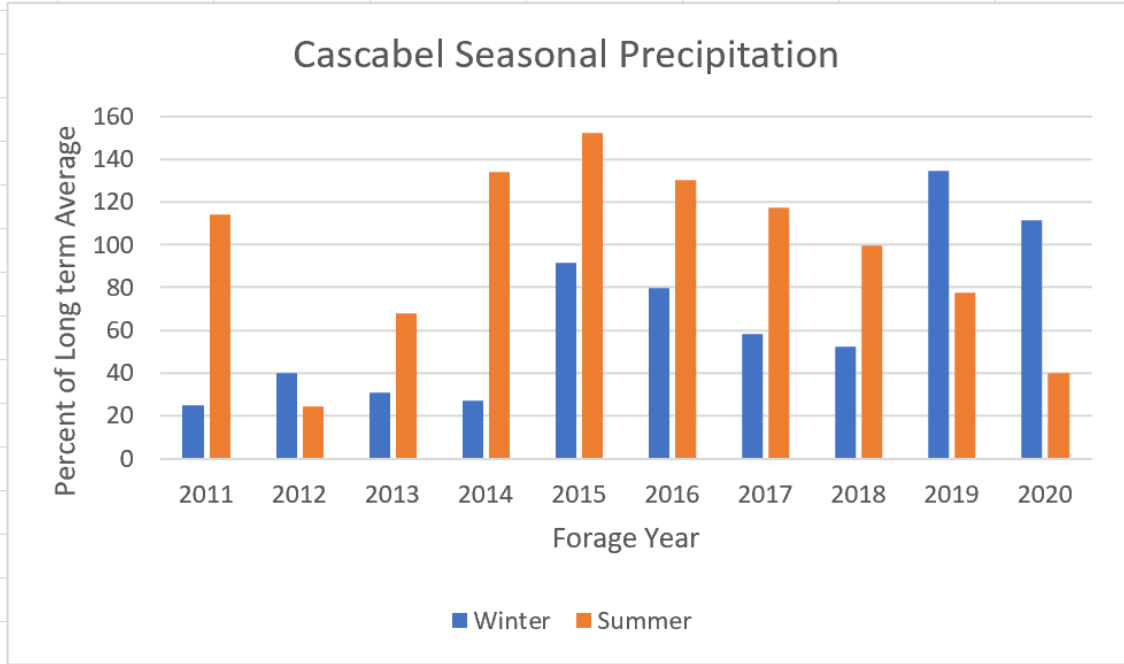
June	0.09	0	0.08	0	1.02	0.88	0.14	1.02	0	0.25
July	3.6	0.46	1.19	2.84	2.19	2.26	6.42	2.55	1.76	0.93
August	1.8	1.16	2.49	4.28	3.99	2.39	1.27	1.72	1.08	0.8
September	2.53	0.09	1.02	2.27	3.49	3.61	0.4	1.72	2.61	0.83
Summer	8.02	1.71	4.78	9.39	10.69	9.14	8.23	7.01	5.45	2.81
% Avg	114	24	68	134	152	130	117	100	78	40
Deviation	14	-76	-32	34	52	30	17	0	-22	-60

Summer Long Term Avg = 7.02

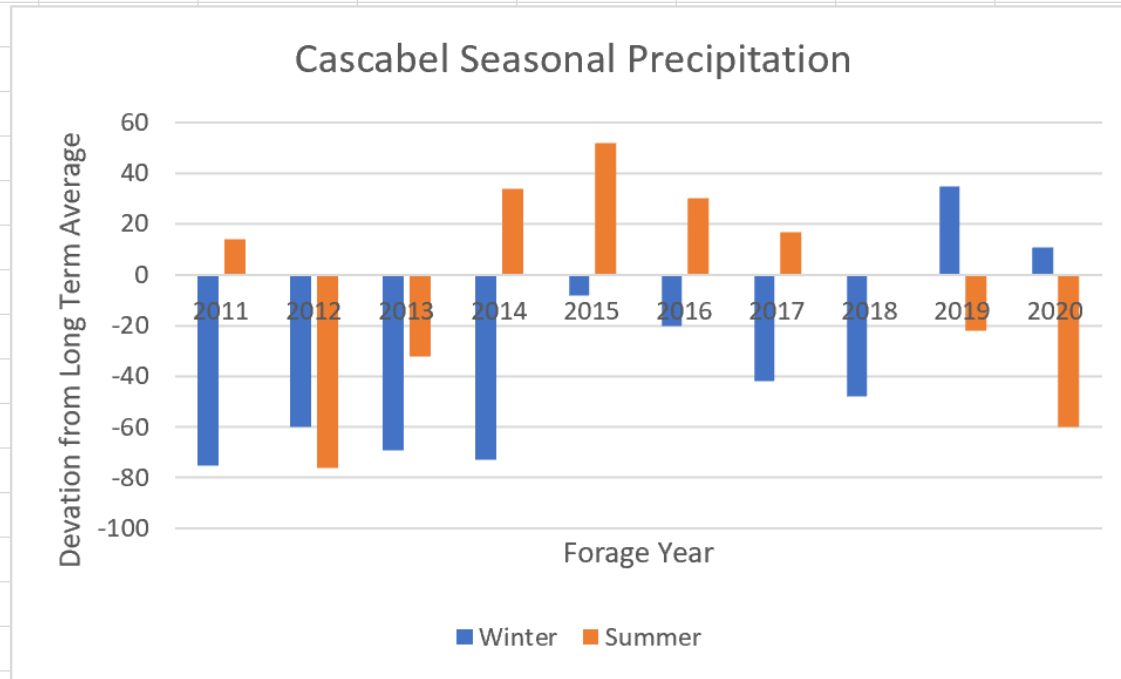


Forage Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Winter	1.74	2.78	2.15	1.88	6.41	5.56	4.08	3.66	9.42	7.77
Summer	8.02	1.71	4.78	9.39	10.69	9.14	8.23	7.01	5.45	2.81

This chart shows that summer rain has generally been better than winter rain over this 10-year period.



Forage Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Winter	25	40	31	27	92	80	58	52	135	111
Summer	114	24	68	134	152	130	117	100	78	40



Forage Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Winter	-75	-60	-69	-73	-8	-20	-42	-48	35	11
Summer	14	-76	-32	34	52	30	17	0	-22	-60

This type of chart shows very clearly that the period from winter of 2010-2011 to the winter of 2014 was well below average in both winter and summer rainfall, except for one summer which was only a little above average. This type of successive dry season is what can cause significant mortality of range plants and plant production and reproduction. Four summers of above-average precipitation following may have allowed some recovery of warm season grasses, although winters were still dry.