TYPICAL YEAR

Regulatory Division - Savannah District
19 MAY 2020; Released 10 Sept 2020

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TYPICAL YEAR

OVERVIEW

- Definition, Concept, and Application
- Typical Year Tools and Resources

TYPICAL YEAR - DEFINITION

When precipitation and other climatic variables are within the normal periodic range (e.g., seasonally, annually) for the geographic area of the applicable aquatic resource based on a rolling thirty-year period.

TYPICAL YEAR OBSERVATIONS

Typical year is not synonymous with a calendar year.

The intent is to measure the characteristics of a waterbody at times that are not too wet or too dry.

COE has similar experience with this when looking at wetland hydrology, via the WETS tables.

Typical year conditions may not occur during the specified time period. For example is the time period experiencing a drought, this would not be considered typical.

NORMAL PERIODIC RANGE

Compares climatic data for a specified time period to the same date range over a 30 year period.

- Typical year is not necessarily synonymous with a calendar year.
- PMs will generally use the previous three months of data prior to the date associated with the point in time data source (i.e., date of aerial photo, date of site visit).
- Typical year may be assessed by comparing climatic metrics from a time period that is shorter than one year (e.g., 90 days), equal to one year, or longer than one year to climatic metrics from a 30-year record, if justified.

GEOGRAPHIC AREA

- Climatic data should be collected from the appropriate geographic area.
- Watershed boundaries should be a consideration.
- A particular HUC size is not specified since this could preclude the use of the best available data sources.
- Other considerations include:
  - geographic scale of the rainfall or snowpack sources,
  - data availability,
  - topography, and
  - distance of climatic data collection in relation to the aquatic resource location.

ROLLING 30-YEAR PERIOD

- A standardized time frame is necessary to ensure consistent application across the country.
- 30 years accounts for variability without being confounded by a year or two of unusual data.
- National Oceanic & Atmospheric Administration (NOAA) uses a 30-year timeframe for climatic data programs which is based on World Meteorological Organization requirements.
- PMs are familiar with using a rolling 30-year period when assessing hydrology for wetlands via the WETS tables.

DETERMINING TYPICAL YEAR

- Typical year will generally be determined by:
  - Normal precipitation conditions based on the three 30-day periods preceding the observation date.
  - For each period, a weighted condition value is assigned by determining whether the 30-day precipitation total falls within, above, or below the 70th and 30th percentiles for totals from the same date range over the preceding 30 years.
  - A determination of "normal," "wetter than normal," or "drier than normal" is made based on the condition value sum.
- Other accurate and reliable measurements of normal precipitation and other climatic conditions may be considered when scientifically warranted.

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DETERMINING TYPICAL YEAR - ANTECEDENT PRECIPITATION TOOL (APT)

- Developed by the Corps.
- Assesses rainfall data from the preceding 30 years.
- The APT is automated and provides a consistent methodology.
- Includes information from the Web-based Water-Budget Interactive Modeling Program (WebWIMP) and Palmer Drought Severity Index.
- Uses the recommended parameters contained in the NWPR's preamble (previous slide).

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DETERMINING TYPICAL YEAR

In addition to the information generated by the APT, the following should also be considered:

- the range of climatic variables and data available through remote tools, and
- direct on-site observations.

Use professional judgment and a weight of evidence approach when considering precipitation normalcy along with other available data sources.

DETERMINING TYPICAL YEAR – TYPICAL V. ATYPICAL

- Hydrologic conditions (e.g., surface hydrologic connections, inundation by flooding or flow regime) during atypically wet or dry periods may not accurately represent hydrology during typical year conditions.
- When making a determination during a dry or wet period, it may be necessary to rely on other resources like on remote tools or field-based indicators.
- Consider the weight of the evidence.
  - For example, if flow is observed during an abnormally dry period and not after recent precipitation, more weight may be given to the flow meeting the requirements in the NWPR.
  - In situations where flow is observed on-site during a period of abnormally high precipitation, it might be necessary to rely on remote tools to provide a stronger and more accurate indication of flow conditions.

TYPICAL YEAR APPLICATION

- Provides a predictable framework to appropriately interpret data when determining the jurisdictional status of certain waterbodies.

- Applies to some of the requirements for the following categories of waters:
  - (a)(2) -Tributaries;
  - (a)(3) - Lakes and ponds, and impoundments of jurisdictional waters; and
  - (a)(4) - Adjacent wetlands

- May also be applied to determine if a water or feature is not jurisdictional (e.g., an ephemeral stream).

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TYPICAL YEAR APPLICATION - TRIBUTARIES

1. To meet the tributary definition, a channel must have **perennial or intermittent flow in a typical year.**

2. To meet the tributary definition, a channel must **contribute surface water flow to a downstream (a)(1) water in a typical year.**
   - Does not have to occur every calendar year, just in a typical year.

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TYPICAL YEAR APPLICATION – LAKES AND PONDS, AND IMPOUNDMENTS OF JURISDICTIONAL WATERS

1. A lake, pond, or an impoundment of jurisdictional waters is jurisdictional if it **contributes surface water flow to a water identified in paragraph (a)(1) in a typical year**.
   - Only one flow event is required in a typical year.
   - Does not have to occur every calendar year, just in a typical year.

2. A lake, pond, or an impoundment of a jurisdictional water is also jurisdictional if it **is inundated by flooding from a water identified in paragraph (a)(1), (2), or (3) in a typical year**.
   - Required inundation frequency is only once in a typical year.
   - Does not have to occur every calendar year, just once in a typical year.

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TYPICAL YEAR APPLICATION- ADJACENT WETLANDS

1. Adjacent wetlands include those that are inundated by flooding from a water identified in paragraph (a)(1), (2), or (3) in a typical year.
   - Required inundation frequency is only once in a typical year.

2. Adjacent wetlands include those that are physically separated from a water identified in paragraph (a)(1), (2), or (3) by an artificial structure **so long as that structure allows for a direct hydrological surface connection to the water identified in paragraph (a)(1), (2), or (3) in a typical year** over/through an artificial feature.
   - Only one flow event is required in a typical year.

NOTE: Abutting wetlands or wetlands separated by a natural barrier do not require a Typical Year analysis.

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TYPICAL YEAR RESOURCES

- Definition, Concept, & Application
- Typical Year Tools and Resources

TYPICAL YEAR TOOLS AND RESOURCES

1. Antecedent Rainfall Calculator or Antecedent Precipitation Tool (APT)
2. *Palmer Drought Severity Index -https://www.ncdc.noaa.gov/temp-and-precip/drought/historical-palmers/psi/201811-201910
3. *WebWIMP - http://climate.geog.udel.edu/~wimp/
4. NOAA National Snow Analysis Map - https://www.nohrsc.noaa.gov/nsa/
5. NRCS Snow Telemetry – https://www.wcc.nrcs.usda.gov
6. Standard Precipitation Index - https://www.ncdc.noaa.gov/temp-and-precip/drought/nadm/indices
7. NOAA/National Weather Service Meteorological Stations
8. WETS tables - https://www.wcc.nrcs.usda.gov/climate/wets_doc.html
9. Continuous flow models
10. Hydrologic models
11. Familiar resources (aerials, topographic maps, soil surveys, etc…)
12. Physical and biological field indicators

*Tools already included into the APT

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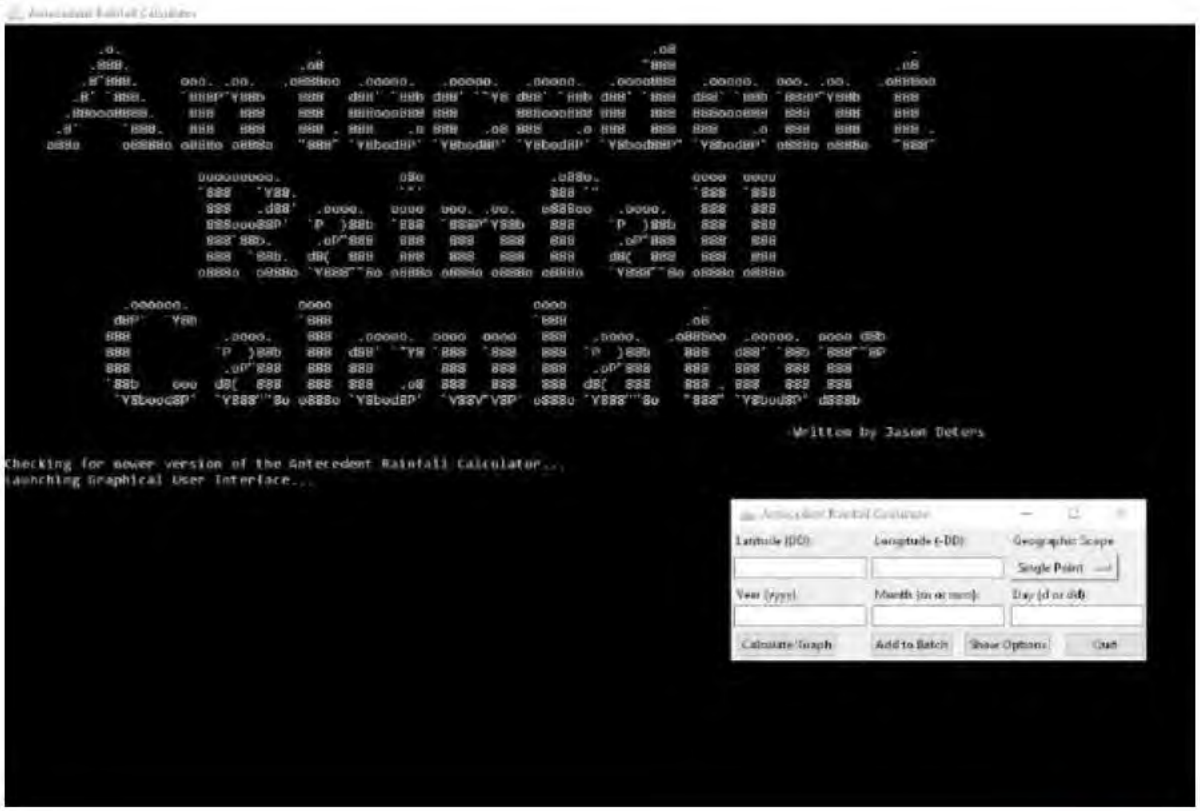
TYPICAL YEAR TOOLS AND RESOURCES

Antecedent Rainfall Calculator or Antecedent Precipitation Tool (APT)

- Automated and applies a consistent methodology that aligns with the NWPR.
- Incorporates PDSI and Web WIMP to help with climatic information.
- HQ will provide access to and training on the APT prior to the rule effective date.
- EPA will post the APT on a public facing website for the public to use (Timeframe TBD).

TYPICAL YEAR TOOLS AND RESOURCES

Antecedent Rainfall Calculator or Antecedent Precipitation Tool (APT)



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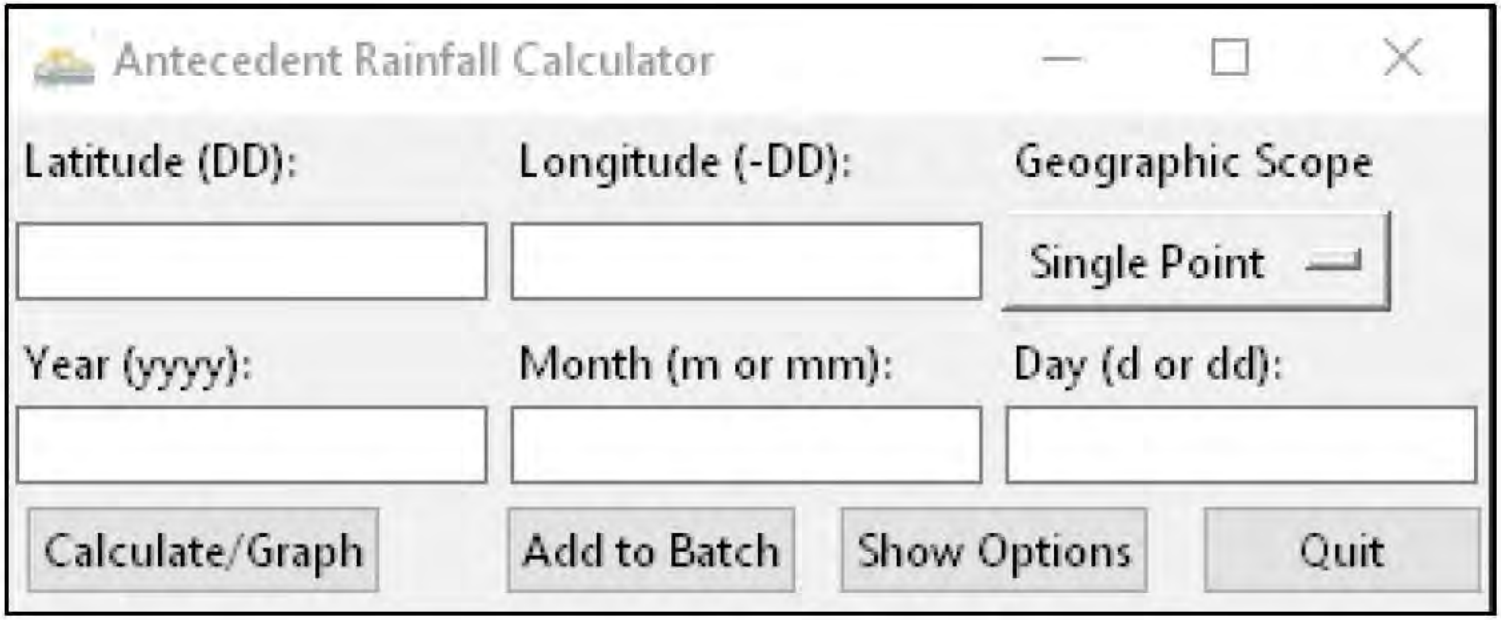

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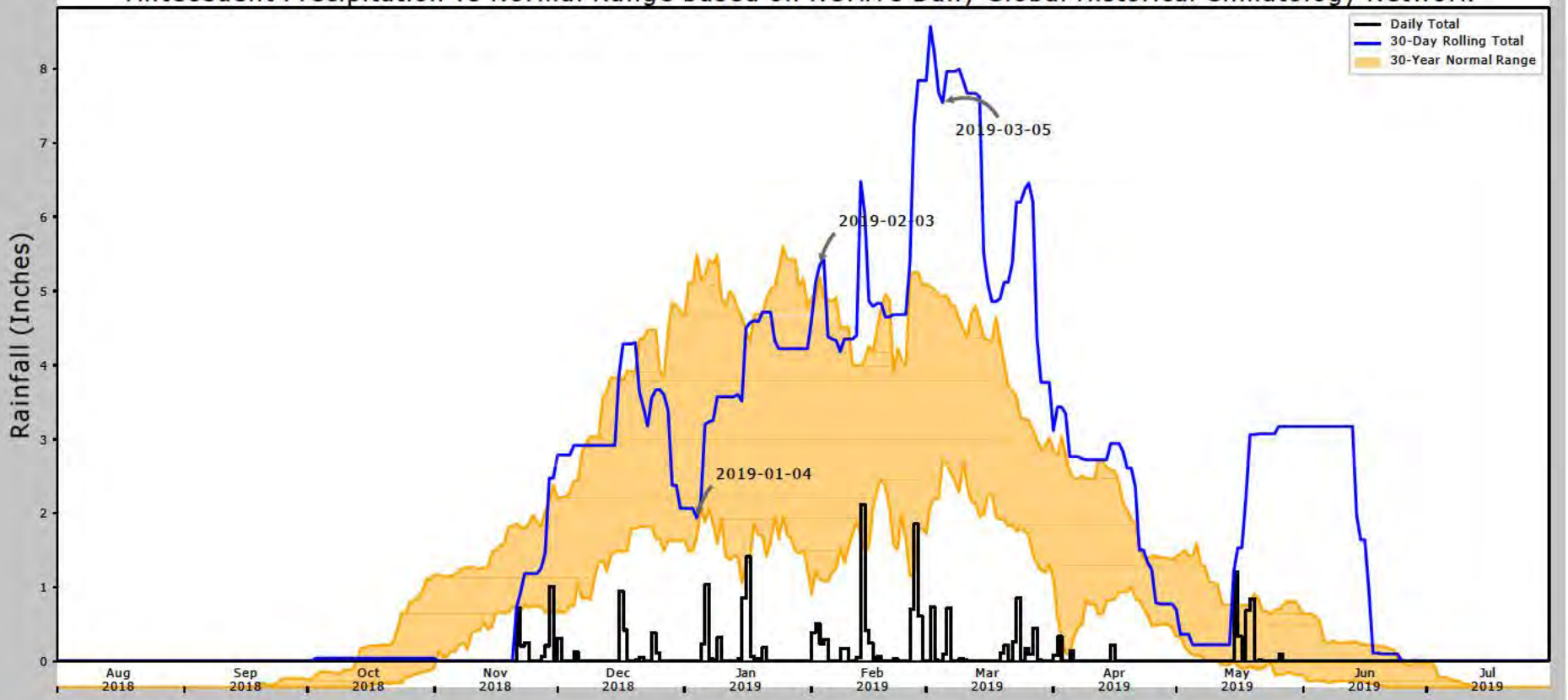
Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	38.5, -121.5
Observation Date	2019-03-05
Elevation (ft)	7.14
Drought Index (PDSI)	Moderate wetness
WebWIMP H_2O Balance	Wet Season

30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2019-03-05	2.669291	4.561024	7.543307	Wet	3	3	9
2019-02-03	1.259449	4.777953	5.350394	Wet	3	2	6
2019-01-04	1.748425	5.048425	1.933071	Normal	2	1	2
Result							Wetter than Normal- 17

Weather StationName	Coordinates	Elevation (ft)	Distance (mi)	ElevationΔ	WeightedΔ	Days (Normal)	Days (Antecedent)
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SACRAMENTO 5ESE	38.5556, -121.4169	38.058	5.398	22.966	2.553	8	0

Figure generated using the Antecedent Rainfall Calculator

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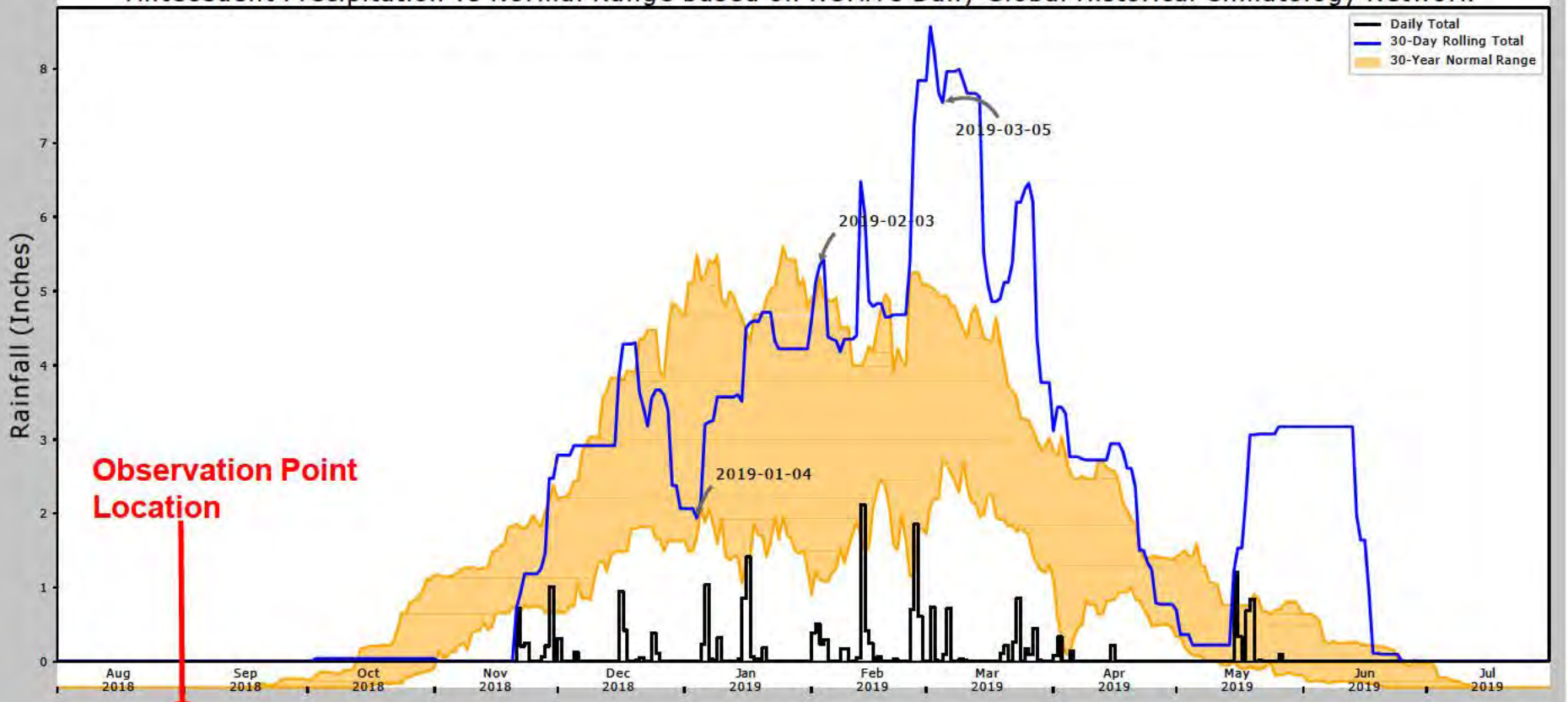
Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Observation Point Location

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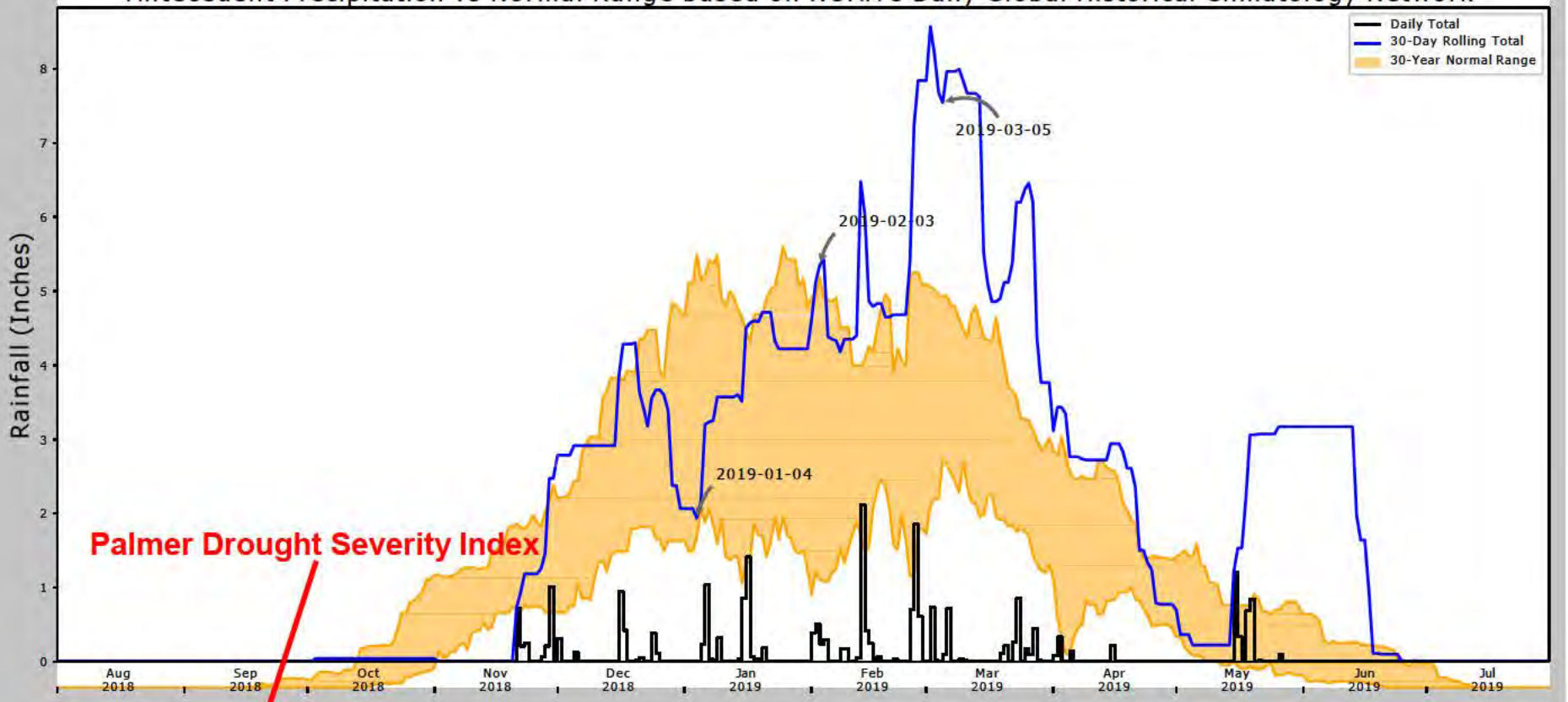

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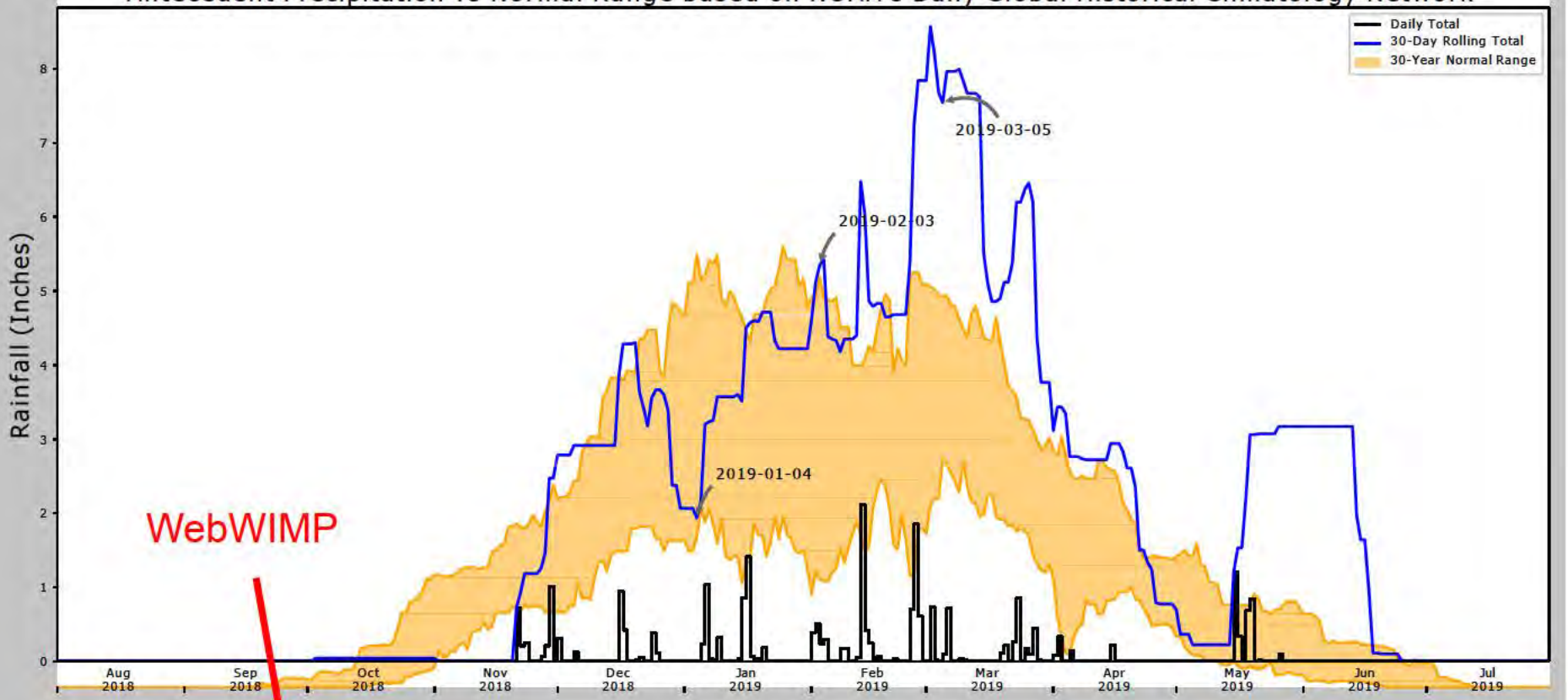

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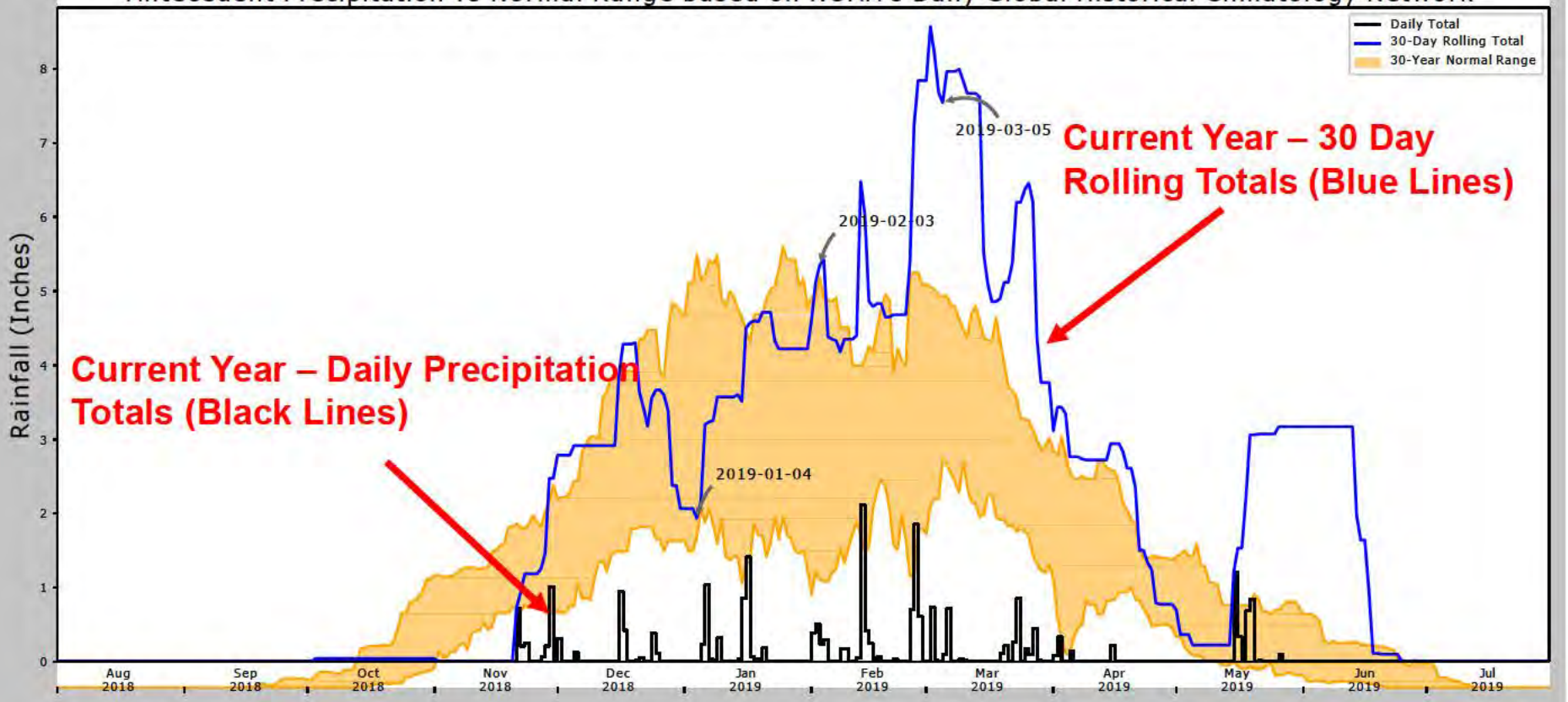

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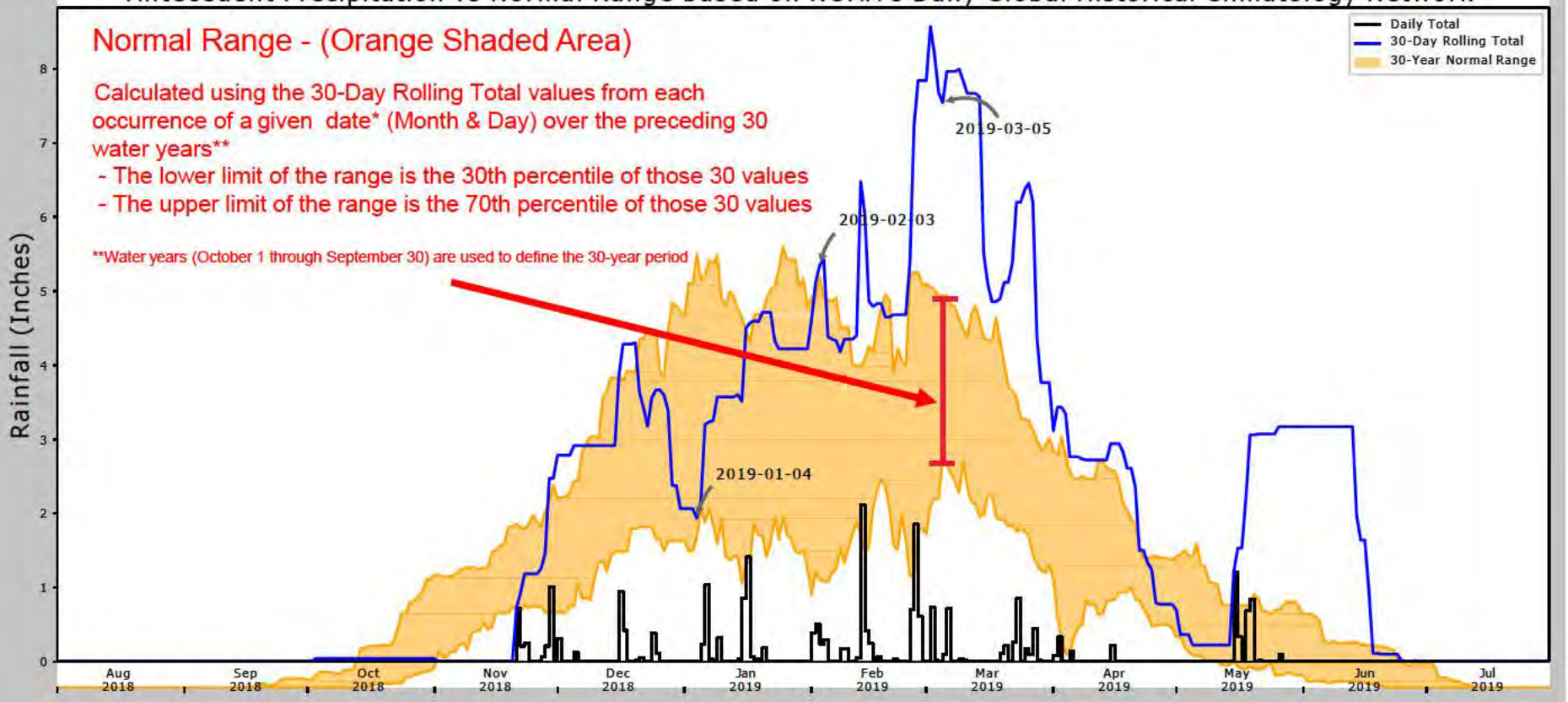

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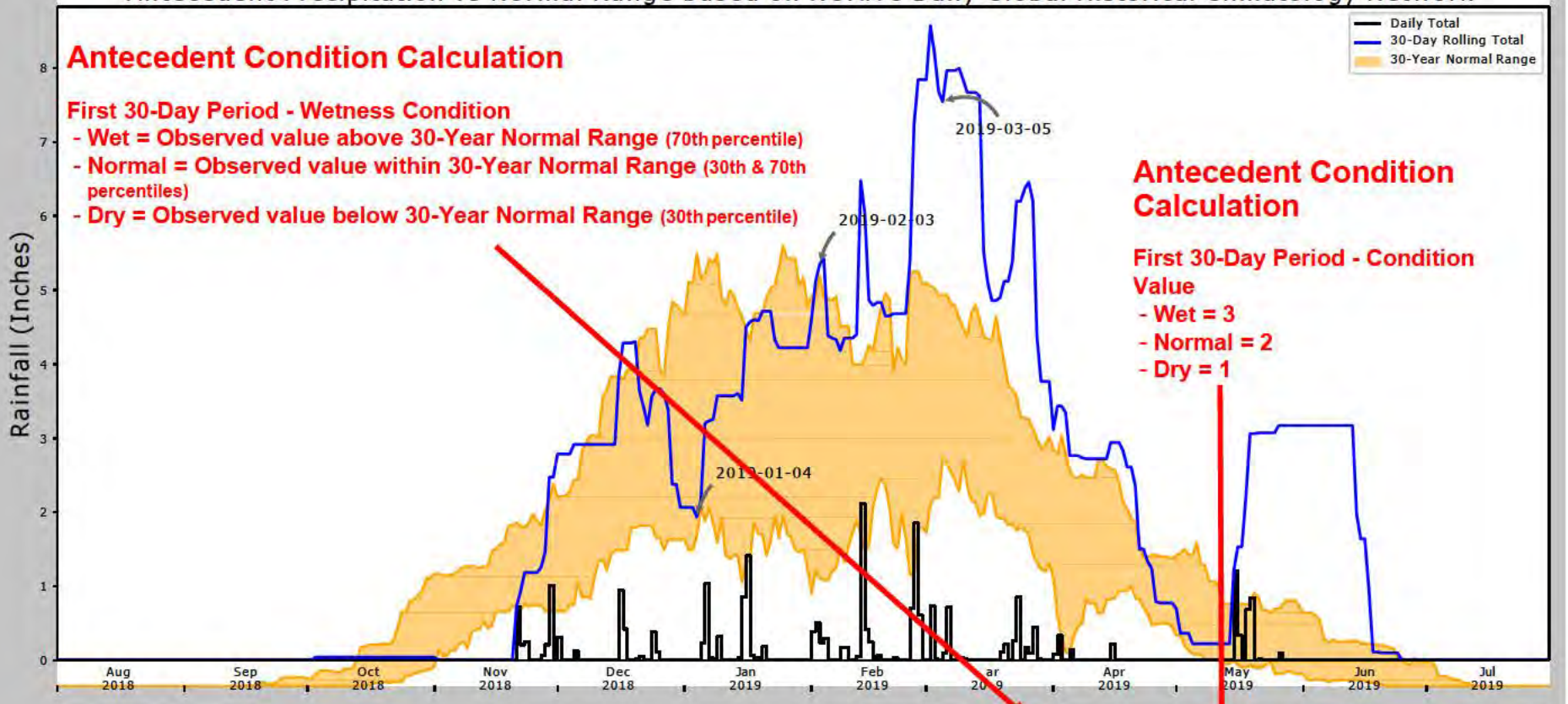

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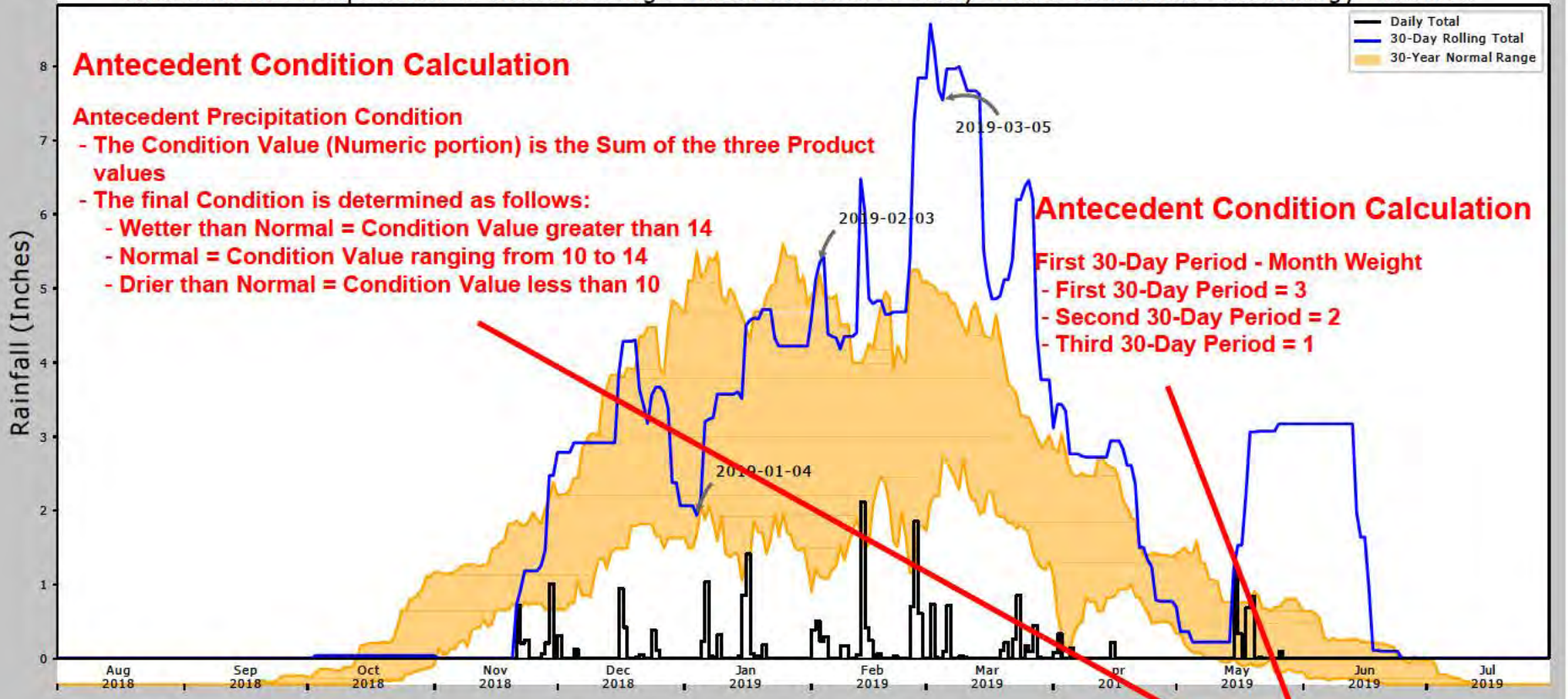

Antecedent Condition Calculation

Antecedent Precipitation Condition

- The Condition Value (Numeric portion) is the Sum of the three Product values
- The final Condition is determined as follows:
  - Wetter than Normal = Condition Value greater than 14
  - Normal = Condition Value ranging from 10 to 14
  - Drier than Normal = Condition Value less than 10

Antecedent Condition Calculation

First 30-Day Period - Month Weight

- First 30-Day Period = 3
- Second 30-Day Period = 2
- Third 30-Day Period = 1

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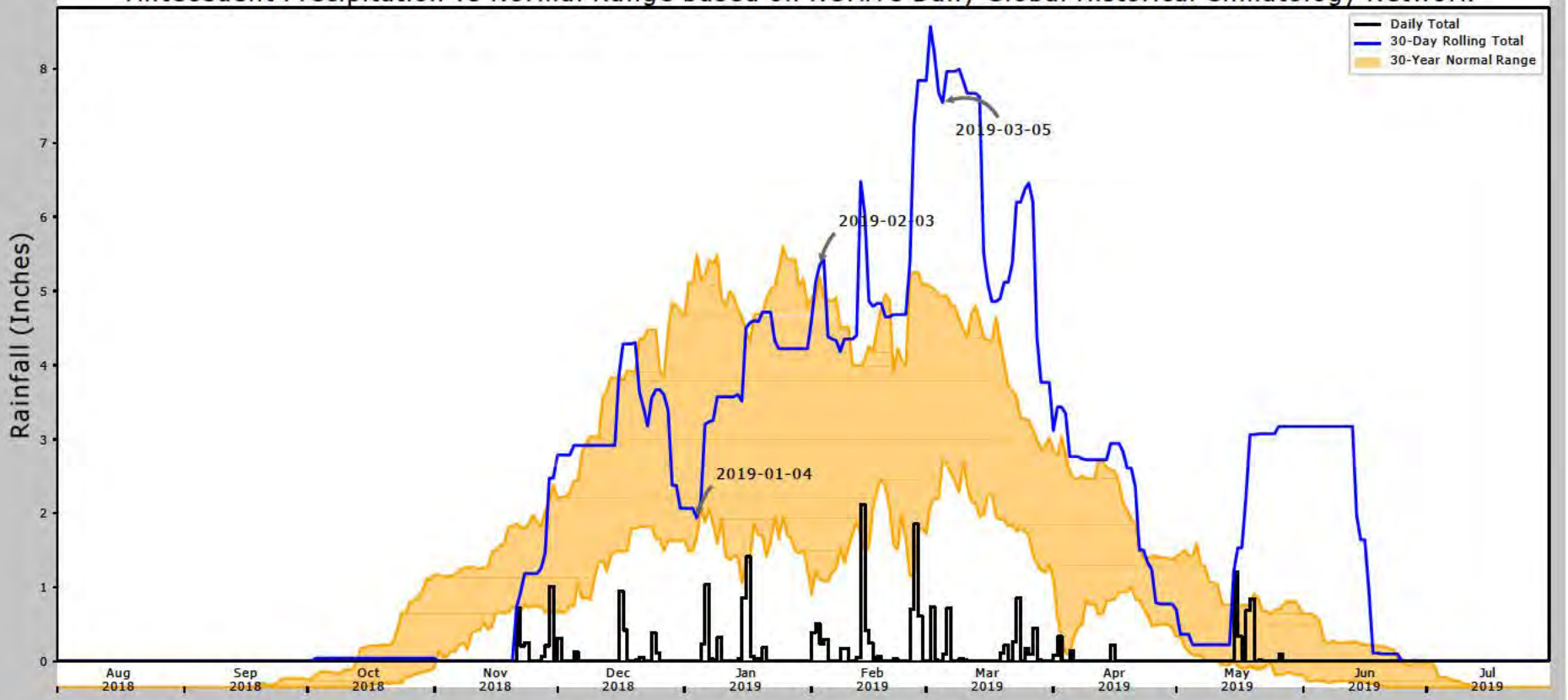

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Weather Station Table

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TYPICAL YEAR TOOLS AND RESOURCES

Antecedent Rainfall Calculator or Antecedent Precipitation Tool (APT)

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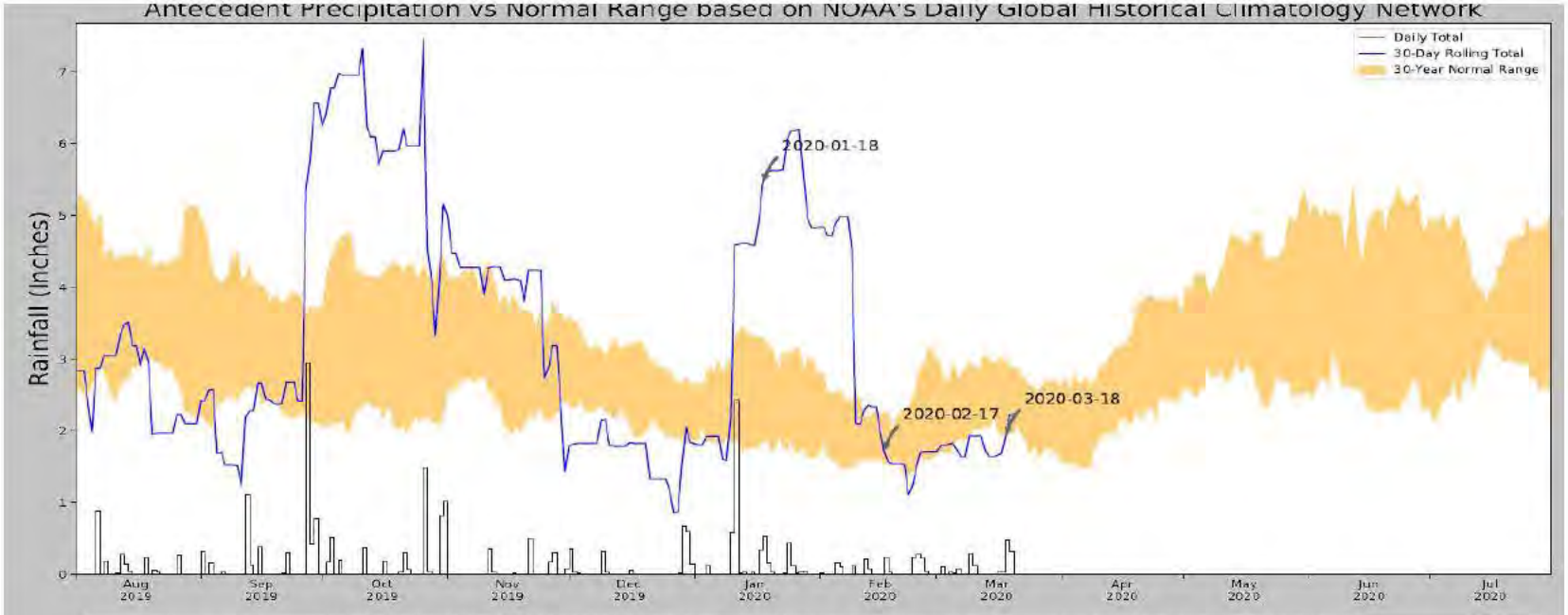

Coordinates	41.637563, -86.146463
Observation Date	2020-03-18
Elevation (ft)	751.87
Drought Index (PDSI)	Mild Wetness (2020-02)
WebWIMP H_2O Balance	Wet Season

30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2020-03-18	1.934646	2.922047	1.917323	Dry	1	3	3
2020-02-17	1.545669	2.249213	1.700787	Normal	2	2	4
2020-01-18	1.854724	3.28937	5.440945	Wet	3	1	3
Result							Normal Conditions - 10

Figure generated using the Antecedent Rainfall Calculator

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Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days (Normal)	Days (Antecedent)
SOUTH BEND MICHIANA RGNL AP	41.7072, -86.3164	772.966	10.004	21.096	4.713	11349	90
MISHAWAKA 2.5 SE	41.648, -86.129	734.908	1.155	16.962	0.539	2	0
LAKEVILLE 7 NE	41.5603, -86.1581	854.987	5.372	103.117	2.971	1	0

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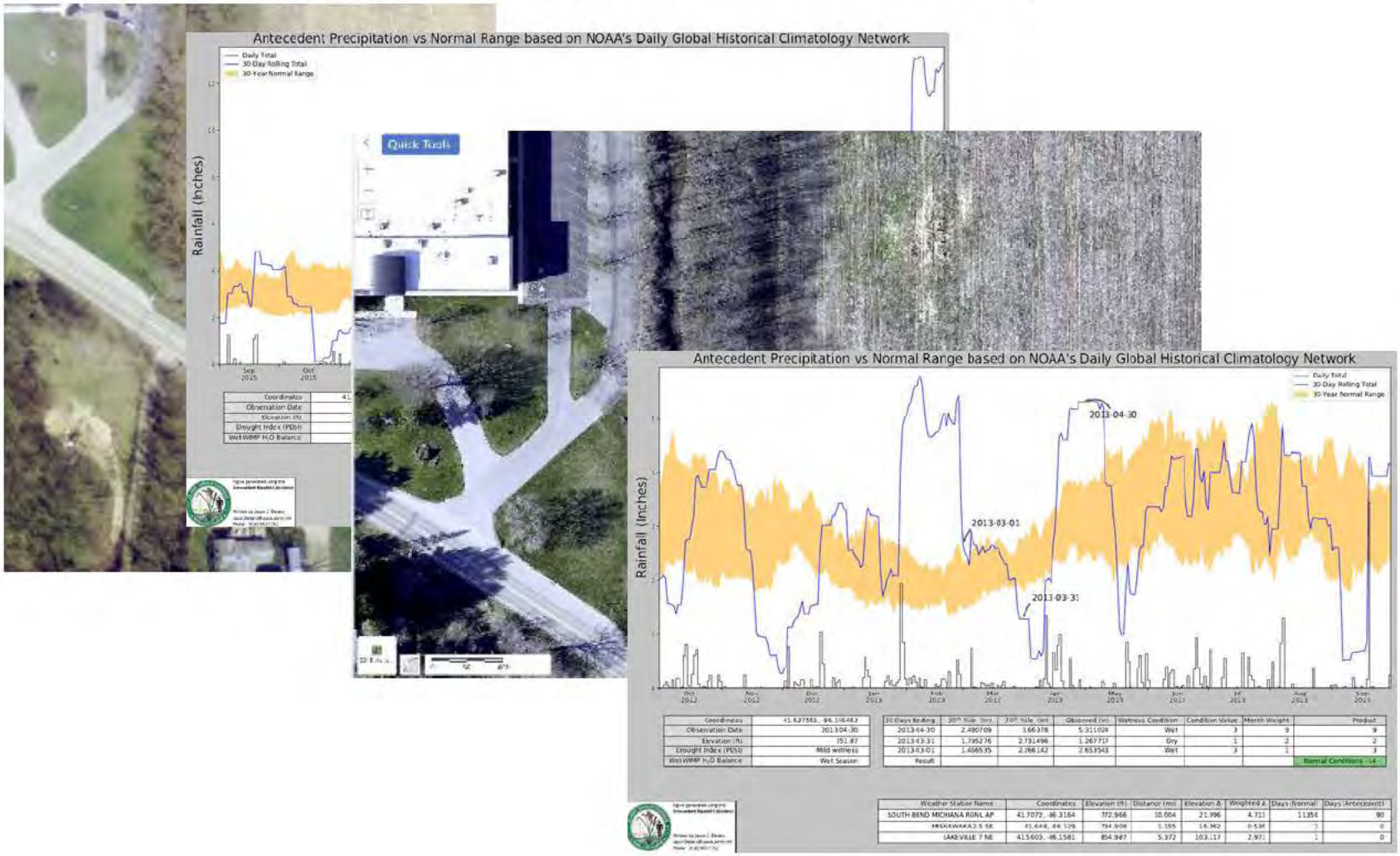
TYPICAL YEAR TOOLS AND RESOURCES



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TYPICAL YEAR TOOLS AND RESOURCES

1. Antecedent Rainfall Calculator or Antecedent Precipitation Tool (APT)
2. *Palmer Drought Severity Index -https://www.ncdc.noaa.gov/temp-and-precip/drought/historical-palmers/psi/201811-201910
3. *WebWIMP - http://climate.geog.udel.edu/~wimp/
4. NOAA National Snow Analysis Map - https://www.nohrsc.noaa.gov/nsa/
5. NRCS Snow Telemetry – https://www.wcc.nrcs.usda.gov
6. Standard Precipitation Index - https://www.ncdc.noaa.gov/temp-and-precip/drought/nadm/indices
7. NOAA/National Weather Service Meteorological Stations
8. WETS tables - https://www.wcc.nrcs.usda.gov/climate/wets_doc.html
9. Continuous flow models
10. Hydrologic models
11. Familiar resources (aerials, topographic maps, soil surveys, etc…)
12. Physical and biological field indicators

*Tools already inlcuded into the APT

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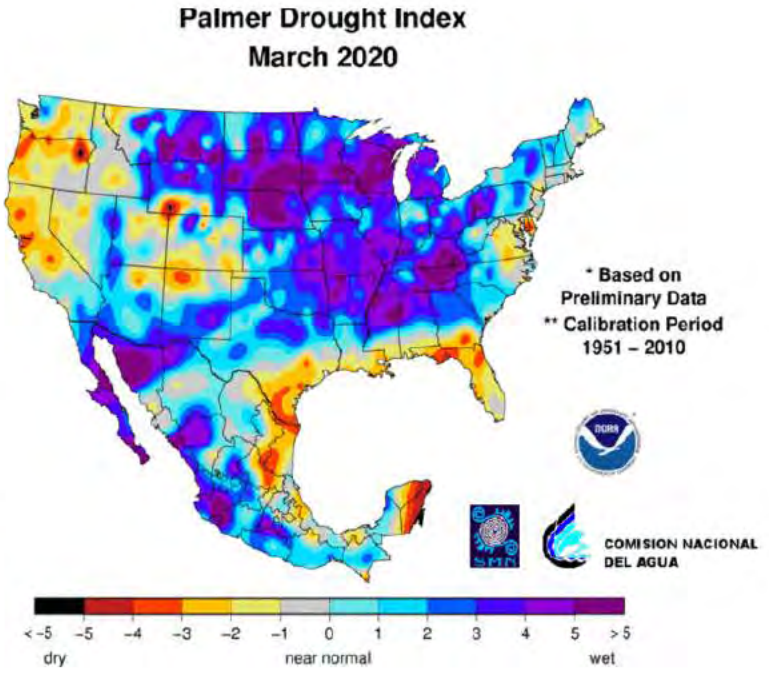
TYPICAL YEAR TOOLS AND RESOURCES

Palmer Drought Severity Index (PDSI)

- Data is current, updated monthly.
- Integrates precipitation, soil moisture, and evapotranspiration.
- Sensitive to climatic patterns over a longer time period (e.g., months).

*Included in the APT.



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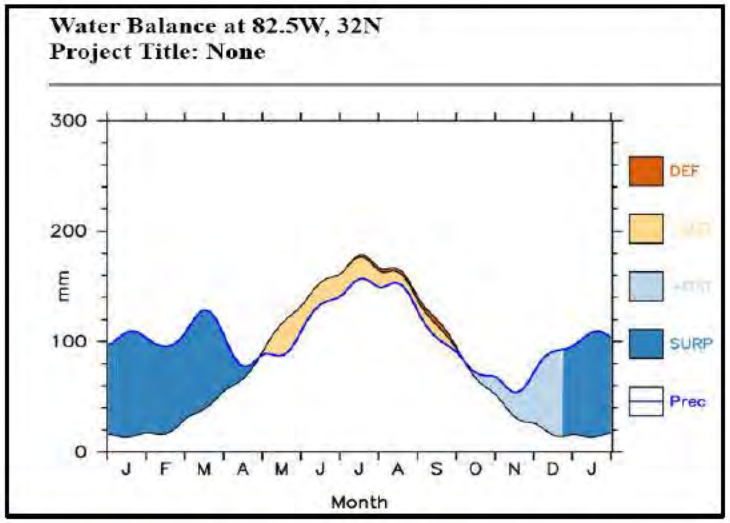
TYPICAL YEAR TOOLS AND RESOURCES

Web WIMP

- Designed to evaluate monthly water balance.
- Provide some reasonable expectation of when a time of year may be a wet or dry period.
- Not Site Specific.
- Based on averages.

*Included in the APT.



Monthly and annual climatic water balance **table**

MON	TEMP	UPE	APE	PREC	DIFF	ST	DST	AE	DEF	SURP	SMT	SST
Jan	-3.6	0	0	50	0	131	0	0	0	0	0	85
Feb	-2.5	0	0	43	13	144	13	0	0	0	5	115
Mar	2.7	8	8	64	171	150	6	8	0	165	115	0
Apr	9.2	36	40	86	46	150	0	40	0	46	0	0
May	15.7	70	88	82	-6	142	-8	88	0	2	0	0
Jun	21.0	101	127	96	-31	111	-31	127	0	0	0	0
Jul	22.9	112	144	97	-47	72	-39	137	7	0	0	0
Aug	21.8	105	125	75	-50	44	-28	103	22	0	0	0
Sep	18.0	83	85	69	-16	37	-7	75	10	0	0	0
Oct	11.8	49	46	60	14	51	14	46	0	0	0	0
Nov	4.7	16	13	68	55	106	55	13	0	0	0	0
Dec	-1.4	0	0	60	25	131	25	0	0	0	0	35
Total			676	850				637	39	213		

Monthly and annual climatic water balance **graph**

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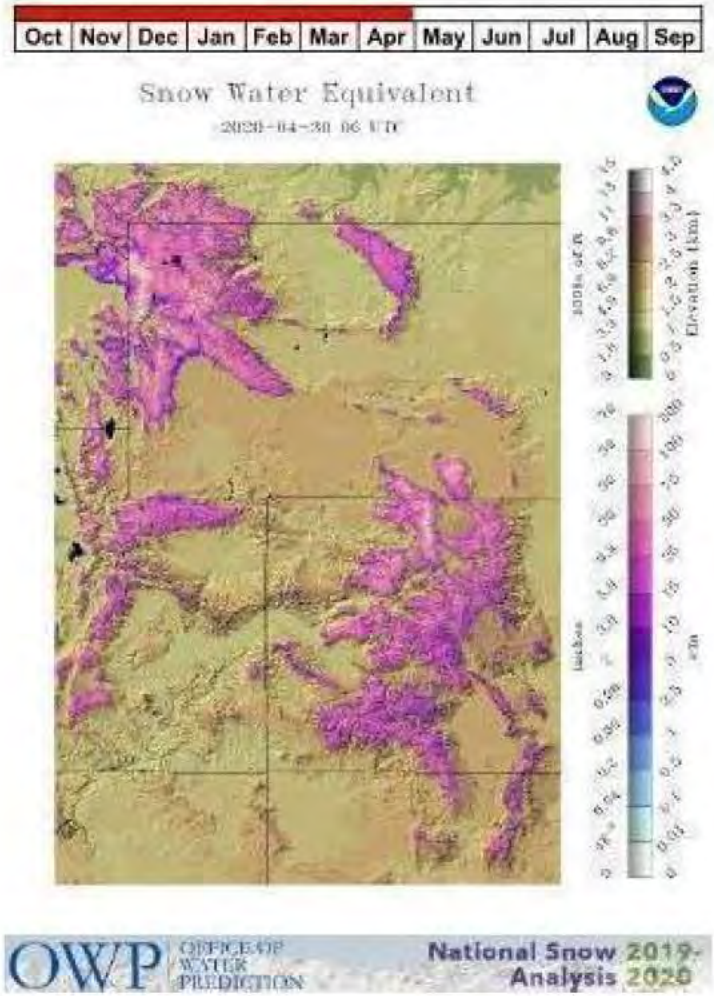
TYPICAL YEAR TOOLS AND RESOURCES

NOAA National Snow Analysis Map



- Displays current snow pack conditions graphically on a map.
- Provides information if snow pack is normal, above normal or below normal.
- Provides what the water equivalent of the snow is.

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TYPICAL YEAR TOOLS AND RESOURCES

Colorado SNOTEL Snow/Precipitation Update Report

Based on Mountain Data from NRCS SNOTEL Sites

Provisional data, subject to revision

Data based on the first reading of the day (typically 00:00) for Thursday, April 30, 2020

Basin Site Name	Elev (ft)	Snow Water Equivalent			Water Year-to-Date Precipitation		
		Current (in)	Median (in)	Pct of Median	Current (in)	Average (in)	Pct of Average
GUNNISON RIVER BASIN							
Butte	10160	9.0	10.5	86	13.5	18.0	75
Cochetopa Pass	10020	0.0	0.0_R	*	7.4	8.8_R	84
Columbine Pass	9400	0.2	4.3	5	18.3	25.7	71
Idarado	9800	6.6	8.8	75	16.8	21.6	78
Mc Clure Pass	9500	6.7	10.3	65	19.2	23.5	82
Mesa Lakes	10000	7.8	15.3	51	15.9	24.3	65
Overland Res.	9840	5.0	7.5	67	13.3	18.7	71
Park Cone	9600	6.9	5.7	121	11.3	13.6	83
Park Reservoir	9960	19.5	27.3	71	21.1	30.8	69
Porphyry Creek	10760	15.1	13.7	110	18.0	18.1	99
Red Mountain Pass	11200	22.4	24.2	93	25.9	29.8	87
Sargents Mesa	11530	11.4	N/A	*	14.2	N/A	*
Schofield Pass	10700	29.3	31.4	93	25.3	36.2	70
Slumgullion	11560	13.0	13.9	94	14.0	15.8	89
Upper Taylor	10640	9.2	N/A	*	16.5	N/A	*
Wager Gulch	11100	7.4	N/A	*	13.4	N/A	*
Basin Index (%)				**82**			**77**

NRCS Snow Telemetry

- Similar to the NOAA National Snow Analysis map.
- Selecting for a date and region you can compare the average for snow pack accumulation.
- Compare the current snow water equivalent to average.

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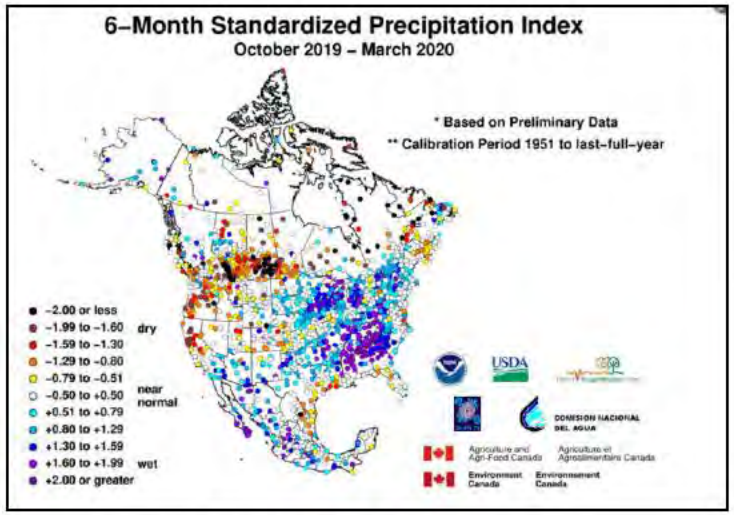
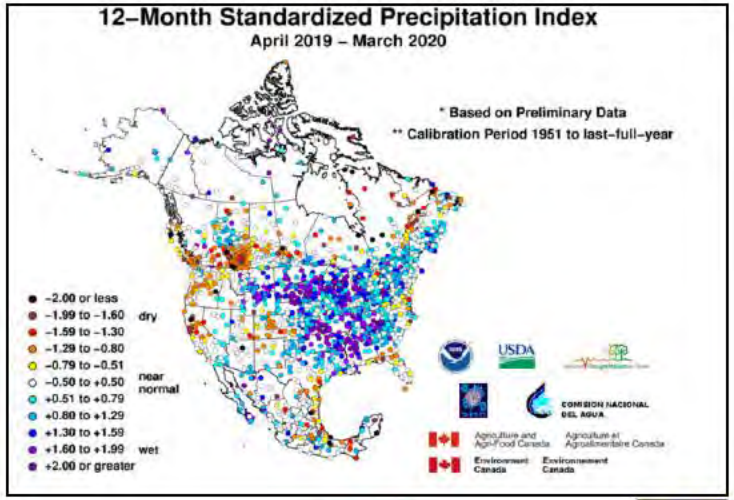
TYPICAL YEAR TOOLS AND RESOURCES

Standardized Precipitation Index

- Can characterize drought or abnormal wetness at different time scales (1 to 36 months).
- Regional patterns of drought or excess wetness can be quickly observed.
- Only analyzes precipitation.
- Not site specific.





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TYPICAL YEAR TOOLS AND RESOURCES

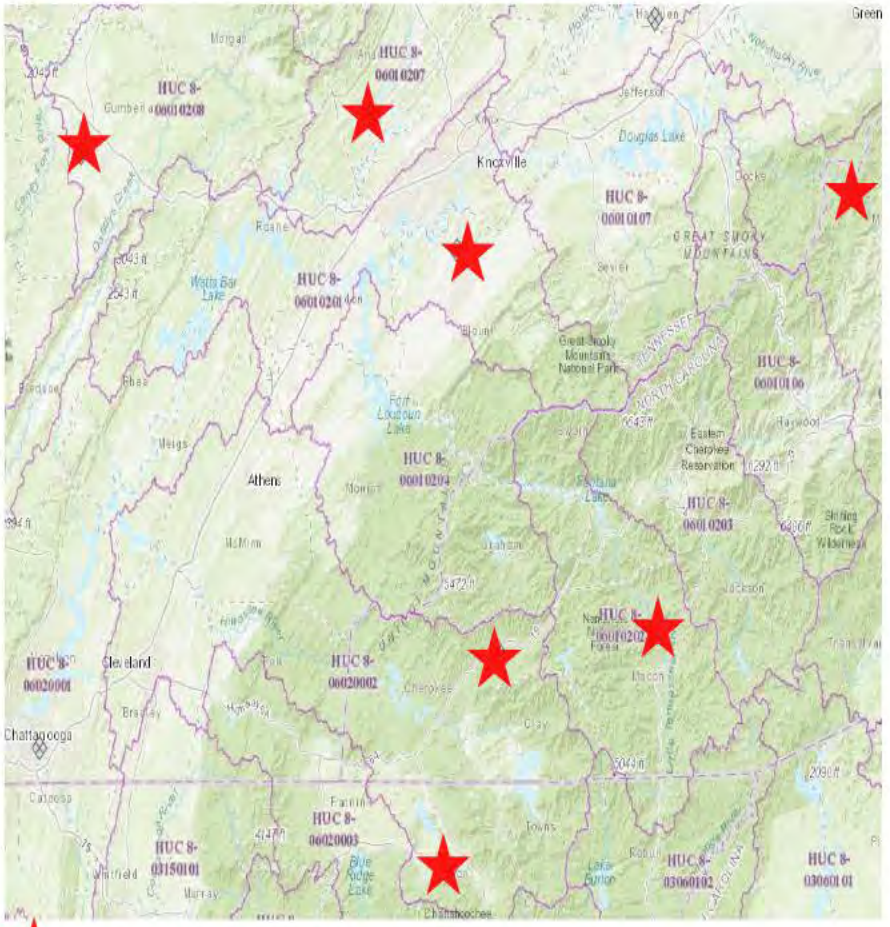
NOAA Weather Stations

- One of two ways:
    1. GIS Data Layer
    2. NOAA Website

- Click on the station to display information available.

- Helpful in determining geographic area.

*APT pulls in stations closest to the entered observation point.



★ Weather Stations

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QUESTIONS FROM THE FIELD

- Topics for questions include, but are not limited to, the following:
  - Ditches
  - Tributaries
  - Flow Regimes
  - Downstream flow contribution
  - Adjacency
  - Lakes and ponds, and Impoundments
  - Inundation by flooding
  - Typical year
  - Exclusions
  - Compliance/enforcement
  - Compensatory mitigation
  - Uplands