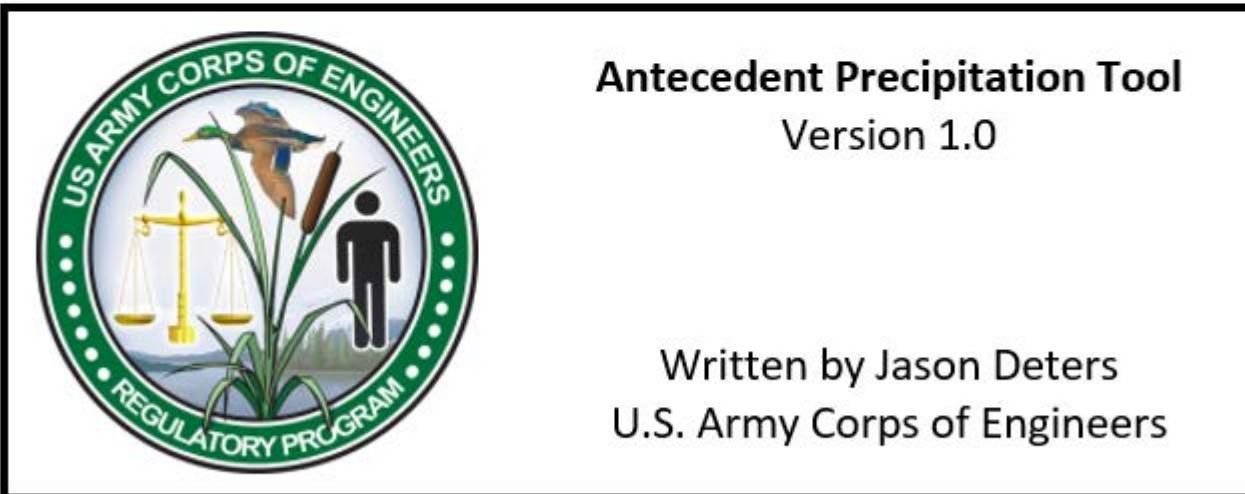


How to Read the Output of a Watershed Analysis



Antecedent Precipitation Tool v.1.0 - Watershed Sampling Summary

Generated on 2020-06-22

User Inputs

Coordinates	28.523933, -98.843927
Date	1952-07-10
Geographic Scope	HUC8

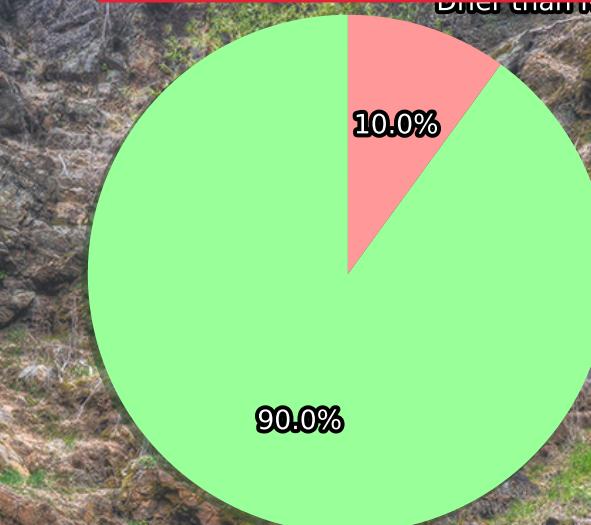
Coordinates of the Observation Location
(Source: User Input)

Intermediate Data

Hydrologic Unit Code	12110108
Watershed Size	1221.06 mi ²
# Random Sampling Points	68

Preliminary Result

Average Antecedent Precipitation Score	10.6
Preliminary Determination	Normal Conditions



Sampling Point Breakdown

Antecedent Precipitation Score	Antecedent Precipitation Condition	WebWIMP H ₂ O Balance	Drought Index (PDSI)	# of Points
14	Normal Conditions	Dry Season	Severe drought	8
11	Normal Conditions	Dry Season	Severe drought	19
10	Normal Conditions	Dry Season	Severe drought	34
9	Drier than Normal	Dry Season	Severe drought	4
8	Drier than Normal	Dry Season	Severe drought	3

Antecedent Precipitation Tool v.1.0 - Watershed Sampling Summary

Generated on 2020-06-22

User Inputs

Coordinates	28.523933, -98.843927
Date	1952-07-10
Geographic Scope	HUC8

Observation Date
(Source: User Input)



Intermediate Data

Hydrologic Unit Code	12110108
Watershed Size	1221.06 mi ²
# Random Sampling Points	68

Preliminary Result

Average Antecedent Precipitation Score	10.6
Preliminary Determination	Normal Conditions

Normal Conditions

Sampling Point Breakdown

Antecedent Precipitation Score	Antecedent Precipitation Condition	WebWIMP H ₂ O Balance	Drought Index (PDSI)	# of Points
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8	Drier than Normal	Dry Season	Severe drought	3

Antecedent Precipitation Tool v.1.0 - Watershed Sampling Summary

Generated on 2020-06-22

User Inputs

Coordinates	28.523933, -98.843927
Date	1952-07-10
Geographic Scope	HUC8

Geographic Scope

- Single Point
- HUC8, HUC10, HUC12
- Custom Watershed

(Source: User Input)

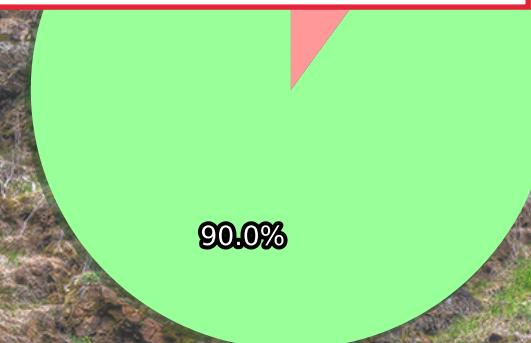
Intermediate Data

Hydrologic Unit Code	12110108
Watershed Size	1221.06 mi ²
# Random Sampling Points	68

Preliminary Result

Average Antecedent Precipitation Score	10.6
Preliminary Determination	Normal Conditions

Normal Conditions



Sampling Point Breakdown

Antecedent Precipitation Score	Antecedent Precipitation Condition	WebWIMP H ₂ O Balance	Drought Index (PDSI)	# of Points
14	Normal Conditions	Dry Season	Severe drought	8
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10	Normal Conditions	Dry Season	Severe drought	34
9	Drier than Normal	Dry Season	Severe drought	4
8	Drier than Normal	Dry Season	Severe drought	3

Antecedent Precipitation Tool v.1.0 - Watershed Sampling Summary

Generated on 2020-06-22

User Inputs

Coordinates	28.523933, -98.843927
Date	1952-07-10
Geographic Scope	HUC8

Intermediate Data

Hydrologic Unit Code	12110108
Watershed Size	1221.06 mi ²
# Random Sampling Points	68

Preliminary Result

Average Antecedent Precipitation Score	10.6
Preliminary Determination	Normal Conditions

Hydrologic Unit Code (HUC)

The specific identification code of the watershed feature within which the Observation Location falls.

If Custom Polygon is selected, this will be the name given by the user for the Custom Watershed Polygon (E.g. EPA MyWaters Drainage Area)

Normal Conditions

Sampling Point Breakdown

Antecedent Precipitation Score	Antecedent Precipitation Condition	WebWIMP H ₂ O Balance	Drought Index (PDSI)	# of Points
14	Normal Conditions	Dry Season	Severe drought	8
11	Normal Conditions	Dry Season	Severe drought	19
10	Normal Conditions	Dry Season	Severe drought	34
9	Drier than Normal	Dry Season	Severe drought	4
8	Drier than Normal	Dry Season	Severe drought	3

Antecedent Precipitation Tool v.1.0 - Watershed Sampling Summary

Generated on 2020-06-22

User Inputs

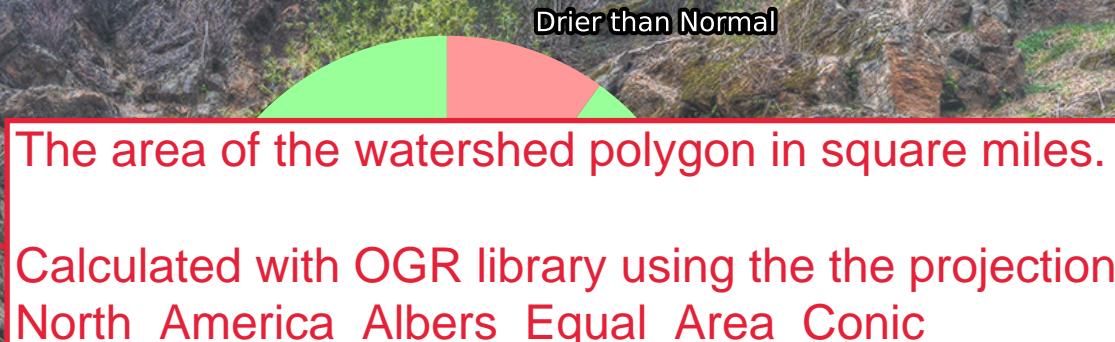
Coordinates	28.523933, -98.843927
Date	1952-07-10
Geographic Scope	HUC8

Intermediate Data

Hydrologic Unit Code	12110108
Watershed Size	1221.06 mi ²
# Random Sampling Points	68

Preliminary Result

Average Antecedent Precipitation Score	10.6
Preliminary Determination	Normal Conditions



Sampling Point Breakdown

Antecedent Precipitation Score	Antecedent Precipitation Condition	WebWIMP H ₂ O Balance	Drought Index (PDSI)	# of Points
14	Normal Conditions	Dry Season	Severe drought	8
11	Normal Conditions	Dry Season	Severe drought	19
10	Normal Conditions	Dry Season	Severe drought	34
9	Drier than Normal	Dry Season	Severe drought	4
8	Drier than Normal	Dry Season	Severe drought	3

Antecedent Precipitation Tool v.1.0 - Watershed Sampling Summary

Generated on 2020-06-22

User Inputs

Coordinates	28.523933, -98.843927
Date	1952-07-10
Geographic Scope	HUC8

Intermediate Data

Hydrologic Unit Code	12110108
Watershed Size	1221.06 mi ²
# Random Sampling Points	68

Preliminary Result

Average Antecedent Precipitation Score	10.6
Preliminary Determination	Normal Conditions

Sampling Point Breakdown

Antecedent Precipitation Score	Antecedent Precipitation Condition	WebWIM Condition
14	Normal Conditions	Drier than Normal
11	Normal Conditions	Drier than Normal
10	Normal Conditions	Drier than Normal
9	Drier than Normal	Drier than Normal
8	Drier than Normal	Drier than Normal

Number of Random Sampling Points

Points = Watershed Size / 18

- Minimum of 3 for small HUC12s
- Denominator arrived at through iterative analysis of randomly selected HUC8, HUC10, and HUC12 watersheds, followed by a visual examination in ArcGIS Pro to ensure all major regions of each watershed were being sampled. Early versions took hours to run, so it was deemed important to try to get this number as low as possible without omitting significant portions of watersheds.

Sampling methodology:

- Generate random latitudes and longitudes between the minimum and maximum values of each for a given watershed polygon.
- Drop any points falling outside the watershed polygon.
- Drop any points falling within the minimum point spacing, created to reduce the workload required to cover sample the entire polygon.
- Continue until required number met.

Antecedent Precipitation Tool v.1.0 - Watershed Sampling Summary

Generated on 2020-06-22

User Inputs

Coordinates	28.523933, -98.843927
Date	1952-07-10
Geographic Scope	HUC8

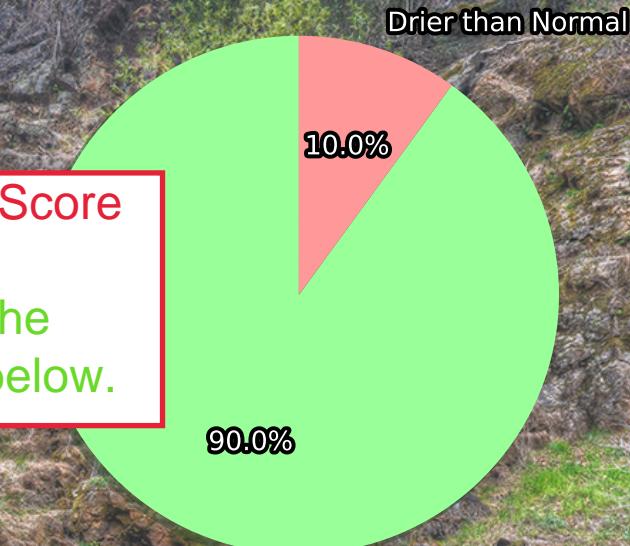
Hydrologic Unit Code
Watershed Size
Random Sampling Points

Preliminary Result

Average Antecedent Precipitation Score	10.6
Preliminary Determination	Normal Conditions

Average Antecedent Precipitation Score

The source numbers are listed in the Sampling Point Breakdown table below.



Normal Conditions

Sampling Point Breakdown

Antecedent Precipitation Score	Antecedent Precipitation Condition	WebWIMP H ₂ O Balance	Drought Index (PDSI)	# of Points
14	Normal Conditions	Dry Season	Severe drought	8
11	Normal Conditions	Dry Season	Severe drought	19
10	Normal Conditions	Dry Season	Severe drought	34
9	Drier than Normal	Dry Season	Severe drought	4
8	Drier than Normal	Dry Season	Severe drought	3

Antecedent Precipitation Tool v.1.0 - Watershed Sampling Summary

Generated on 2020-06-22

Preliminary Determination

By preliminary, this means that it is not considering any factors outside of the average Antecedent Precipitation Score.

Drier than Normal: Avg. Score < 10

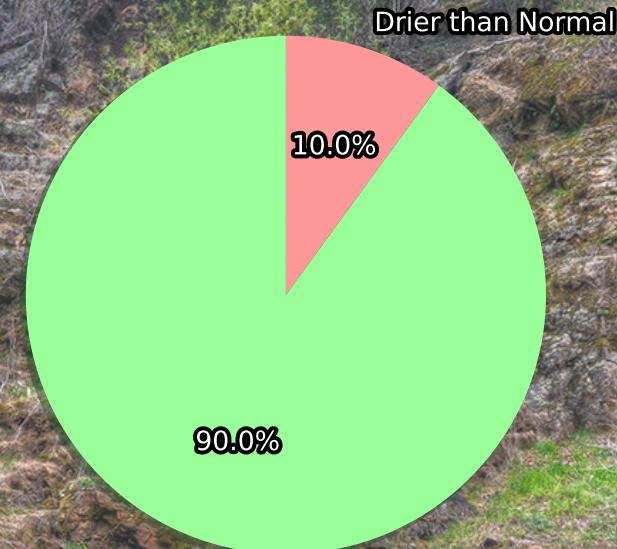
Normal Conditions: Avg. Score >10 and <15

Wetter than Normal: Avg. Score >15

Average Antecedent Precipitation Score	10.6
Preliminary Determination	Normal Conditions

8.843927
7-10
8

11.0108
1.06 mi ²
68



Preliminary Results

10.6
Normal Conditions

Sampling Point Breakdown

Antecedent Precipitation Score	Antecedent Precipitation Condition	WebWIMP H ₂ O Balance	Drought Index (PDSI)	# of Points
14	Normal Conditions	Dry Season	Severe drought	8
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8	Drier than Normal	Dry Season	Severe drought	3

Antecedent Precipitation Tool v.1.0 - Watershed Sampling Summary

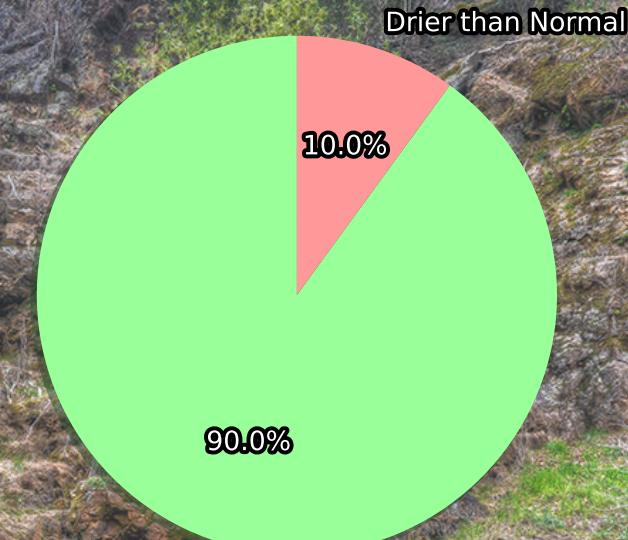
Generated on 2020-06-22

Things to consider in addition to the Average Score:

1. The distribution of the individual scores. Was the average brought up or down by outliers?

Sampling Point Breakdown Table Column 1 provides each unique Antecedent Precipitation Score, and Column 5 provides the frequency that each of those scores occurred in the among the Sampling Points.

Preliminary Result	
Average Antecedent Precipitation Score	10.6
Preliminary Determination	Normal Conditions



Sampling Point Breakdown				
Antecedent Precipitation Score	Antecedent Precipitation Condition	WebWIMP H ₂ O Balance	Drought Index (PDSI)	# of Points
14	Normal Conditions	Dry Season	Severe drought	8
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9	Drier than Normal	Dry Season	Severe drought	4
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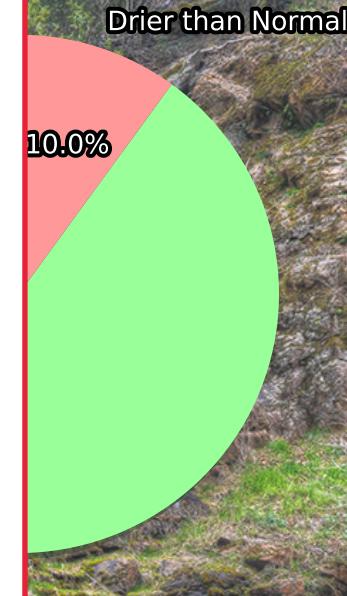
Antecedent Precipitation Tool v.1.0 - Watershed Sampling Summary

Generated on 2020-06-22

Things to consider in addition to the Average Score:

2. Whether the Observation Date is typically considered to fall within the Wet Season or the Dry Season for the Observation Location (Based on the Web-based Watershed Interactive Modeling Program WebWIMP, and the definitions of Wet Season and Dry Season found in the Regional Supplements to the Corps of Engineers Wetland Delineation Manual.)

If we are looking for indicators of greater than ephemeral flow for a given feature, and we determine we are in the dry season, we may not want to give as much weight to the absence of compelling field indicators as we would in the wet Season.



Sampling Point Breakdown				
Antecedent Precipitation Score	Antecedent Precipitation Condition	WebWIMP H ₂ O Balance	Drought Index (PDSI)	# of Points
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Antecedent Precipitation Tool v.1.0 - Watershed Sampling Summary

Generated on 2020-06-22

Things to consider in addition to the Average Score:

3. The primary contributing source of flowing water:

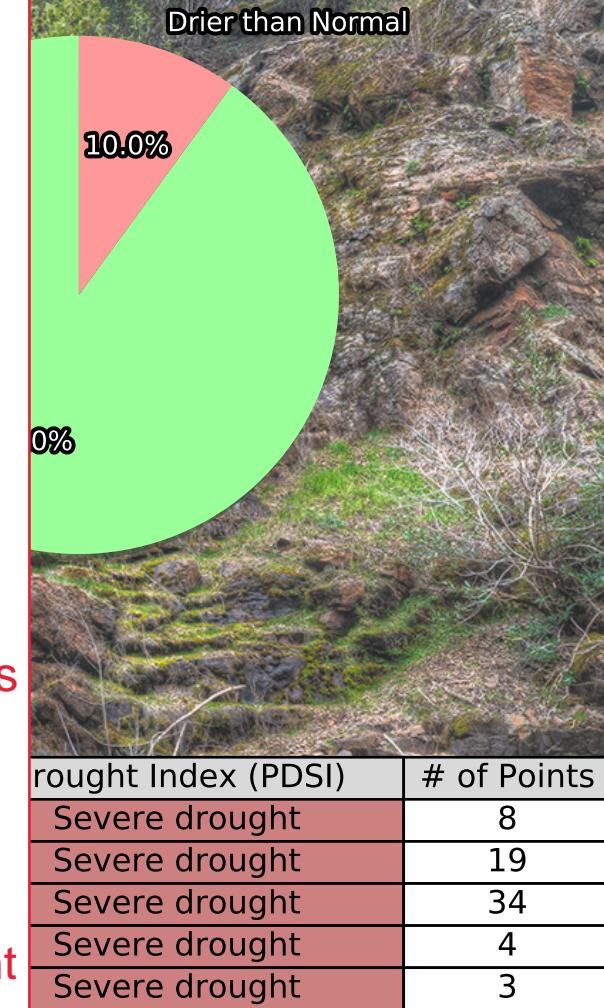
In the Arid West, for example, a given stream may be fed primarily by precipitation during the wet season, but in the dry season that same stream may receive most , if not all of its water from snow melt.

For a stream that is typically fed entirely by snow melt during much of the dry season, one might have less interest in the normalcy of rainfall over the preceding 90 days and more interest in the volume of snow that fell over the past winter season.

Still, one cannot ignore rainfall entirely, as "the most damaging floods in rivers of the Sierra Nevada of California have occurred during warm storms when rain fell in snow covered catchments." (Kattelmann, 1997)

This is why it is so important to review the actual figures that follow the Watershed Sampling Summary. If you look at how much snow the catchment received compared to normal, and whether any rain-on-snow events took place, you will be getting much closer to a complete picture.

Flooding from rain-on-snow events in the Sierra Nevada, Richard Kattelmann, 1997



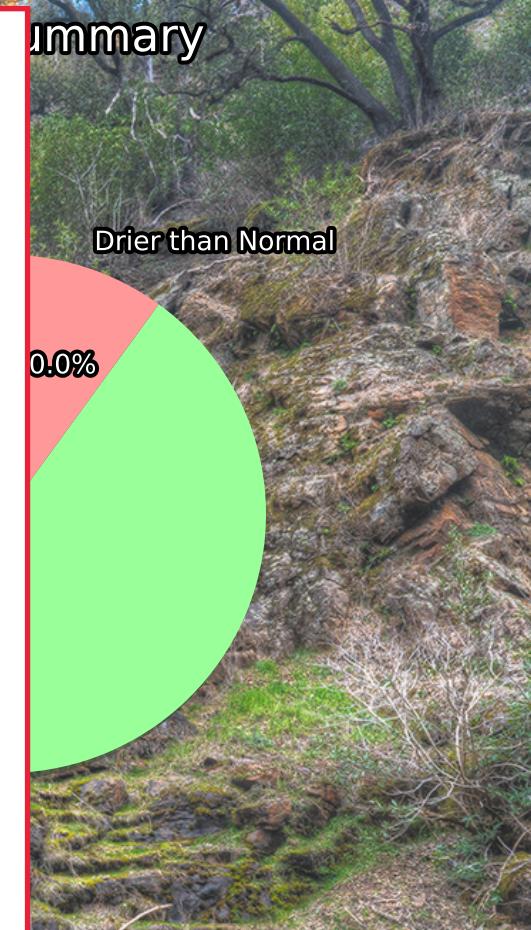
Things to consider in addition to the Average Score:

4. Drought Indices:

From Palmer Drought Severity Index: attempts to measure the duration and intensity of the long-term drought-inducing circulation patterns. Long-term drought is cumulative, so the intensity of drought during the current month is dependent on the current weather patterns plus the cumulative patterns of previous months. Since weather patterns can change almost literally overnight from a long-term drought pattern to a long-term wet pattern, the PDSI can respond fairly rapidly.

<https://www.ncdc.noaa.gov/temp-and-precip/drought/historical-palmers/overview>

NOTE: PDSI is not the only drought index. It happens to be the drought index for which I was able to locate a reliable data source (Hosted by NOAA) for the entire United States, which is why it was incorporated into the APT. Additional indices may be added to the APT as options at a later date, but until that time users are encouraged to consult whichever index they deem most appropriate for their region.



Sampling Point Breakdown				
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Antecedent Precipitation Tool v.1.0 - Watershed Sampling Summary

Generated on 2020-06-22

User Inputs

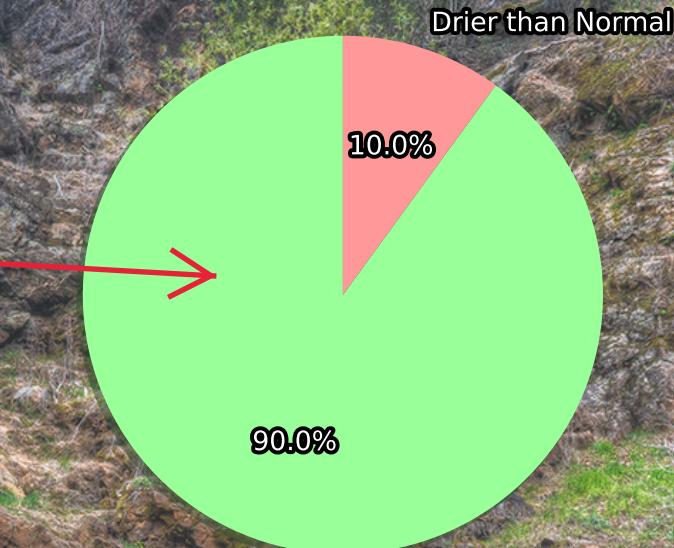
Coordinates: 129.52322, 39.81227

Superfluous Figure:

While this visual restatement of the information presented in columns 2 and 5 of the Sampling Point Breakdown table is not particularly useful, the degree of difficulty I experienced trying to get it to consistently appear round in this dynamically-generated figure compelled me to give it its own Text Callout.

Preliminary Result

Average Antecedent Precipitation Score	10.6
Preliminary Determination	Normal Conditions



Normal Conditions

Sampling Point Breakdown

Antecedent Precipitation Score	Antecedent Precipitation Condition	WebWIMP H ₂ O Balance	Drought Index (PDSI)	# of Points
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