



# Wind River Indian Reservation and Surrounding Area Climate and Drought Summary



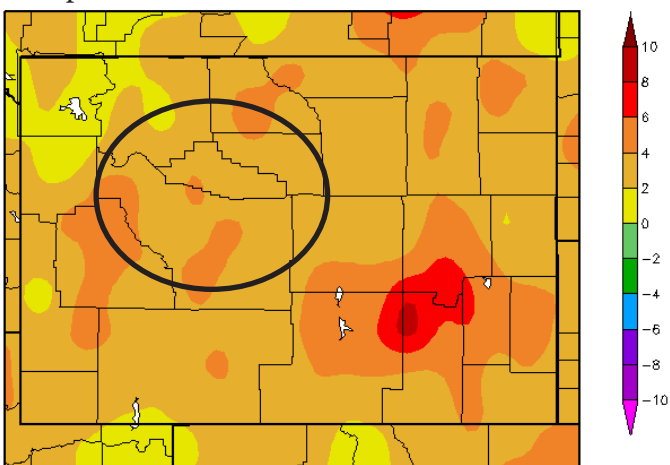
## Fall Events & Winter Outlook 2015-2016

### Fall Was Very Warm And Dry Across The Region

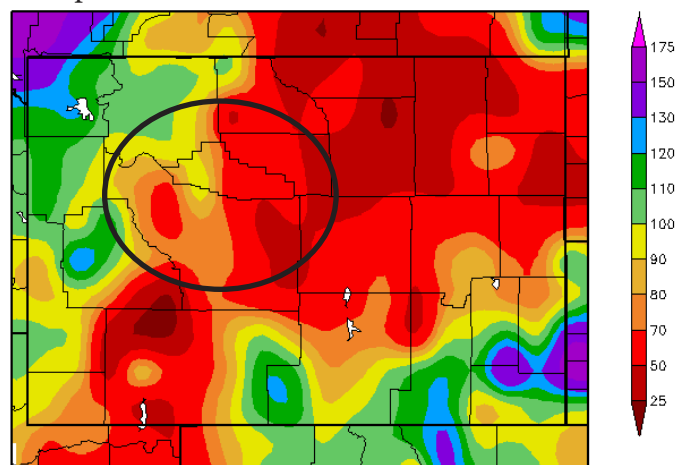
The Wind River Region\* experienced a very warm fall this year, as temperatures ranged from about 2-6°F above normal in the area (see map below left). The Basin and Riverton stations had their warmest fall on record, and it was the 3rd warmest fall for Thermopolis (see data table at the top of Page 2). The warmth in Basin was particularly impressive, as the average fall temperature was nearly 7°F above normal. The fall was also dry across the region with precipitation ranging from about 50-90 percent of normal (see map below right). The dryness was not as impressive as the warmth though, as most stations in the area were only slightly on the dry side for the season. The exceptions were Black Mountain, Boysen Dam, and Burris, which had their 9th, 10th, and 13th driest fall on record, respectively.

Taking a look at each month, September was warm and dry across the entire region. Basin had its warmest September on record. Diversion Dam recorded no precipitation the entire month, tying several years for the driest September on record. Only a trace of precipitation was recorded at Boysen Dam in September, tying 2010 for the driest September on record. October was even warmer across the area with temperatures up to 8°F above normal. In addition to September, Basin also had its warmest October on record. Thermopolis had its warmest October on record as well. October precipitation was split across the area, ranging from as little as 5 percent of normal precipitation in the southern and eastern parts of the region to as much as 200 percent of normal precipitation in the northern and western parts of the region. The temperature pattern shifted to cooler conditions across the area in November, but for the most part, average temperatures were only slightly below normal. November was much wetter across the area than the previous two months, as the central part of the region received 150-300 percent of normal precipitation. However, the precipitation was not record-breaking. (\*Note: The Wind River Region refers to the Wind River and Upper Bighorn Basins.)

Departure from Normal Temperature (°F)  
September 1, 2015 - November 30, 2015



Percent of Normal Precipitation (%)  
September 1, 2015 - November 30, 2015



Maps produced by the High Plains Regional Climate Center and are available at: <http://www.hprcc.unl.edu/maps/current>

## Summary Of Station Data (September 2015-November 2015)

Station	Average Temp. (°F)	Dep. from Normal Temp. (°F)	Temp. Rank	Total Precip. (in.)	Dep. from Normal Precip. (in.)	Percent of Normal Precip.	Precip. Rank	Period of Record
Basin	52.5	6.9	WARMEST	1.35	-0.38	78	near normal	1898-present
Black Mtn <sup>1</sup>	50.8	3.2	-	2.28	-1.36	63	9th driest	1963-present
Boysen Dam	51.3	4.5	-	1.04	-1.24	46	10th driest	1948-present
Burris	45.6	2.8	-	1.29	-0.63	67	13th driest	1963-present
Diversion Dam	46.0*	1.8	near normal	1.35*	-0.80	62	-	1920-present
Dubois	44.2*	3.6	-	2.10	-0.52	80	near normal	1905-present
Lander 1N	46.4	3.7	-	2.04	-0.62	77	-	1999-present
Riverton	48.3	3.8	WARMEST	1.47	-0.62	70	near normal	1907-present
Thermopolis	51.8	2.2	3rd warmest	1.89*	-	-	-	1899-present
Worland	49.4*	3.9	-	1.49	-0.55	73	near normal	1907-present

A dash (-) indicates insufficient data for calculation. An asterisk (\*) indicates some missing data for this period.

All data are preliminary and subject to change.

Data were retrieved from the Applied Climate Information System (ACIS): rcc-acis.org

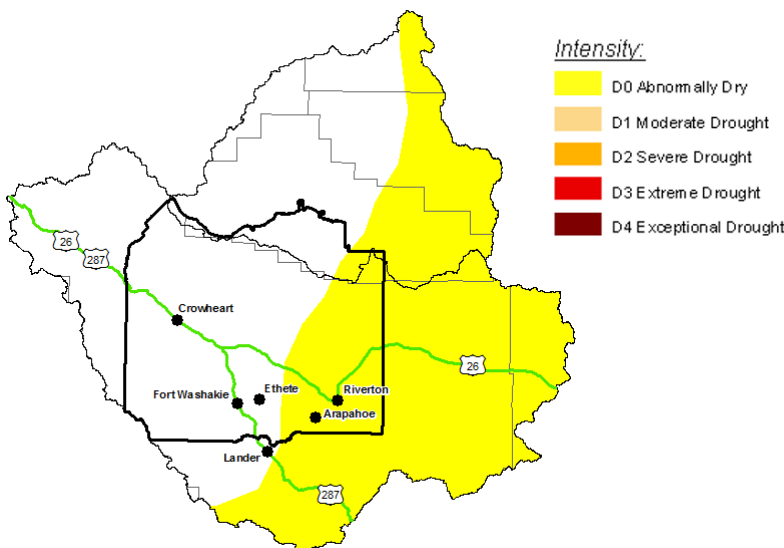
<sup>1</sup>The Black Mtn station is east of Thermopolis and does not refer to Black Mountain in the Wind River Range.

## Dryness Spread Into The Region This Fall

Above normal temperatures and slightly below normal precipitation created dry conditions across the Wind River Region this fall. According to the U.S. Drought Monitor (see the most recent map and data below), the area has gradually moved toward abnormally dry conditions (D0) since late September. By early November, the central and eastern parts of the reservation and surrounding area were placed in D0, covering about 46 percent of the region. The region has been very dry with the exception of irrigated lands in early fall. During late November, a cold front swept through the area, bringing below normal temperatures and snow accumulations of about 10 inches in lowland areas, helping to temporarily alleviate some dryness in the area. The area in D0 is not in drought but should be monitored closely.

### U.S. Drought Monitor of the Wind River Indian Reservation and Surrounding Area - November 24, 2015

Released November 25, 2015 Valid 7 a.m. EST



### Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	53.84	46.16	0.00	0.00	0.00	0.00
<b>Last Week</b> 11-17-2015	53.84	46.16	0.00	0.00	0.00	0.00
<b>3 Months Ago</b> 08-25-2015	99.55	0.45	0.00	0.00	0.00	0.00
<b>Start of Calendar Year</b> 12-30-2014	100.00	0.00	0.00	0.00	0.00	0.00
<b>Start of Water Year</b> 09-29-2015	74.90	25.10	0.00	0.00	0.00	0.00
<b>One Year Ago</b> 11-25-2014	100.00	0.00	0.00	0.00	0.00	0.00

(Note: Statistics are for reservation and surrounding area.)

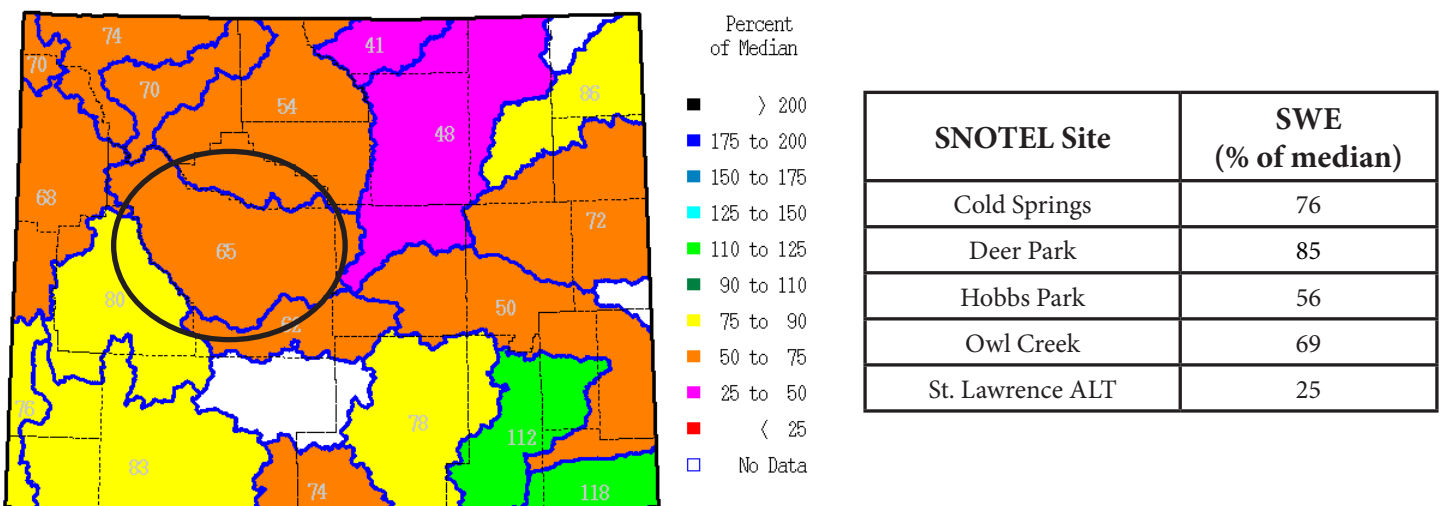
The U.S. Drought Monitor is jointly produced by the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration. Map courtesy of NDMC-UNL. For more information on the U.S. Drought Monitor, go to: <http://droughtmonitor.unl.edu>

## Mountain Snowpack Got Off To A Slow Start

Despite recent cooler and wetter conditions, the warmth and dryness of the first part of fall caused a slow start to the mountain snowpack season. At the end of November, the average Snow Water Equivalent (SWE)\* for the Wind River Basin was only 65 percent of median, and all SNOTEL sites in and around the Wind River Region were reflecting low percent of median values (see SWE map of Wyoming and table of SNOTEL sites in the region below). SWE in the Wind River Basin was down from the previous three years on the same date (November 30th): 83 percent of median (2014), 112 percent of median (2013), and 80 percent of median (2012). (\*Note: SWE is the amount of water contained within the snowpack. It can be thought of as the depth of water that would theoretically result if you melted the entire snowpack instantaneously. Median is a common descriptor used to express a “middle” value in a set of data. Median better represents SWE than does the “average.” Source: Natural Resources Conservation Service)

At the end of fall, reservoir levels were also relatively low (see reservoir table at the bottom of the page). As of November 30th, Boysen and Pilot Butte were faring best at 82.6 percent full and 82.2 percent full, respectively. Anchor’s pool was very low and the last reported values were from November 9th. Washakie Reservoir was not reporting data due to either low levels (which is typical for this time of year) or a frozen water surface. Ray Lake was also iced over, so the reservoir level provided in the table was estimated by the lead dam operator.

Snow Water Equivalent (SWE) % of Median by Basin and SNOTEL Site (Wyoming) as of November 30, 2015



On the map above, the percent of median value for the Wind River Basin is based on all reporting SNOTEL sites in the basin. The table above lists SWE by SNOTEL site in and around the Wind River Reservation. Reference period for average comparison is 1981-2010. Map provided by the Wyoming Water Resources Data System: <http://www.wrds.uwyo.edu/wrds/nrcs/snowrept/snowrept.html>. SNOTEL data provided by the Natural Resources Conservation Service: <http://www.wcc.nrcs.usda.gov/snow/>.

Reservoir Data as of November 30, 2015

Reservoir Name	Reservoir Elevation (feet)	Reservoir Storage (acre-feet)	Reservoir % Full	Reservoir Name	Reservoir Elevation (feet)	Reservoir Storage (acre-feet)	Reservoir % Full
Anchor	6,361.38'	467'	no data	Pilot Butte	5,453.0	27,712	82.2
Boysen	4,717.9	612,893	82.6	Ray Lake	5,518.0**	no data	no data
Bull Lake	5,775.6	70,675.6	46.4	Washakie	no data	no data	no data
Dinwoody	no data	no data	no data				

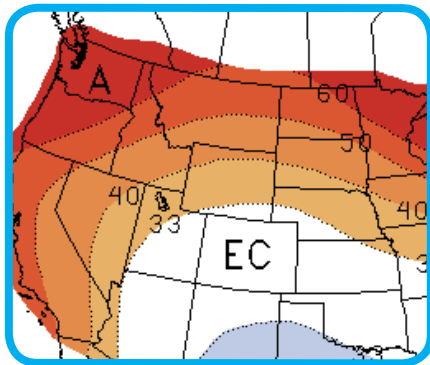
\*Last reported value was November 9th. \*\*Reservoir elevation is estimated.

Data sources: Bureau of Indian Affairs (not available online), Bureau of Reclamation ([http://www.usbr.gov/gp/lakes\\_reservoirs/wyoming\\_lakes.htm](http://www.usbr.gov/gp/lakes_reservoirs/wyoming_lakes.htm))

## Winter Outlook Calls For Warm And Dry Conditions

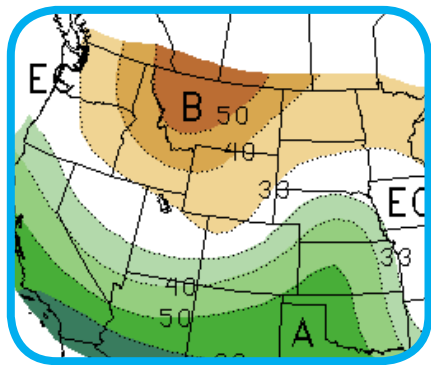
El Niño is present in the Pacific. It is likely to peak during the winter and gradually diminish by late spring or early summer 2016 (its impacts are reflected in the outlooks). The Climate Prediction Center is calling for an increased chance of above normal temperatures for most of Wyoming this winter, including the Wind River Region (see map below left). Below normal precipitation is also expected for the next three months (see map below center). Drought is not expected to develop through February in the region but may develop in northwestern Wyoming (see map below right). The National Weather Service long-range flood outlook calls for less than a 50 percent chance of flooding through February for the upper reaches of the Wind River. The National Interagency Fire Center predicts wildfire potential to be normal for the Wind River Region through February. CPC outlooks are available at: <http://www.cpc.ncep.noaa.gov/>

**3-Month Temperature Outlook**  
Valid December 2015-February 2016

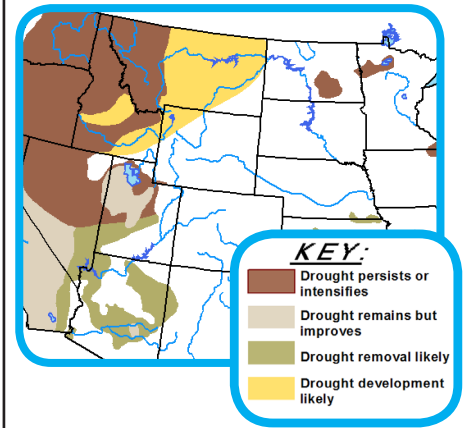


EC: Equal chances of above, near, or below normal  
A: Above normal B: Below normal

**3-Month Precipitation Outlook**  
Valid December 2015-February 2016



**U.S. Seasonal Drought Outlook**  
Valid Nov. 19, 2015-Feb. 29, 2016



### Drought Outlook explanation:

The Climate Prediction Center issues a seasonal drought outlook for the U.S. that is based on probabilities for drought development, persistence and intensification, improvement, and removal at a large scale. Local-scale changes in drought conditions may not be captured by this outlook. “On-going” drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to D4). The tan areas on the map imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none). The white areas imply no drought present.

### Three-Month Temperature and Precipitation Outlook explanation:

Each month, the Climate Prediction Center issues a new three-month outlook for temperatures and precipitation for the lower 48 states and Alaska. These outlooks indicate the probability of temperatures and precipitation being above, near, or below normal. (“Normal” is what is expected based on average temperatures and precipitation during the period of 1981-2010.) In general, the colors on the map will indicate warmer/cooler or wetter/drier conditions. In the temperature outlook, the oranges signify above normal temperatures, while the blues signify below normal temperatures. In the precipitation outlook, the greens indicate above normal precipitation, while the browns indicate below normal precipitation. You will also see probabilities on the map (e.g. 33, 40, 50, 60, 70, and 80). For a location and season, forecasters divide the 30 observations from 1981-2010 into thirds: 1/3 is the coldest or driest, 1/3 is the warmest or wettest, and 1/3 is in between. When forecasters indicate that an area will have above normal precipitation, for example, they are saying that the probability is greater than 33 percent. The outlooks are for the 3-month period as a whole and do not indicate when certain conditions would occur or the duration and intensity of any particular event. Areas of white are marked by “EC,” which means equal chances of above, near, or below normal temperatures/precipitation. EC does not mean near normal.

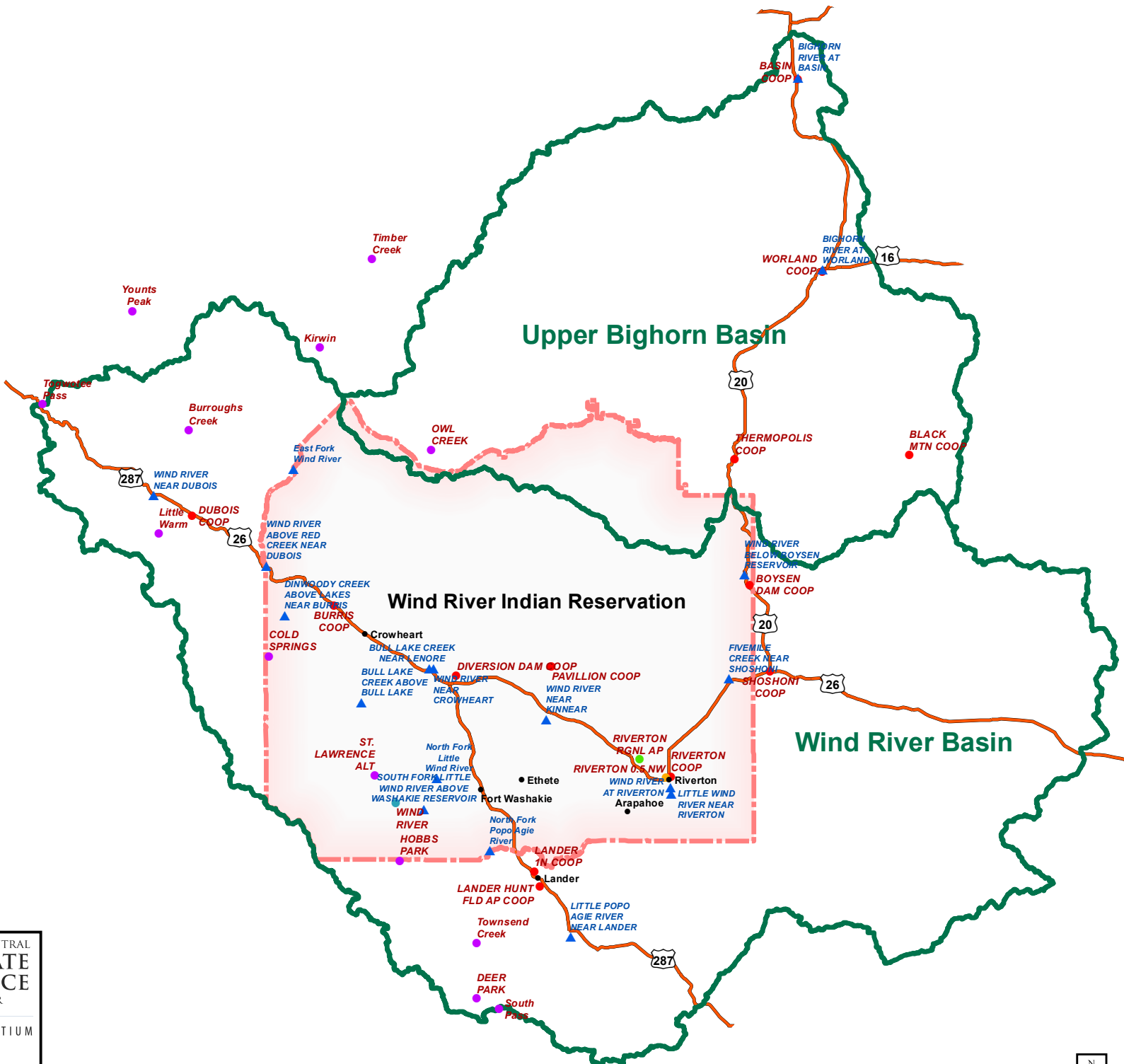
### Collaborators and Partners:



**Contact Information:** Please direct questions and feedback on this climate summary to Al C’Bearing, Office of the Tribal Water Engineer, 307-332-6464.

# Wind River Indian Reservation and Surrounding Area

Revised 6/18/2015



**Legend**

- WR Stream Gauges
  - ▲ RAWS
- WR Weather Stations
  - COOP
  - CoCoRaHS
  - SNOTEL
  - WBAN
- Basin Boundary

**NORTH CENTRAL CLIMATE SCIENCE CENTER**  
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