



September 2022 Climate Summary



Medicine Bow National Forest outside of Albany, Wyoming, Photo Courtesy of Gannon Rush

Warm and Dry Start to Fall

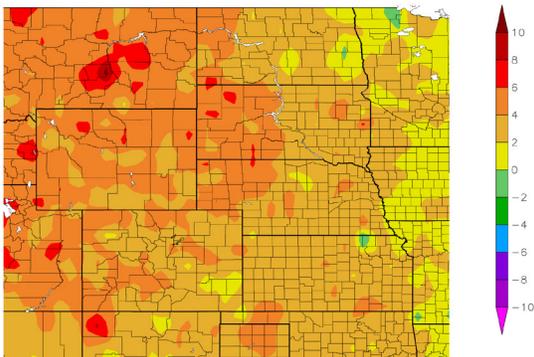
The first month of meteorological fall was disappointing for much of the region. Instead of bringing cooler temperatures and much-needed moisture, the trend of warm and dry conditions, unfortunately, dominated the region. The dryness that had been limited to Kansas and Nebraska spread into the Dakotas. Drought conditions rapidly spread across North Dakota in response to minimal precipitation.

Among the more interesting impacts of the drought this year occurred outside of Hays, Kansas. The nearby Ellis City Lake declared a public fish salvage in response to the extremely low water levels. With levels dangerously low, the fish are in danger of using oxygen too quickly. All catch limits and size rules on fish within the lake are removed, with any means of catch acceptable. The state of Kansas fears all the fish will die, resulting in them having to completely restart the aquatic population.

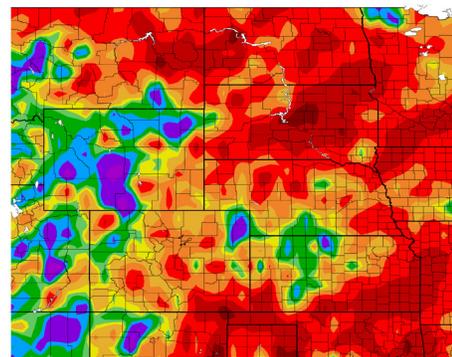
The dire situation in southeastern Kansas led to serious consequences for one town. The town of Caney declared a water emergency in mid-September in response to low well levels. Water usage for outdoor purposes is banned, with the potential for citations or disconnections for residents. This part of Kansas rapidly dried out in the summer months, with September offering no relief.

Temperature and Precipitation Overview

Departure from Normal Temperature (F)
9/1/2022 – 9/30/2022



Percent of Normal Precipitation (%)
9/1/2022 – 9/30/2022



Above: Departure from 1991-2020 normal temperature (left) and percent of normal precipitation (right) for September 2022 in the High Plains region. Maps produced by the High Plains Regional Climate Center and are available at: <http://hprcc.unl.edu/maps/current>.

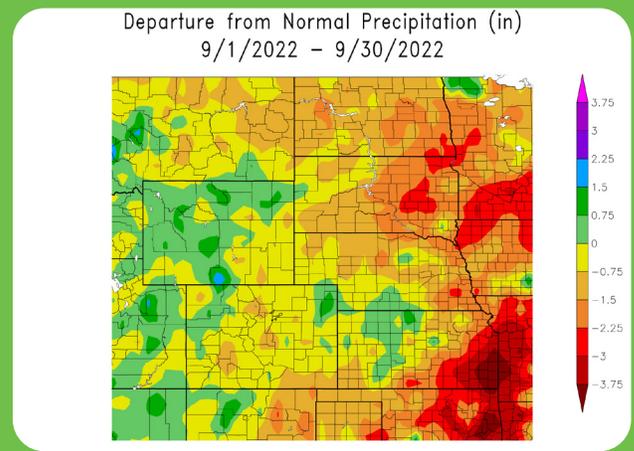
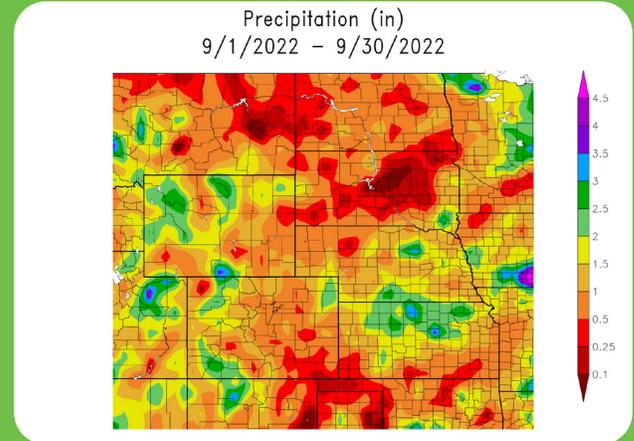
Precipitation

Much of the High Plains was dry in September, with the majority of the Dakotas receiving less than an inch of precipitation. Drought-stricken areas in the western parts of Kansas and Nebraska received some precipitation, but not nearly enough to improve drought conditions.

After observing near-normal to above-normal precipitation for much of this year, North Dakota was nearly bone-dry in September. Dickinson observed their driest September on record, with a paltry 0.07 inches (1.78 mm) of precipitation. In South Dakota, Sisseton fared slightly better with 0.08 inches (2.03 mm) to rank 2nd driest. Aberdeen and Pierre recorded less than 0.15 inches (3.81 mm) in September to rank in the top 10 driest.

Looking further back, many locations in Kansas and Nebraska currently rank in the top 10 driest year-to-date. Arguably the driest place in the region is Garden City, Kansas. Only 5.01 inches (12.73 cm) of precipitation has fallen this year, nearly 2 inches (5.08 cm) below the previous record. In southwestern Nebraska, several locations are in the midst of their driest year-to-date. Most notably is Ogallala, which is the site of Lake McConaughy. Through the end of September, only a meager 5.74 inches (14.58 cm) of precipitation has been observed, well below the normal of 17.29 inches (43.92 cm).

Regional Precipitation



Above: Total precipitation in inches (top) and departure from normal precipitation in inches (bottom) for September 2022. These maps are produced by HPRCC and can be found on the Current Climate Summary Maps page at: <http://hprcc.unl.edu/maps/current>.

Streamflow Update

Outside the areas impacted by drought, streamflow throughout the region was generally in good shape. Flooding continues along the James River in South Dakota resulted from heavy precipitation in previous months. Conditions in southwestern Nebraska and western Kansas continued to be much below normal. August runoff north of Sioux City was 62% of normal due to the long-term effects of drought.

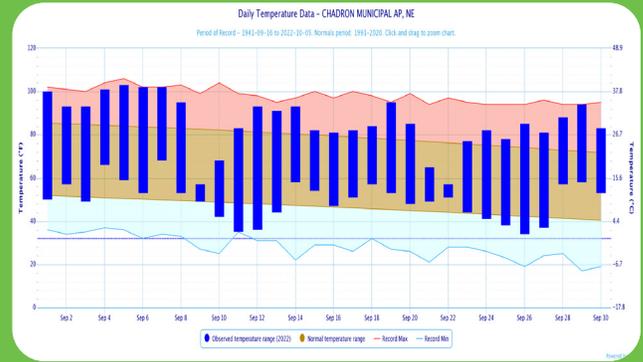
Temperatures

September temperatures were well above-normal across the region, with numerous locations ranking in the top 10 warmest months on record. Much of the region experienced 2 to 4 degrees F (1.1 to 2.2 degrees C) above normal, while small areas of 6 to 8 degrees F (3.3 to 4.4 degrees C) above normal temperatures were also present.

The warmest areas in the region have been eastern Wyoming and western Nebraska for the past few months. This area experienced record to near-record warmth this summer, with the trend continuing into the beginning of fall. In Wyoming, Cheyenne, Laramie, and Rawlins all ranked 2nd warmest. While in Nebraska, Scottsbluff ranked 2nd, and Chadron was the warmest on record with an average temperature of 67.7 degrees F (19.8 degrees C).

Colorado was also extremely warm this past month as well. Alamosa averaged 59.9 degrees F (15.5 degrees C) to rank warmest, while Denver ranked 3rd. Other locations such as Grand Junction, Pueblo, and Colorado Springs, also ranked in the top 5.

Station Spotlight: Chadron, Nebraska

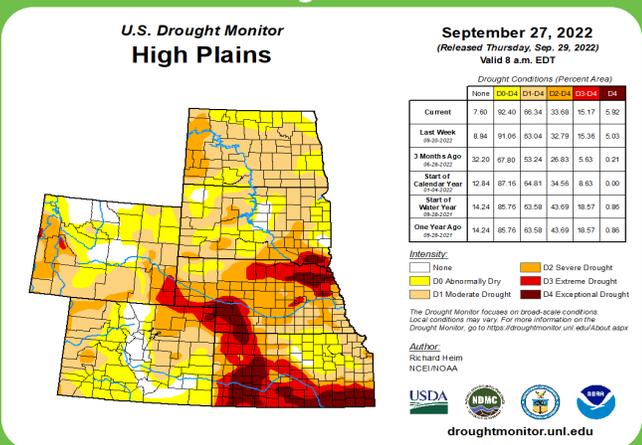


Above: Daily temperatures for September 2022, along with extremes and normals values in Chadron, Nebraska.

Drought Conditions

Drought not only re-appeared, but rapidly spread across North Dakota after a very dry month. Outside of areas in Colorado and Wyoming, there were minimal improvements. Overall, there was a 16 percent increase in moderate to exceptional (D1-D4) this September.

U.S. Drought Monitor



The U.S. Drought Monitor is produced as a joint effort of the U.S. Department of Agriculture (USDA), National Drought Mitigation Center, U.S. Department of Commerce, and the National Oceanic and Atmospheric Administration (NOAA). For current Drought Monitor information, please see: <http://droughtmonitor.unl.edu/>.

At the beginning of September, less than 1 percent of North Dakota was under drought conditions. By the end of the month, 72 percent of the state was experiencing drought. The lack of precipitation in the state in the past 60 days prompted the rapid expansion. Western Kansas has been the epicenter of the drought for most of the year for the state, but the southern part of the state has rapidly deteriorated in recent months. Currently, 25 percent of the state is in exceptional drought (D4). Elsewhere in the region, other improvements and degradation were observed. According to the Climate Prediction Center's U.S. Monthly Drought Outlook for October, drought development is likely across parts of Kansas, Nebraska, and South Dakota.

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Climate Outlooks

According to the Climate Prediction Center, La Niña conditions are likely to continue through the end of the year. A La Niña advisory is currently in effect. For more information, visit https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf

The National Weather Service's long-range flood outlook indicates a low probability of Minor Flooding in eastern Kansas through December. According to the National Inter-agency Fire Center (NIFC), fire potential will be limited across the region through next year.

The seasonal temperature and precipitation outlooks presented below combine the effects of long-term trends, soil moisture, and when applicable, the El Niño Southern Oscillation cycle (ENSO). To learn more about these outlooks, please visit <http://www.cpc.ncep.noaa.gov>.

Temperature

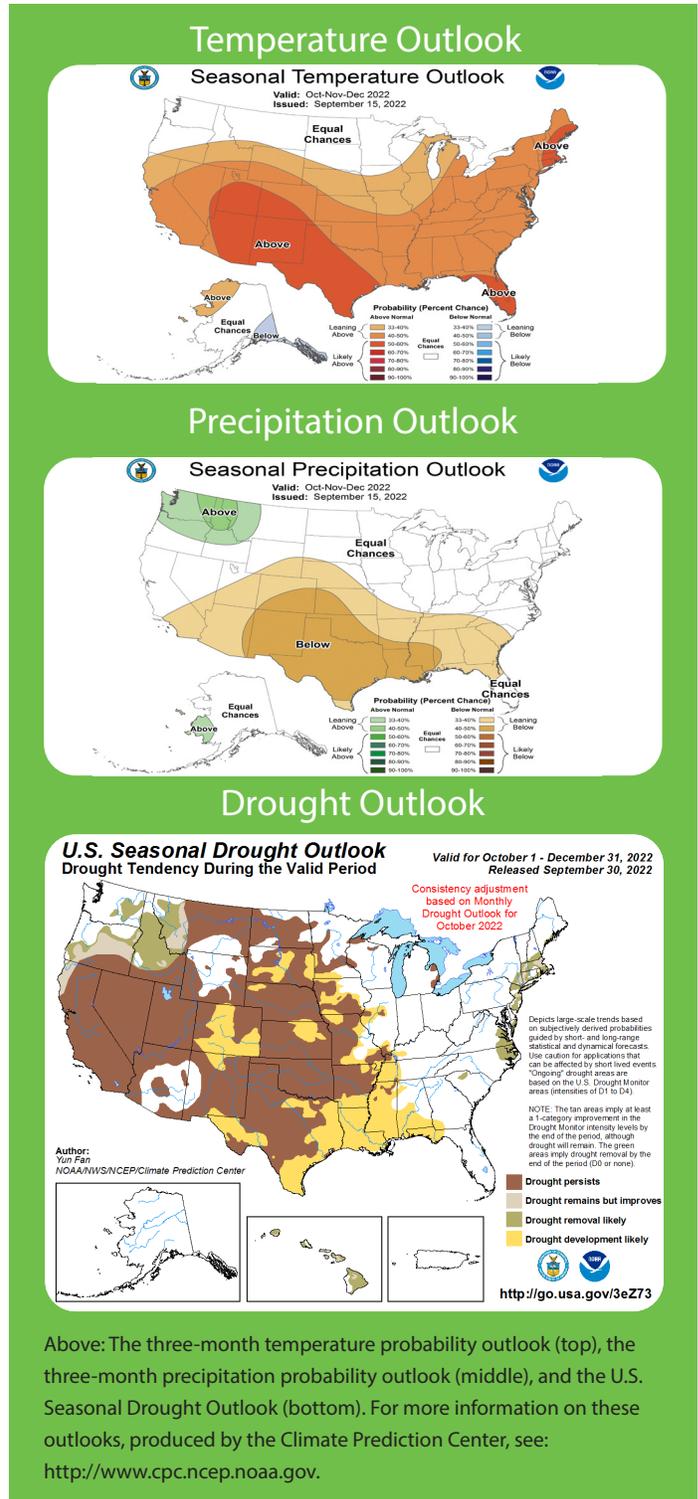
The three-month temperature outlook shows an increased chance of above-normal temperatures across the majority of the United States. Equal chances of above-, below-, and near-normal are present in the Dakotas, otherwise above-normal temperatures are favored.

Precipitation

The outlook for the next three months indicates below-normal precipitation across central parts of the United States. Across the High Plains there are equal chances of above-, below-, and near-normal precipitation in the Dakotas and northern Wyoming. The rest of the region has increased chances of below-normal precipitation.

Drought

The U.S. Seasonal Drought Outlook released on September 30th indicates drought conditions are expected to develop in Colorado, Kansas, Nebraska, and South Dakota.



Above: The three-month temperature probability outlook (top), the three-month precipitation probability outlook (middle), and the U.S. Seasonal Drought Outlook (bottom). For more information on these outlooks, produced by the Climate Prediction Center, see: <http://www.cpc.ncep.noaa.gov>.

Station Summaries: By the Numbers

Colorado	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Akron Washington County Airport	84.0	52.0	68.0	3.9	103	09/06	39	09/11	0.66	-0.58	53
Alamosa San Luis Airport	78.7	41.0	59.9	4.0	89	09/05	32	09/12	0.53	-0.45	54
Colorado Springs Municipal Airport	82.1	51.7	66.9	3.9	94	09/08	44	09/26	0.81	-0.54	60
Denver International Airport	84.3	53.6	69.0	4.2	99	09/08	42	09/25	1.25	-0.10	93
Grand Junction Walker Field Airport	85.5	56.9	71.2	4.1	102	09/06	46	09/24	2.29	1.10	192
Pueblo Memorial Airport	88.3	51.9	70.1	3.5	101	09/08	44	09/12	0.49	-0.16	75

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	87.5	59.1	73.3	4.8	102	09/20	45	09/29	1.96	-0.84	70
Dodge City Regional Airport	88.8	57.4	73.1	3.1	99	09/18	45	09/11	2.66	1.35	203
Goodland Renner Field	86.0	52.6	69.3	4.0	101	09/08	40	09/11	0.65	-0.75	46
Topeka Municipal Airport	85.6	58.1	71.9	2.7	100	09/20	43	09/26	1.21	-2.31	34
Wichita Mid-Continent Airport	89.1	60.7	74.9	3.2	101	09/21	48	09/12	0.67	-2.38	22

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	85.8	49.7	67.7	4.9	103	09/05	34	09/26	0.55	-1.04	35
Grand Island Airport	84.7	55.7	70.2	3.6	100	09/20	41	09/28	1.29	-0.71	65
Lincoln Municipal Airport	86.0	55.6	70.8	3.6	103	09/20	39	09/26	0.97	-1.93	33
Norfolk Karl Stefan Airfield	84.2	54.1	69.2	4.8	100	09/20	39	09/26	1.49	-0.88	63
North Platte Regional Airport	85.9	49.8	67.9	3.7	103	09/08	38	09/26	0.91	-0.70	57
Omaha Eppley Airport	81.7	56.1	68.9	1.3	100	09/20	40	09/28	1.55	-1.41	52
Valentine Miller Field	84.9	49.7	67.3	3.1	106	09/08	32	09/26	0.80	-0.92	47

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismarck Municipal Airport	78.4	48.6	63.5	3.8	102	09/01	34	09/22	0.97	-0.75	56
Fargo International Airport	73.7	48.4	61.0	1.0	87	09/01	35	09/27	0.50	-2.18	19
Grand Forks International Airport	73.4	46.9	60.2	2.3	90	09/01	31	09/28	0.53	-1.73	23
Theodore Roosevelt Airport	77.1	46.8	62.0	3.5	97	09/07	34	09/22	0.07	-1.55	4
Williston International Airport	77.0	49.4	63.2	5.2	99	09/01	37	09/21	0.37	-0.99	27

All data are preliminary and subject to change. + indicates multiple dates, latest date listed. * indicates some missing data for the period. ** indicates value is under evaluation. Data are retrieved through the Applied Climate Information System (ACIS) and are available online through the CLIMOD system. For more information please contact us: <http://www.hprcc.unl.edu/contact.php>.

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South Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Aberdeen Regional Airport	79.9	48.6	64.3	3.4	95	09/01	31	09/28	0.11	-1.88	6
Huron Regional Airport	82.3	50.0	66.1	3.5	98	09/08	37	09/22	0.16	-2.27	7
Pierre Regional Airport	82.5	51.0	66.8	3.2	99	09/01	41	09/22	0.06	-1.68	3
Rapid City Regional Airport	81.7	49.1	65.4	4.1	98	09/04	36	09/26	0.39	-0.83	32
Sioux Falls Joe Foss Field Airport	80.1	53.3	66.7	2.9	95	09/20	34	09/28	1.94	-0.79	71

Wyoming	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Casper Natrona County International AP	79.9	44.6	62.3	3.4	100	09/04	32	09/25	0.81	-0.14	85
Cheyenne Municipal Airport	78.6	49.4	64.0	4.4	97	09/07	40	09/25	1.12	-0.35	76
Lander Hunt Field Airport	79.6	49.5	64.6	5.0	99	09/04	40	09/11	1.50	0.52	153
Laramie Regional Airport	75.3	42.0	58.7	4.4	89	09/06	25	09/11	0.57	-0.54	51
Rawlins Municipal Airport	78.0	43.4	60.7	4.2	94	09/04	30	09/11	1.23	0.34	138
Sheridan County Airport	81.3	47.4	64.4	5.3	104	09/07	37	09/10	2.24	0.77	152

September 2022 Highlights

Monthly Rankings

Temperature in degrees Fahrenheit, Precipitation in inches

Precipitation	Precipitation / Ranking	Record / Year	Period of Record
Dickinson, North Dakota	0.07 / DRIEST	0.14 / 1958	1938-2022
Sisseton, South Dakota	0.08 / 2nd Driest	0.02 / 1998	1931-2022
Pierre, South Dakota	0.06 / 5th Driest (tied with 1937)	0.00 / 1893	1893-2022
Aberdeen, South Dakota	0.11 / 6th Driest	0.01 / 2012	1893-2022
Temperature	Temperature / Ranking	Record / Year	Period of Record
Chadron, Nebraska	67.7 / WARMEST	67.0 / 2021 & 1969	1941-2022
Alamosa, Colorado	59.9 / WARMEST	59.0 / 1933	1906-2022
Laramie, Wyoming	58.7 / 2nd Warmest	59.2 / 1998	1948-2022
Scottsbluff, Nebraska	67.7 / 2nd Warmest	68.1 / 1998	1893-2022
Rawlins, Wyoming	60.7 / 2nd Warmest	63.1 / 1998	1951-2022
Cheyenne, Wyoming	64.0 / 2nd Warmest (tied with 2019)	64.7 / 2015	1871-2022
Sheridan, Wyoming	64.4 / 3rd Warmest	65.3 / 1963	1907-2022
Denver, Colorado	69.0 / 3rd Warmest	69.4 / 2015	1872-2022
Mobridge, South Dakota	67.0 / 3rd Warmest (tied with 1948)	67.5 / 1940	1911-2022
Lander, Wyoming	64.6 / 3rd Warmest	65.3 / 2015	1891-2022
Grand Junction, Colorado	71.2 / 4th Warmest	72.0 / 1979	1893-2022
Akron, Colorado	68.0 / 5th Warmest	69.8 / 2015	1937-2022
Colorado Springs, Colorado	66.9 / 5th Warmest	68.7 / 2019	1894-2022

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About the High Plains Regional Climate Center

The High Plains Regional Climate Center (HPRCC) is one of six NOAA Regional Climate Centers (RCCs) that has been providing timely climate data and information to the public for cost effective decision-making since 1987. The HPRCC primarily serves the six-state region of Colorado, Kansas, Nebraska, North Dakota, South Dakota, and Wyoming, but has also served people from all across the country and even throughout the world. HPRCC operates under a three-tiered structure of climate services and works closely with other organizations on the local, regional, and national levels. HPRCC staff engage with a wide range of stakeholders including K-20 education, the public, media, private industry, research, and state/tribal/federal entities, among others.

Much of the data and products found throughout this publication were built on the Applied Climate Information System (ACIS) framework. ACIS was designed to manage the complex flow of information from climate data collectors to the end users of climate data information. The main purpose of ACIS is to alleviate the burden of climate information management for people who use climate information to make management decisions.

HPRCC is involved in the ongoing development and management of ACIS. In the spring of 2014, the RCCs released a new website for ACIS. This new and improved website not only contains descriptions of ACIS and the sources of data found within, but also features real-world examples of how RCCs and external groups are using ACIS for their particular climate data needs. In addition to these examples, there is extensive documentation and tutorials on how ACIS can be used and accessed by external clients using Web Services. For more information see: <http://rcc-acis.org>.



Additional Summary Information for the High Plains

Missouri River Basin Quarterly Climate Impacts and Outlook

For more information:
<https://www.drought.gov/drought/dews/missouri-river-basin/reports-assessments-and-outlooks>

Midwest and Great Plains Monthly Climate and Drought Webinar

To sign up for future webinars:
<https://www.drought.gov/drought/calendar/webinars>

For an archive:
www.hprcc.unl.edu/webinars.php

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