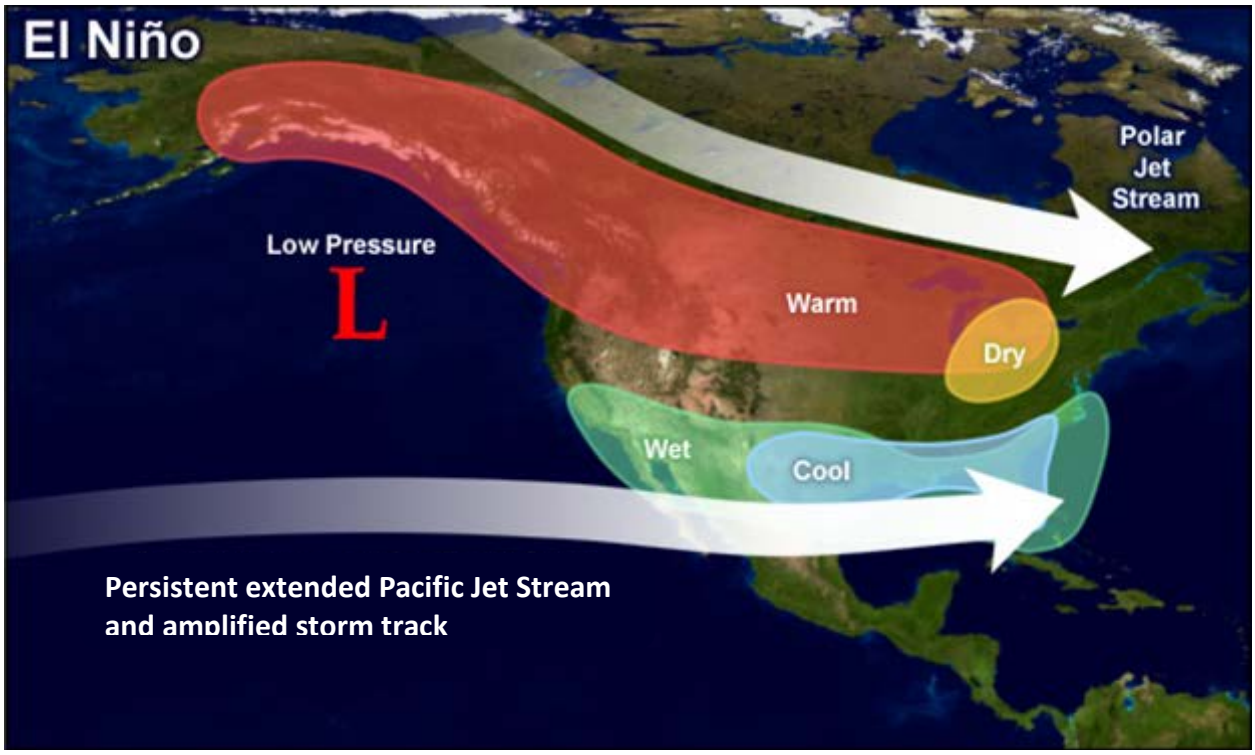


Source: Climate Prediction Center/NCEP/NWS/The Comet Program

FEMA REGION VII: EL NINO FORECAST, WINTER 2012-2013 OUTLOOK, AND REGIONAL DECLARATION ANALYSIS

December 2012

FEMA

Executive Summary

During 2012, especially the summer, many records were broken for both warmest temperatures and precipitation deficits that led to lingering drought conditions across the country. Particularly hardest hit was Region VII. With precipitation deficits still below normal, drought conditions are predicted to continue through winter 2012-2013. Additionally, El Niño conditions that were expected to develop have not materialized and are not expected to through winter. Though El Niño may develop in spring 2013, it is not expected to impact spring weather patterns.

An in-depth disaster declaration analysis was also performed and is included as a part of this document. The purpose of this analysis was to identify and determine which weather related declarations are more prevalent during each phase of the ENSO cycle (***El Niño***, ***ENSO neutral*** and ***La Niña***).

Current Drought Conditions

Drought continues for the region aside from a portion of Missouri (<1%) which is only experiencing Abnormally Dry (D0) conditions. As of December (Figure 1), 32% of the region is experiencing Exceptional (D4) drought, 25% Extreme (D3), 20% Severe (D2) and 23% Moderate (D1).

Iowa:

- Moderate (D1) to Exceptional (D4)
  Exceptional (D4): 1%
  Extreme (D3): 41%
  Severe (D2): 27%
  Moderate (D1): 31%

Kansas:

- Severe (D2) to Exceptional (D4)
  Exceptional (D4): 36%
  Extreme (D3): 42%
  Severe (D2): 22%

Missouri:

- Moderate (D1) to Severe (D2)
  Severe (D2): 30%
  Moderate (D1): 68%

Nebraska:

- Severe (D2) to Exceptional (D4)
  Exceptional (D4): 77%
  Extreme (D3): 19%
  Severe (D2): 4%

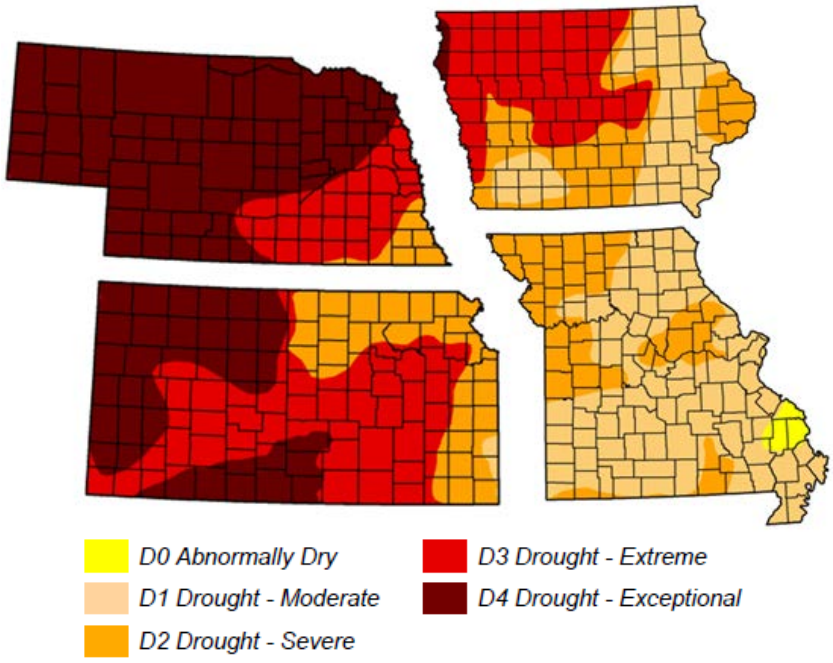


Figure 1: Drought Status (Source: www.http://droughtmonitor.unl.edu)

Seasonal Variability: El Niño-Southern Oscillation (ENSO)

Various factors contribute to fluctuations in variability amongst temperature and precipitation. The El Niño-Southern Oscillation (ENSO) is not the only factor, but it is a major influence on seasonal weather patterns. ENSO is a cyclical pattern occurring near the equator in the Pacific Ocean associated with variations in ocean temperature, air pressure, wind flow and rainfall. Although ENSO does not develop near the U.S., the effects of the climate pattern are felt in the U.S. and may impact seasonal precipitation and temperature patterns within FEMA Region VII. However, Region VII presents a challenge for ENSO predictions as regional boundaries reside between the most impacted areas.

Extreme phases of the ENSO cycle are *La Niña* and *El Niño* (Figure 2) with near average conditions or the absence of El Niño and La Niña referred to as *ENSO neutral*. Wind patterns during ***La Niña*** favor a more active storm pattern for the north and east leaving them colder and wetter while leaving the south drier and warmer than normal. Conversely, ***El Niño*** wind patterns favor southerly storm activity leading to wetter, cooler conditions in the south and warmer, drier conditions in the north

El Niño (warm phase): Ocean Temperatures: *Warmer* than normal

Temperature

Warmer winters in the **north**
Cooler winters in the **south**

Precipitation

Wetter winters in the **south**
Drier winters in the **north**

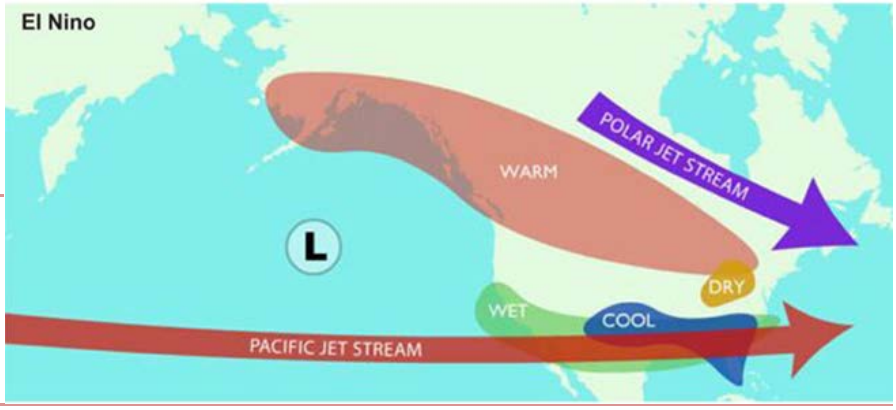


Figure 2: El Niño cycle and associated impacts (Source: Smithsonian Institution)

ENSO Alert System

The NOAA/NWS Climate Prediction Center (CPC) is responsible for monitoring ENSO patterns and issuing El Niño/La Niña status alerts. In addition to non-active status (Table 1), there are 3 main alerts:

El Niño/La Niña Watch	El Niño/La Niña expected to develop within the next six months
El Niño/La Niña Advisory	El Niño/La Niña conditions are observed and expected to continue
Final El Niño/La Niña Advisory	Issued after El Niño/La Niña conditions have ended
NA	ENSO Alert System is not active

Table 1: CPC ENSO Alert System (Source: http://www.cpc.ncep.noaa.gov/)

Current ENSO Status: ENSO Neutral - ENSO Alert System Not Active

During spring 2012, CPC data indicated that La Niña conditions present during the fall/winter of 2011-2012 had ceased in May. In June, an El Niño Watch was issued, indicating that an El Niño was expected to develop over the coming months. However, an El Niño did not develop. *Currently, the ENSO alert system is '**Not Active**' at this time as ENSO neutral conditions are expected to prevail through winter 2012-2013 (Figure 3). There is potential for El Niño development in spring 2013.*

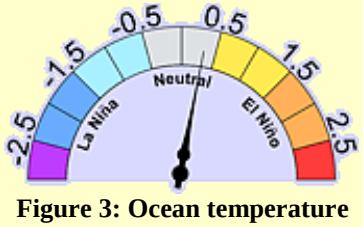


Figure 3: Ocean temperature departure from normal (Source: www.noaawatch.gov)

Future Projections

Winter Outlook

Temperature: For western Kansas into south-western Nebraska temperatures are expected to be warmer than normal this winter (Figure 4). The remainder of the region should expect average winter temperatures having equal chances for colder, warmer or average temperatures this winter season.

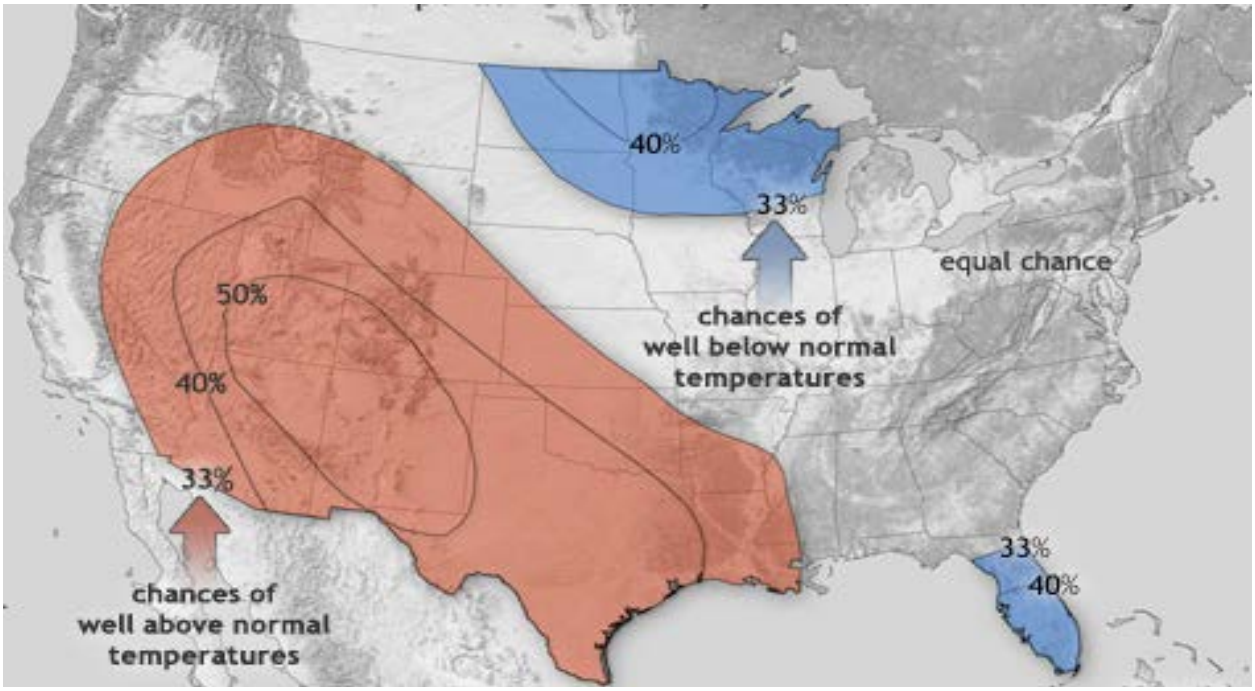


Figure 4: Winter Temperature Outlook (Source: http://www.noaa.gov/)

Precipitation: Average precipitation amounts are expected for the majority of the region this winter with equal chances for above, below or average precipitation amounts (Figure 5). Far southern Missouri is the exception as above normal precipitation is expected through winter.

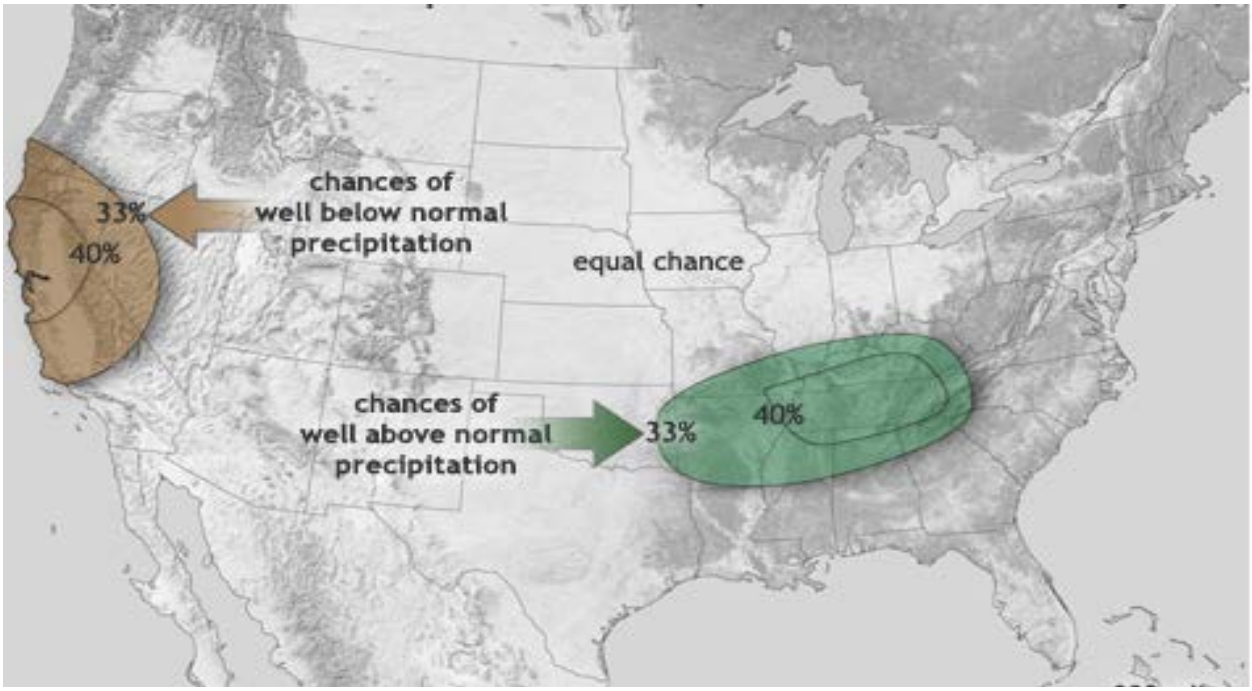


Figure 5: Winter Precipitation Outlook (Source: http://www.noaa.gov/)

Drought Outlook

Conditions across the region are expected to persist through winter aside from the Missouri 'Bootheel,' where drought conditions are expected to improve (Figure 6). While there is potential for slight improvement for far eastern Iowa and eastern into south central Missouri, the remainder of the region should see drought conditions persist through winter.

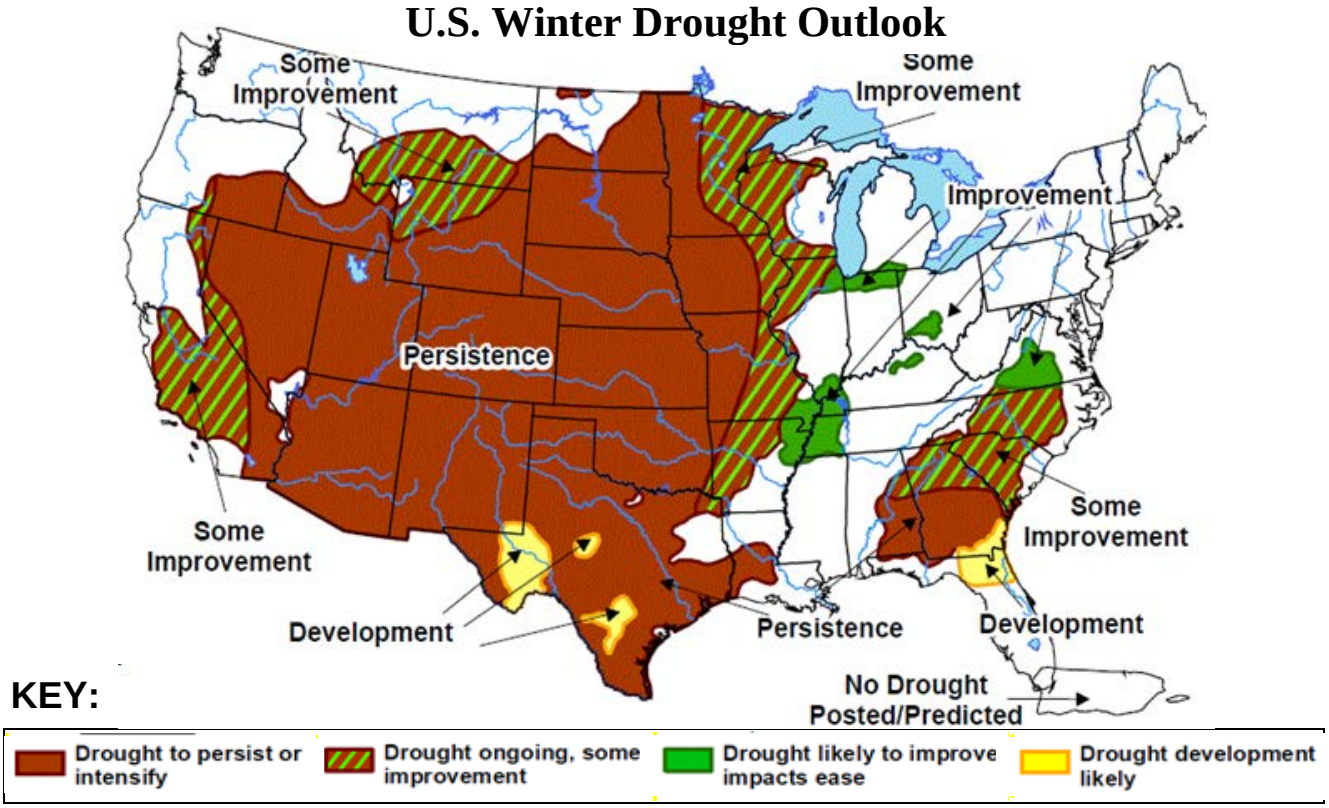


Figure 6: Winter Drought Outlook, December 6, 2012 – February 28, 2013 (Source: http://www.cpc.ncep.noaa.gov)

Expected Winter Conditions

With ENSO Neutral conditions prevailing, average winter conditions are expected for most of the region. State averaged temperature and precipitation are as follows (Table 2):

Iowa	
Temp	Precip
21	3.19"

Kansas	
Temp	Precip
31	3.78"

Missouri	
Temp	Precip
31	5.77"

Nebraska	
Temp	Precip
24	2.68"

Table 2: State averaged temperature and precipitation (Source: http://www.hprcc.unl.edu/)

External to Region VII

In previous years (i.e. 2010), heavy snowpack in the Rocky Mountains and abundant spring rains in the Northern Plains have led to flooding concerns within Region VII during the spring season. During late November and early December 2012, strong storms have moved across the Northern Plains and provided snow from the State of Montana to the Great Lakes region. As of this report, portions of central Minnesota have 10 to 15 inches of snow on the ground. Weather forecasts for the remainder of the month of December show that above normal temperatures with little additional precipitation is to be expected. These conditions should allow the current snowpack across the Northern United States to melt throughout the winter season. Portions of the northern states are expected to experience warmer than normal temperatures with normal precipitation amounts. As a result, the risk of spring flooding within Region VII caused by snowmelt is **expected to be low**.

Regional Perspective and Conclusion

Most of the Central Plains have experienced approximately half of the normal precipitation throughout 2012 which has contributed to existing moderate to extreme drought conditions. The long-term forecast does not provide much in the way of relief to region-wide dry conditions. While the Region will have typical winter storms and cold outbreaks, the overall winter should be drier and warmer than normal. The only exception that might occur would be across southern Missouri which may experience normal to above normal precipitation this winter. As a result of this forecast, drought conditions are expected to persist into the spring season, **therefore increasing the wildland fire threat throughout the Region.**

Federal Operational Status

FEMA Region VII Operational Capabilities:

Regional Watch Center

Region VII operates a 24/7 Regional Watch Center (RWC) capable of identifying, analyzing, and notifying staff and stakeholders of any potential threats throughout all seasons.

Incident Management Assistance Teams

The Type II Incident Management Assistance Team (IMAT) is currently deployed in response to and recovery from Post-Tropical Cyclone Sandy. Estimated return date is to-be-determined (TBD).

In addition however, the Region continues to maintain multiple Type III IMATs which are capable of deployments within Region VII.

Joint Field Offices

As of this report, Region VII has **no** active Joint Field Offices (JFO) within any of its four states (Iowa, Kansas, Missouri, and Nebraska). However, the Temporary Housing Staging area in Neosho, MO remains operational.

Declaration Analysis Supplement*

Because ENSO phases bring about different weather patterns, various types of weather phenomena or weather related hazards occur during each phase. Tables 2-7 below, break down FEMA declaration data by state within Region VII and ENSO phase (*El Niño*, *La Niña*, and *ENSO neutral*) in order to determine which weather related declarations are more prevalent during each phase of the ENSO cycle.

For this analysis the two datasets utilized were the NOAA/NWS/CPC ENSO historical data along with the official declarations dataset from FEMA which includes declarations prior to 1979 (FEMA's creation), as well as FEMA declarations including major declarations (DR), fire suppression or management (FS or FM) and emergency declarations (EM). The analysis period of May 1953 to present was used for analysis as the ENSO data extends back to 1950, but the declaration data only dates back to May 1953.

During the time period analyzed, there were **216** weather related declarations issued within Region VII. Table 2, shows the total number of declarations for each state and per each ENSO phase. There was an almost equal distribution of declarations for each ENSO phase (~33% per phase) and state (~25% per state).

	IA	KS	MO	NE	
El Niño	21	15	11	11	58 (27%)
Neutral	16	17	26	25	84 (39%)
La Niña	14	20	24	17	75 (35%)
	51	52	61	53	216

Table 3: Declarations per ENSO event type by state

Regional Overview

Overall, 46% of the declarations issued for the region were for severe storms while flooding followed closely with 34%. Tornadoes came in third with 9% of the declarations issued while ice storms (4%), fires (3%), snow events (2%), and drought (1%) accounted for the remaining 10% (Table 4). Severe storms were the most issued declarations during both La Niña and ENSO neutral conditions, with 74% and 43% respectively while flooding was the most issued declaration during El Niño's with 36%. Conversely, flooding was the second most issued declaration during both La Niña's and ENSO neutral conditions, with 28% and 36% respectively while severe storms was the second most issued declaration during El Niño's with 28%.

	El Niño	La Niña	Neutral	
Drought	3 (4%)	0	0	3 (1%)
Fire	0	4 (7%)	3 (4%)	7 (3%)
Flood	27 (36%)	16 (28%)	30 (36%)	73 (34%)
Severe Storm(s)	21 (28%)	43 (74%)	36 (43%)	100 (46%)
Severe Ice Storm (s)	1	5 (9%)	3 (4%)	9 (4%)
Snow	3 (4%)	1	1	5 (2%)
Tornado	3 (4%)	5 (9%)	11 (13%)	19 (9%)
Total	58 (27%)	75 (39%)	84 (35%)	216

Table 4: Declarations for the Region per ENSO event type and incident type

Tornadoes are third, accounting for 13% during ENSO neutral, 4% during El Niño and tied with ice storms at 9% during La Niña events. Issued during La Niña's and ENSO neutral conditions, fires accounted for 7% of declarations issued during La Niña's and tied with ice storms at 4% during ENSO neutral conditions. Snow and drought declarations were most prevalent during El Niño's at 4% each with all drought declarations issued during El Niño's. Additionally, there was one snow declaration each during La Niña and ENSO neutral conditions, with one ice storm declaration during an El Niño.

Iowa

Overall, the most declarations in Iowa were for flooding accounting for 45% with severe storms close behind at 37%. For El Niño events, flooding had the highest number of declarations with 11 followed by severe storms with 6. Additionally, there were also 3 snow and one drought declaration. During La Niña events, severe storms had the most number of declarations with 7 followed closely by flooding with 5. There was also one declaration each for a tornado and an ice storm. ENSO neutral conditions were split between flooding with 7 and severe storms with 6 declarations. The other 3 declarations issued for Iowa during ENSO neutral conditions were for tornadoes.

	El Niño	La Niña	Neutral	
Drought	1	0	0	1
Fire	0	0	0	0
Flood	11	5	7	23 (45%)
Severe Storm(s)	6	7	6	19 (37%)
Severe Ice Storm (s)	0	1	0	1
Snow	3	0	0	3
Tornado	0	1	3	4
Total	21	14	16	51

Table 5: Declarations for Iowa per ENSO phase and incident type

Kansas

56% of the declarations for Kansas were issued for severe storms followed by flooding at 25%. In El Niño events, declarations were split between flooding with 6 and severe storms with 7. The only other 2 declarations issued during El Niño events were for tornadoes. During La Niña events, severe storm declarations were the most prominent with 13. There were also two declarations each for fires, floods, and tornadoes. Severe storms had the highest number of declarations with 9 followed by flooding with 5 for ENSO neutral conditions, with 2 for tornadoes and 1 for an ice storm.

	El Niño	La Niña	Neutral	
Drought	0	0	0	0
Fire	0	2	0	2
Flood	6	2	5	13 (25%)
Severe Storm(s)	7	13	9	29 (56%)
Severe Ice Storm (s)	0	0	1	1
Snow	0	0	0	0
Tornado	2	2	2	6
Total	15	20	17	52

Table 6: Declarations for Kansas per ENSO phase and incident type

Missouri

Severe storms accounted for the most declarations overall with 48% followed by flooding at 31%. In El Niño events, flooding had the highest number of declarations with 5 followed by severe storms with 3. Additionally, there was one declaration each for a tornado, ice storm and drought. During La Niña events, severe storms had the most number of declarations with 15. Flooding came in second with 4, followed closely by ice storms with 3. There was also one declaration each for a fire and a tornado. ENSO neutral conditions were split between severe storms with 11 and flooding with 10 declarations. The other 5 declarations that were issued for Missouri during ENSO neutral conditions were for tornadoes with 3 declarations and ice storms with 2.

	El Niño	La Niña	Neutral	
Drought	1	0	0	1
Fire	0	1	0	1
Flood	5	4	10	19 (31%)
Severe Storm(s)	3	15	11	29 (48%)
Severe Ice Storm (s)	1	3	2	6
Snow	0	0	0	0
Tornado	1	1	3	5
Total	11	24	26	61

Table 7: Declarations for Missouri per ENSO phase and incident type

Nebraska

The most declarations issued for Nebraska, were for severe storms at 43% followed by flooding at 34%. In El Niño events, severe storms and flooding were split exactly with 5 declarations each. A drought declaration was the only other declaration issued during an El Niño event. During La Niña events, severe storms had the most number of declarations with 8 followed by flooding at 5. There was also one declaration each for a fire, tornado, ice storm and snow event. Severe storms and flooding were the main declarations issued during ENSO neutral conditions with 10 and 8 respectively. Both fires and tornadoes had 3 declarations each with snow having one.

	El Niño	La Niña	Neutral	
Drought	1	0	0	1
Fire	0	1	3	4
Flood	5	5	8	18 (34%)
Severe Storm(s)	5	8	10	23 (43%)
Severe Ice Storm (s)	0	1	0	1
Snow	0	1	1	2
Tornado	0	1	3	4
Total	11	17	25	53

Table 8: Declarations for Nebraska per ENSO phase and incident type

(*) Disclaimers:

- Analysis is based on FEMA Declarations **only**. Other weather events that did not result in a FEMA Declaration are not accounted for.