

# The U.S. Hazards Assessment

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## Introduction

The U.S Hazards Assessment (Assessment) forecasts potential natural hazards related to climate, weather and hydrologic events to assist emergency managers, forecasters and the public in disaster planning and preparedness. Developed in 1997 by Edward O'Lenic of the Climate Prediction Center (CPC), this product was developed as an early warning/monitoring tool after a strong El Niño in the winter of 1997-1998 caused considerable economic losses in the U.S. and elsewhere. Initially developed for extreme precipitation events, this product now includes temperature, wind, flooding, drought, wildfire, and ocean waves. This article describes the product and how it assigns hazard risks and the future development of the U.S. Hazards Assessment.

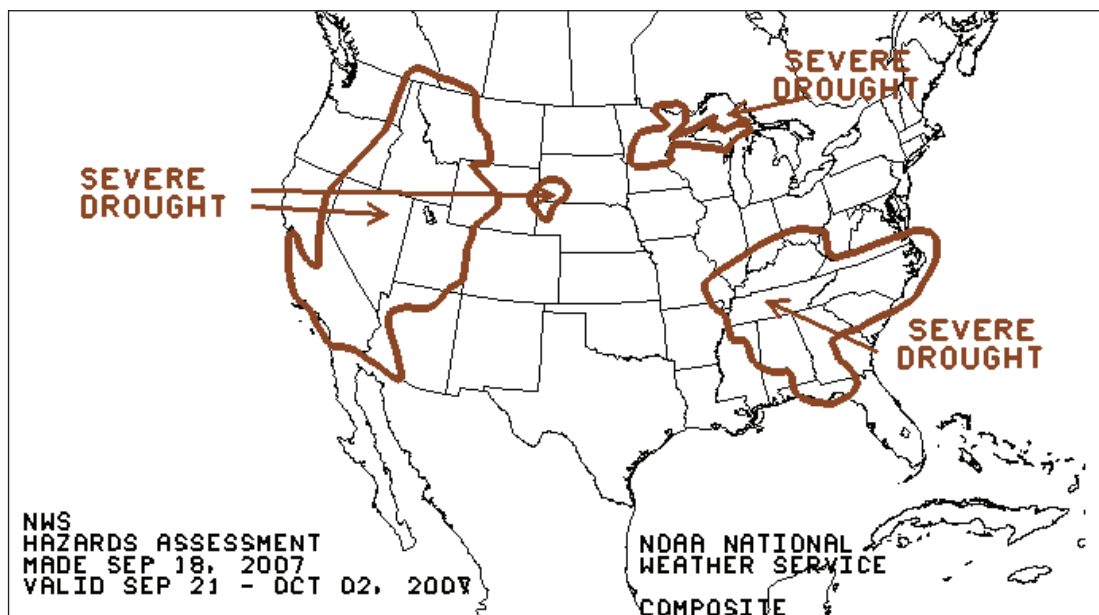
## Hazards Assessment Map & Discussion

The Assessment is a weekly forecast map for the continental U.S. depicting potential weather-related hazards for the next 3-14 days (Figure 13). To develop the assessment, CPC forecasters use current conditions, official NWS medium- (3-7 day), extended- (8-14 day), and long- (1-month and 3-month) forecasts, and more than 15 other climatic and hydrologic products from NWS River Forecast Centers, USGS, the NWS Storm Prediction Center, and the NRCS. The Assessment designates risk areas for seven hazard categories: extreme precipitation, temperature, wind, drought, flood, wildfire, and wave events. A composite

map shows different colored areas indicating the location and type of hazard forecasted; individual maps also are issued for each hazard category. A text discussion of current and projected conditions supplements the maps, and describes the hazards in the context of seasonal or long-term climate behavior. The latest maps, discussion, and information on methodology and applications are on the CPC Hazards Assessment website (see On the Web box).

## Classification of Natural Hazard Risk

Hazard risk is based on threshold criteria, climatic and hydrologic data and projections, and user input. Threshold criteria are the basic framework of the Assessment. Based on analysis of historical data and trends, a specific value or set of conditions is assigned as the threshold criteria for each natural hazard category (Table 13). Risk is assigned when projected conditions exceed threshold criteria determined for each hazard category. For some hazards, such as wildfire and waves, where historical data are not always available to create thresholds, expert judgment by the forecaster supplements information gaps. The threshold criteria are not absolute in assigning risk; threshold values may be lowered when pre-existing conditions are expected to exacerbate the forecasted event. For example, the threshold value for characterizing precipitation risk is forecasted events in the 95th percentile.



**Figure 13:** According to the U.S. Hazards Assessment composite map for September 21-October 2, 2007, risk of severe drought across the West, the Southeast and in Minnesota and Michigan is the only hazard assigned at this time.



However, in regions that are already experiencing saturated soils and above average precipitation, hazard forecasters could lower the precipitation threshold value to the 90th percentile or below for the forecasted period.

Climate and hydrologic processes are not uniform across the nation, so hazard forecasters select products that best characterize risk for a given region. For example, the causes of flooding are different in the eastern and western parts of the U.S. In the east, there is a higher risk of flooding year-round after above average precipitation falls in a short amount of time, while in the intermountain west, flooding risk is most pronounced in the spring if above average temperatures result in rapid snowmelt. Therefore, forecasters look at different weather parameters to determine flood risk in different parts of the country. When possible, Hazard forecasters place predicted weather events in the context of ongoing climate events, such as ENSO (El Niño Southern Oscillation), MJO (Madden-Julian Oscillation) and NAO (North Atlantic Oscillation), all of which can impact the frequency and strength of weather events over the continental United States. As a result, hazards are assigned, to some degree, based on expert analysis of conditions by the forecasters.

The risk of specific hazards is not assigned until forecasters gather input from agencies and users. Each Wednesday at 2 p.m. Eastern Time, a hazards forecaster hosts a conference call open to agencies, forecasters, or anyone interested in providing input into the upcoming Assessment. These calls give users and forecasters the opportunity to discuss the Assessment, to exchange ideas, and to respond to mutual concerns, questions, and comments from others in the community. Very often, users' suggestions are incorporated into the product. For example, user group input prompted including wildfire as a permanent risk category. To participate in weekly teleconferences, call 888-590-4933, (participant code: 3994107), Wednesday at 2:00 PM Eastern Time.

**Future Development**

The CPC is continually improving the Assessment. Edward O'Lenic, developer and director of the Assessment program, says that assigning probabilities of occurrence to each hazard category is an important next step, and they hope to begin adding probabilities to heavy precipitation forecasts. CPC would also like input from anyone who has ideas for enhancing the quality or utility of the product. You can contact the CPC about this product by calling during the weekly conference call or email Edward O'Lenic at Ed.Olenic@noaa.gov.

Natural Hazard Category	Threshold Criteria	Threshold Criteria Lowered When:
<b>Precipitation</b>	Events in the 95th Percentile	<ul style="list-style-type: none"> <li>• Flooding</li> <li>• Heavy Mountain Snow</li> <li>• Saturated Soils</li> </ul>
<b>Temperature</b>	Events that fall in the upper and lower 1/8th of the distribution (upper/lower 12.5%)	<ul style="list-style-type: none"> <li>• Fire</li> <li>• Warm Season + Low RH (Relative Humidity)</li> <li>• Cold Season + Wind</li> </ul>
<b>Wind</b>	34 mph winds for 1 hr 58 mph gusts	<ul style="list-style-type: none"> <li>• Fire</li> <li>• Heavy Snow</li> <li>• Extreme Cold</li> </ul>
<b>Drought</b>	D2 Drought Monitor classification (Severe Drought)	
<b>Flood</b>	USGS Flood Criteria	• Heavy Precipitation
<b>Wildfire</b>	D2 Drought Monitor classification during April-October	<ul style="list-style-type: none"> <li>• Dry Lightning (thunderstorms which produce no rain at the surface)</li> <li>• High Winds</li> <li>• Extreme Heat + Low RH</li> </ul>
<b>Waves</b>	Long Fetch (A large area in which ocean waves are generated by the wind)	• Strong on-shore Flow through Several Tidal Cycles

**Table 13:** U.S. Hazards Assessment threshold criteria for assigning risk are based on occurrence of extreme events for each hazard category (See the Notes for detailed explanation). Threshold values are lowered when current conditions in column three are present.

**On the Web**

- Weekly Hazard Assessment map and discussion: <http://www.cpc.ncep.noaa.gov/products/predictions/threats/index.html>.

