CICSS
Cornell Institute for Climate Smart Solutions

Drought Newsletter

Issue 1, Vol. 1, March, 2017

Key Points:

- Drought conditions from last summer have mostly subsided, or will soon, across much of the Northeast (Figs. 1 and 2).
- In response to farmer surveys after the summer drought of 2016[1], we have begun developing a historical drought database.
- Our "drought atlas" covers New York State (NYS) and Northeast (NE), and includes drought information at 2.5mi resolution at monthly scales going back to 1950.
- Regular updates will be provided to this "NYS/NE Drought Atlas." Seasonal forecasts will also soon be added to generate a seamless monitoring and prediction tool.

During the summer of 2016, farmers and growers in NYS and the Northeast endured drought conditions that haven't been seen in this region for over a decade. In a survey conducted by Drs. Sweet and Wolfe (School of Integrative Plant Sciences, Cornell University), farmers reported—on average—yield losses of between 30% and 50% for field, pasture, fruit, and vegetable crops[1]. Some farms fared even worse, with losses of fruit and vegetable crops exceeding 90%.

In response to feedback from farmers, the Cornell Institute for Climate Smart Solutions (CICCS) and the Emerging Climate Risk Lab (ECRL) have partnered to develop a high-resolution drought monitoring and prediction product for NYS and the Northeast. Initial results from this effort are available online at: ecrl.eas.cornell.edu/Misc/NEDrought/ne-drought-atlas. Currently, maps of historical conditions from 1950-present are available for the entire region, and county level time series can be downloaded for NYS.

We have begun developing our NYS/NE Drought Atlas using the "Palmer Drought Severity Index" (PDSI). This index was originally developed in the 1960s to characterize relative anomalies in soil moisture in the central plains[2]. Since then, it has become one of the most widely used tools for drought monitoring and scientific research across North America.

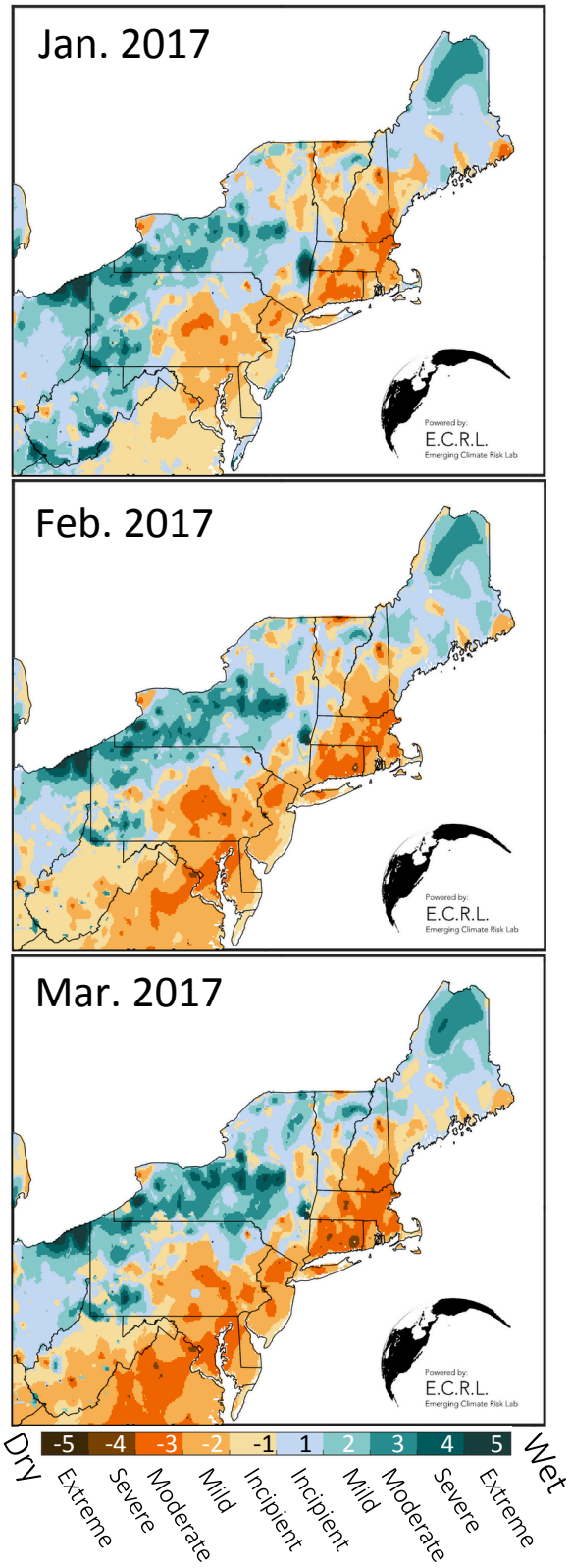

Figure 1. NYS/NE Drought atlas maps from the first three months of 2017.

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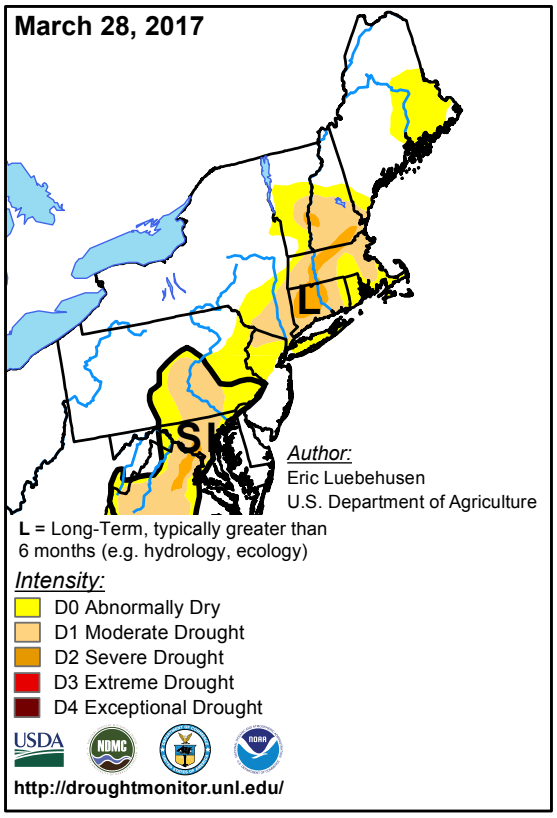

Figure 2. US Drought monitor map for the Northeast (http://droughtmonitor.unl.edu/).

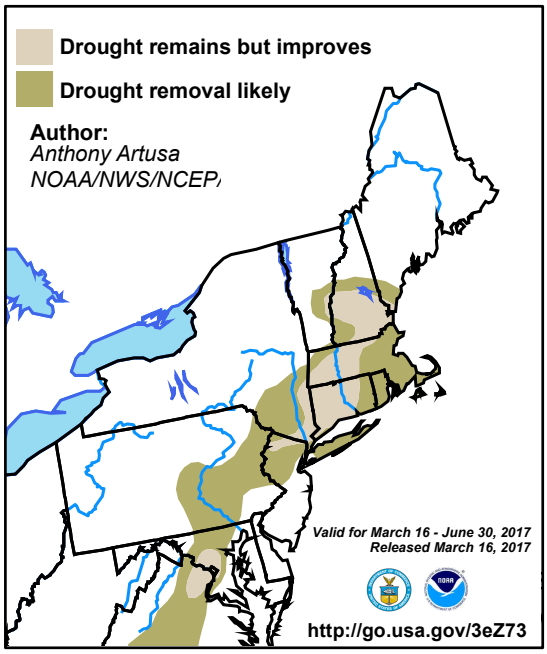

Figure 3. Seasonal drought outlook from the National Weather Service's Climate Prediction Center.

The PDSI's usefulness stems from its consistency across space and through time. That is, soil moisture levels that are considered "normal" will necessarily be different from one region to another because of differences in local climates and soil characteristics. The PDSI factors in this regional variation in climate and soil type to produce an index of local drought conditions. For example, PDSI levels below -4 characterize "extreme drought" whether these values are observed in, say, the Adirondacks or the Hudson River Valley (which have inherently different climates and soils). Likewise, PDSI values above 4 would indicate extreme wet conditions. In this sense, the PDSI can be thought of as a normalized "proxy" for local soil moisture content.

According to our PDSI calculations, conditions across much of NYS have been somewhat wetter than normal for the first part of 2017 (Fig. 1), although drought conditions remain in the southeastern portion of most states in the domain. This picture agrees well with the US drought monitor (Fig. 2), which is produced each week from regional reports and satellite remote sensing, among other indicators. Our drought atlas differs from the US Drought monitor in that it: (1) is quantitative, not qualitative, (2) tracks wet and dry conditions alike, and (3) is produced at farm-scale (2.5mi) spatial resolution.

As spring unfolds, the regions still experiencing drought are expected to see some relief (Fig. 3), according to the US Seasonal Drought Outlook from the National Weather Service's Climate Prediction Center. We will update this picture in June with our next newsletter, and the release of seasonal forecast information linked to our drought atlas.

References cited:

[1] https://blogs.cornell.edu/cicca/files/2015/02/CICSS-RPB-Drought-Survey-v3-126h0si.pdf

[2] Palmer, W. C., 1965: Meteorological drought. U.S. Weather Bureau Research Paper 45, 58 pp.

[3] Alley, W. M., 1984: The Palmer Drought Severity Index: Limitations and assumptions. J. Climate Appl. Meteor., 23, 1100–1109.

[4] http://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.php

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