

# Guidance for Freeze Warnings: Mapping Potential Freeze Susceptibility versus Forecast Freezing Temperatures

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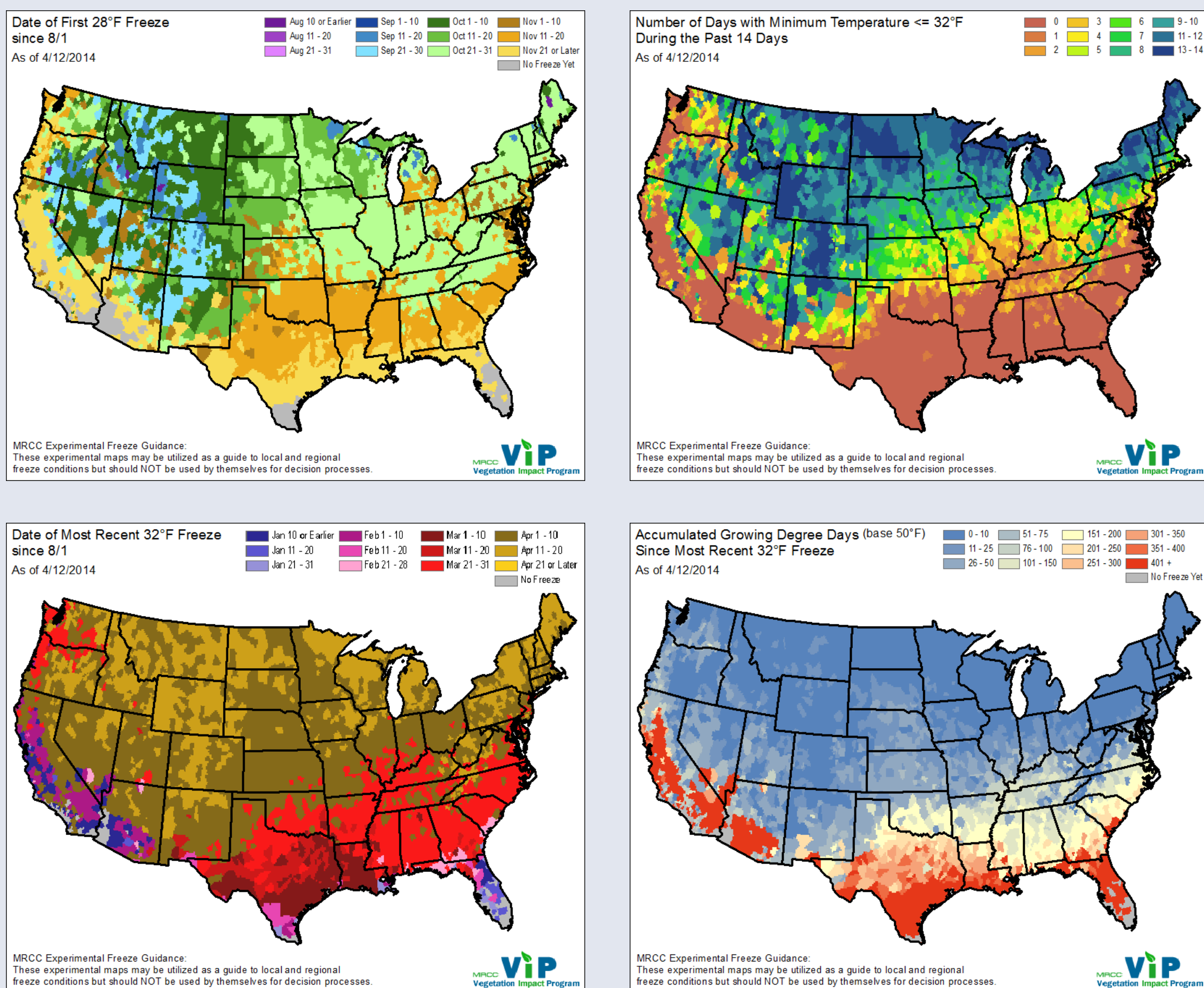
The Midwestern Regional Climate Center (MRCC) is providing collaboration among weather forecasters, University Extension specialists, state climatologists, and other vegetation experts to improve communication about the state of vegetation and its susceptibility to potentially damaging low air temperatures.

The Vegetation Impact Program (VIP) is a monitoring, assessment, and networking program hosted by the Midwestern Regional Climate Center. Major impacts on vegetation are often driven by weather and

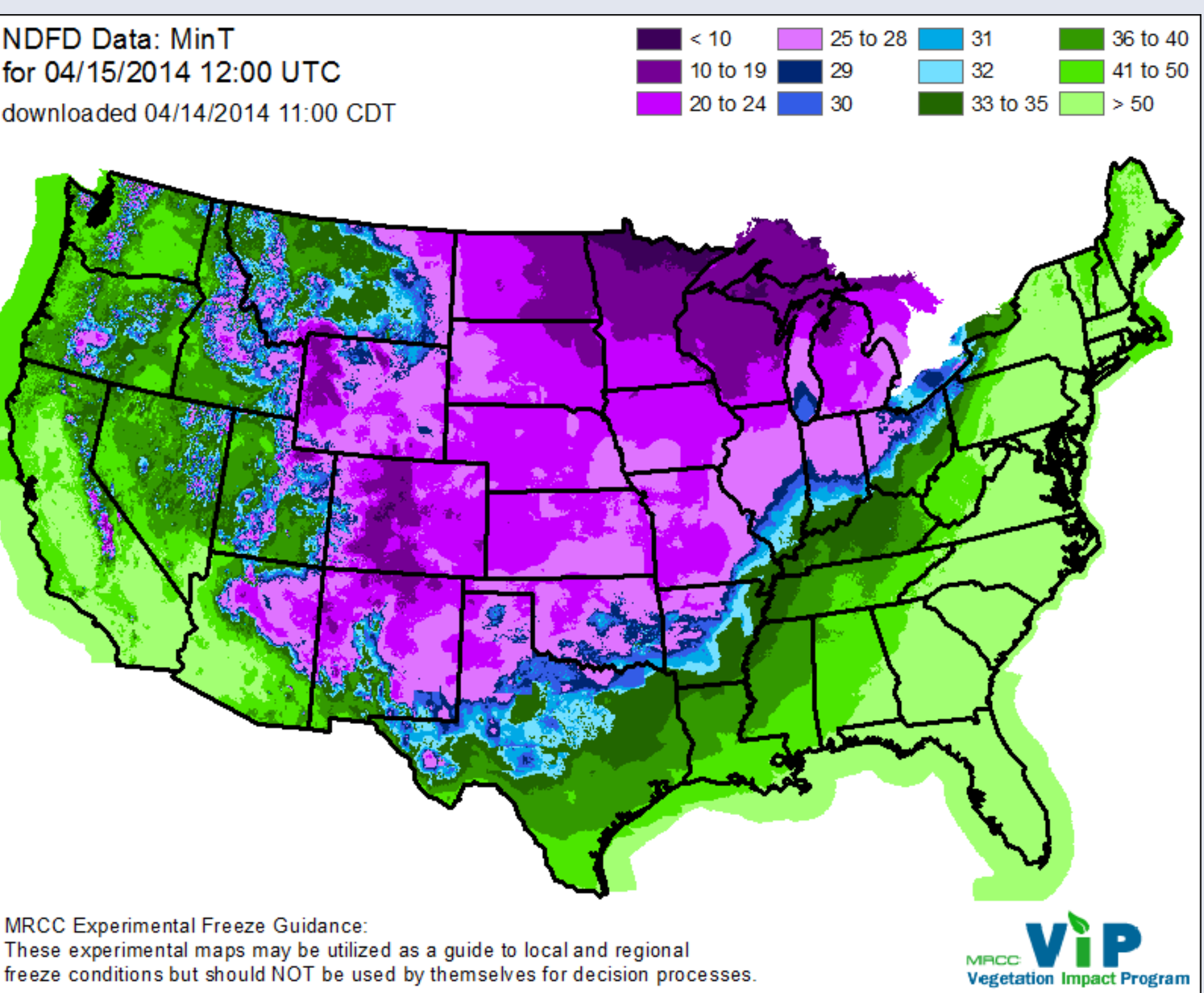
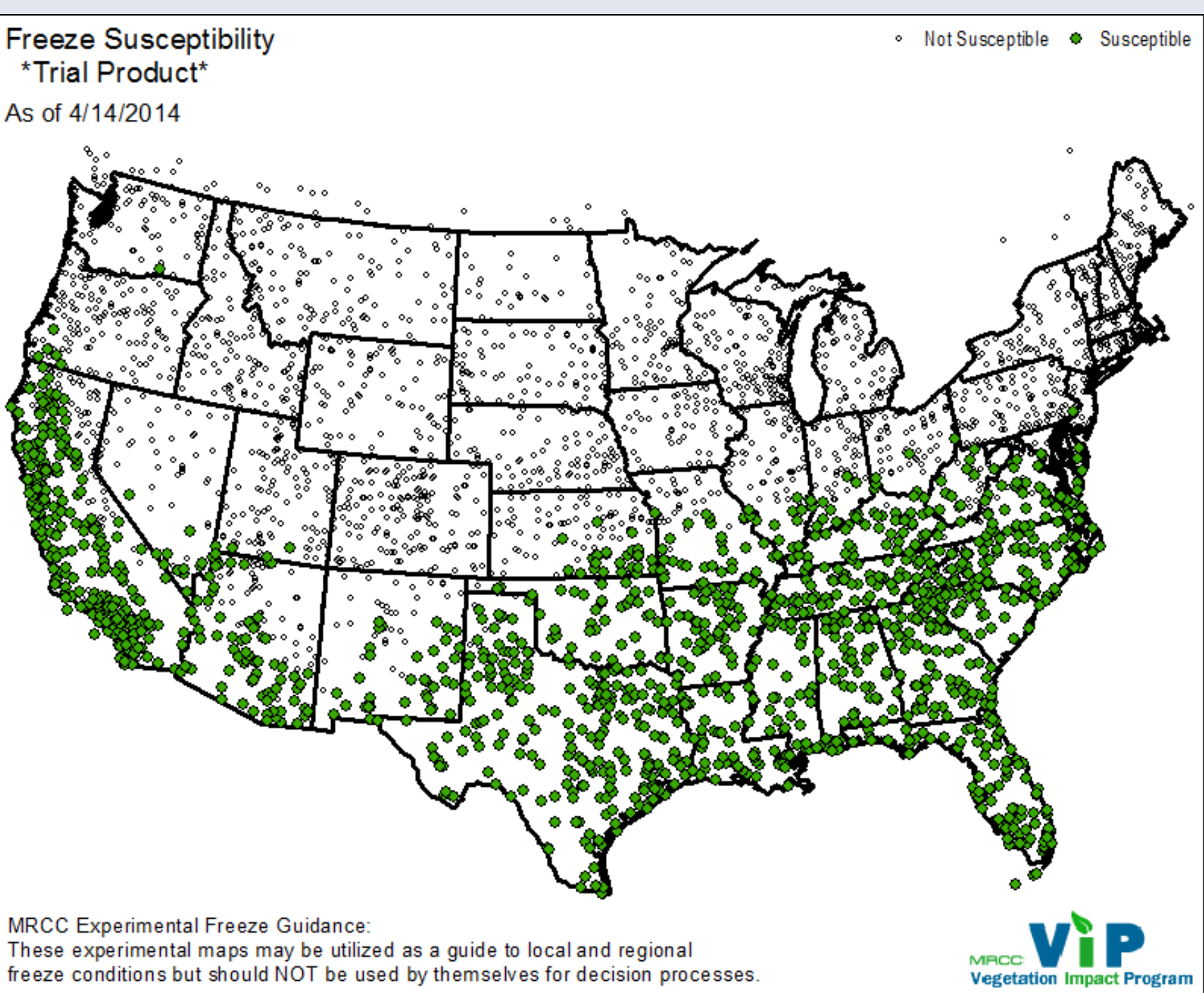
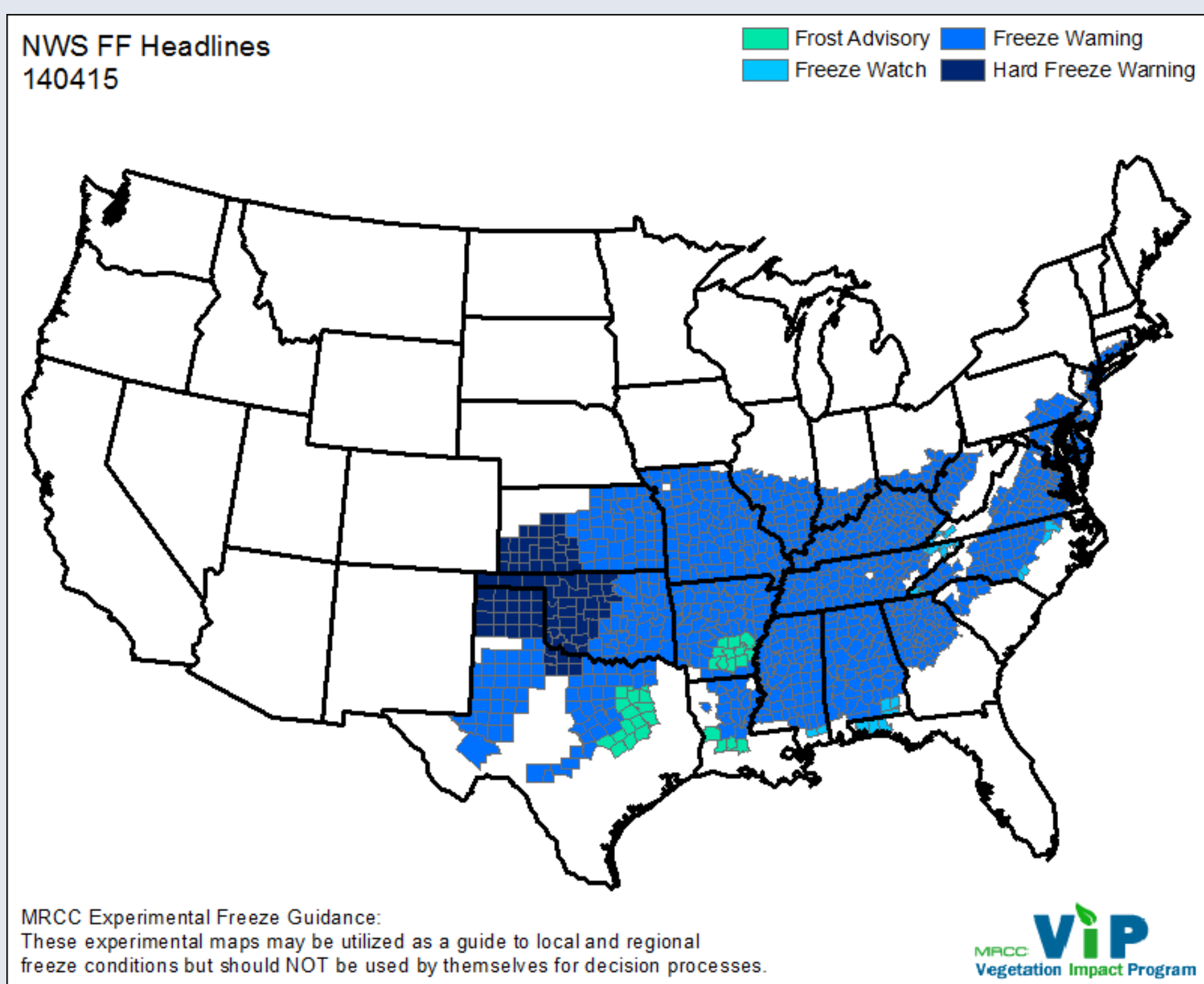


climate conditions. For example, damaging frost events, drought, and even flooding can impact vegetation in areas of agriculture, horticulture, nurseries, or home gardening. Pests and disease are also driven by environmental conditions.

The VIP integrates online climate monitoring information, weather and climate outlooks, and stakeholder input to provide a suite of resources that can help minimize negative vegetation impacts, mitigate climate variability effects, and develop adaptation plans to better prepare for extreme and ever-changing environmental conditions.



## CASE 1: FREEZE WARNINGS IN KANSAS AND MISSOURI



## POTENTIAL FREEZE SUSCEPTIBILITY

We are attempting to construct an index that, from recent weather conditions, indicates where conditions may be susceptible to freeze impacts. This index would indicate that no forecaster input would be needed if the index indicates not susceptible and that forecasters would use their expert knowledge to determine whether or not to issue warnings if the index indicates susceptible. Therefore, we want all marginal cases to be categorized as susceptible so that marginal cases would lead to further inspection by the forecasters.

For the 2013-2014 season, we started with a simple set of criteria which were selected by a group of climatologists at the MRCC. The system starts all stations as susceptible and then passes through

marking stations as not susceptible if any of these four criteria are met:

- Max Temperature <= 32°F once in past 7 days
- Min Temperature <= 24°F once in past 7 days
- Min Temperature <= 28°F thrice in past 7 days
- GDD50 Accumulation <= 75 in past 14 days

Some issues with the criteria have cropped up in the current season. One issue is that the GDD criteria, which causes not susceptible to occur in the fall before the first freeze if temperatures are in the 40s and 50s for a couple weeks. A fix will be to move the GDD criteria to a second pass which switches back to susceptible if the GDD accumulation is greater than 75 units since the last freeze or 14 days, whichever is less. Two spring cases highlighting additional issues

that will need to be resolved are shown. In Case 1, freeze warnings were issued across Missouri and eastern Kansas for areas where the index indicated not susceptible and because forecasters are our “truth”, the index needs adjustments. In Case 2, frost advisories were issued across Iowa and into neighboring states where temperatures were forecast to drop only to the middle to upper 30s indicating that the threshold for forecast minimum temperatures needs to include these near freezing temperatures. Case 2 also shows that freeze events (here in western Minnesota and the eastern Dakotas) that occur later in the spring, when climatologically less frequent, may need different criteria to determined susceptibility. We will investigate climatological criteria to account for early fall and late spring freeze susceptibility.

## CASE 2: FROST ADVISORIES IN IOWA AND SURROUNDING STATES

