



Extreme Temperatures

2008 High Plains Conference

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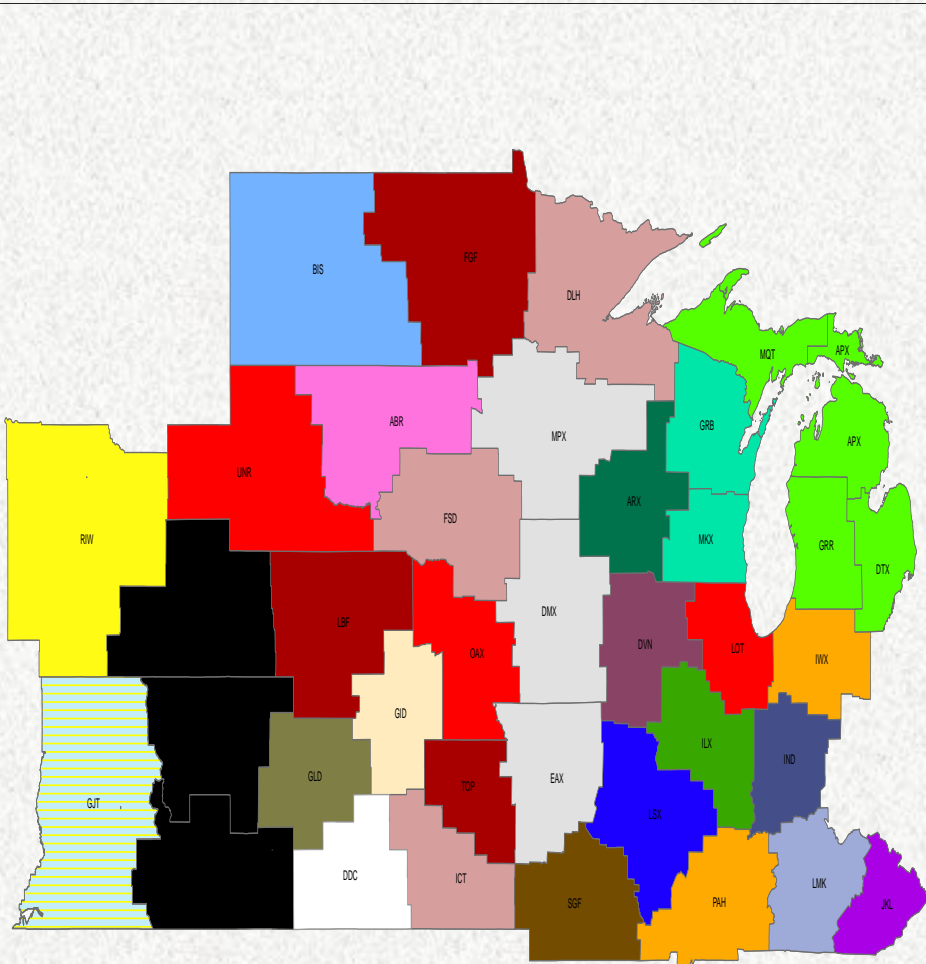
Adam Jones, U. of Oklahoma

“The views expressed are those of the author(s) and do not necessarily represent those of the National Weather Service.”

Purpose

- **Develop climatology of extreme temperature**
 - **Apparent Temperature - capture “feels like” impacts**
 - **Combines heat index and wind chill with temperature**
 - **Apparent temperature forecasts provided in NDFD**
- **Services Issues**
 - **Heat Advisory/Warning Criteria**
 - **Wind Chill Advisory/Warning Criteria**
 - **Consider what a hot/cold day is**

Heat Warning Criteria



Legend

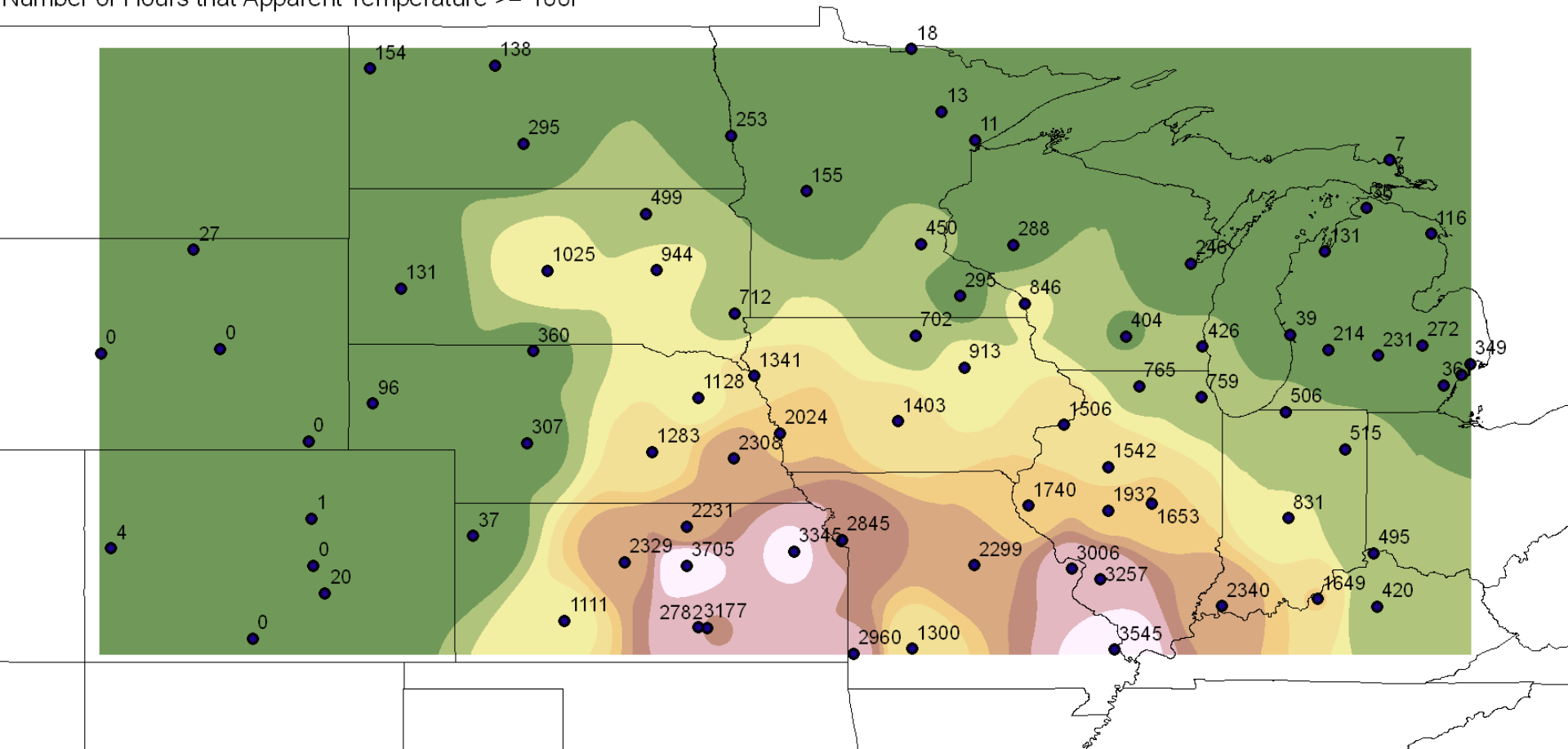
- 3 hours with max HI ≥ 115 °F and min temp ≥ 80 °F (upper 70s)
- max HI ≥ 115 °F for ≥ 3 hrs & min HI ≥ 80 °F during 24 hr period
- Daytime max HI ≥ 110 °F and nighttime min ≥ 75 °F for 2 days
- HI ≥ 115 °F day & ≥ 80 °F at night
- max HI ≥ 110 °F for ≥ 2 days
- Max HI ≥ 110 °F & Min Temp ≥ 75 °F for ≥ 2 days
- HI max ≥ 105 °F & HI min ≥ 75 °F for ≥ 2 days
- HI ≥ 105 °F for ≥ 3 hrs & overnight low ≥ 75 °F for 3 consecutive days
- HI ≥ 115 F for ≥ 3 hrs & minimum temp ≥ 75 F for 24 hrs
- HI ≥ 110 °F for ≥ 3 hrs, continue into night when min Temp ≥ 75 °F
- HI ≥ 110 °F & NIGHTTIME MIN TEMPS ≥ 75 °F FOR AT LEAST 2
- HI ≥ 110 °F for ≥ 3 hrs & nighttime HI ≥ 80 °F for 24 hrs
- Max HI > 110 °F for ≥ 3 hrs & min HI ≥ 80 °F
- HI ≥ 115 °F for 3 hrs & min HI \geq upper 70s
- Max HI ≥ 115 °F for ≥ 3 hrs (no night criteria)
- max HI > 115 °F & min HI ≥ 80 °F for 24 hrs.
- max HI ≥ 115 °F for 3 hrs / 105 °F for 3 days
- max HI ≥ 115 °F & min HI ≥ 75 °F
- max HI ≥ 110 °F for ≥ 3 hrs & min HI ≥ 75 °F for same 24 hour period
- max HI ≥ 110 °F for ≥ 3 hrs & min HI ≥ 80 °F for a 24-hr period.
- max HI ≥ 115 °F for ≥ 3 hrs & min HI \geq upper 70s °F

Approach

- **Create a climatology of Apparent Temperature**
- **NCDC hourly observations used**
 - Last 30 years (1978 through 2007)
 - Focus on Central Region area (initially)
- **Calculated hourly Heat Index (HI) and Wind Chill Index (WCI)**
- **Database apparent temperature data (hourly)**
 - Temperature replaced by HI > 80F
 - Temperature replaced by WCI ≤ 50 F

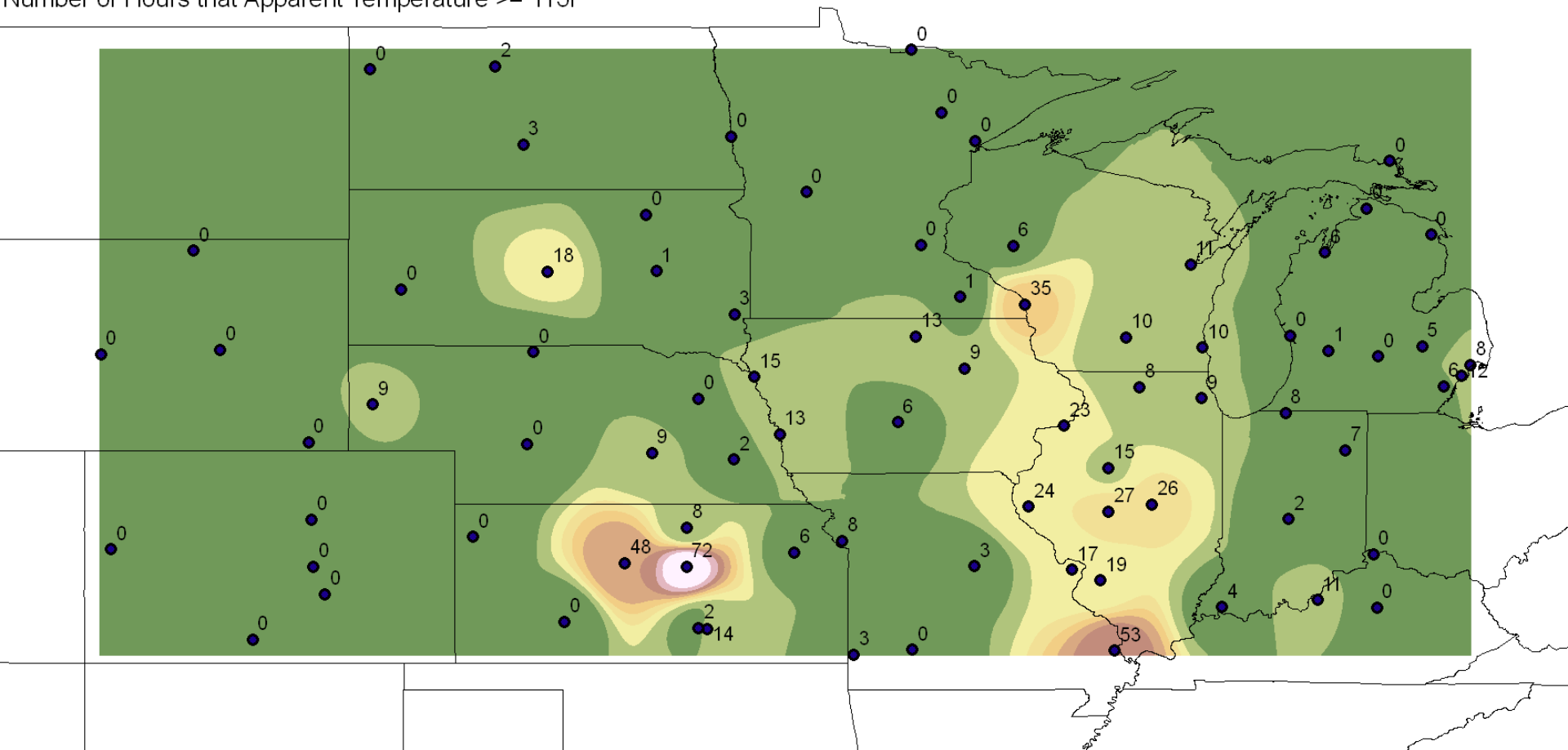
Frequency/Distribution Heat ≥ 100

Number of Hours that Apparent Temperature ≥ 100 F



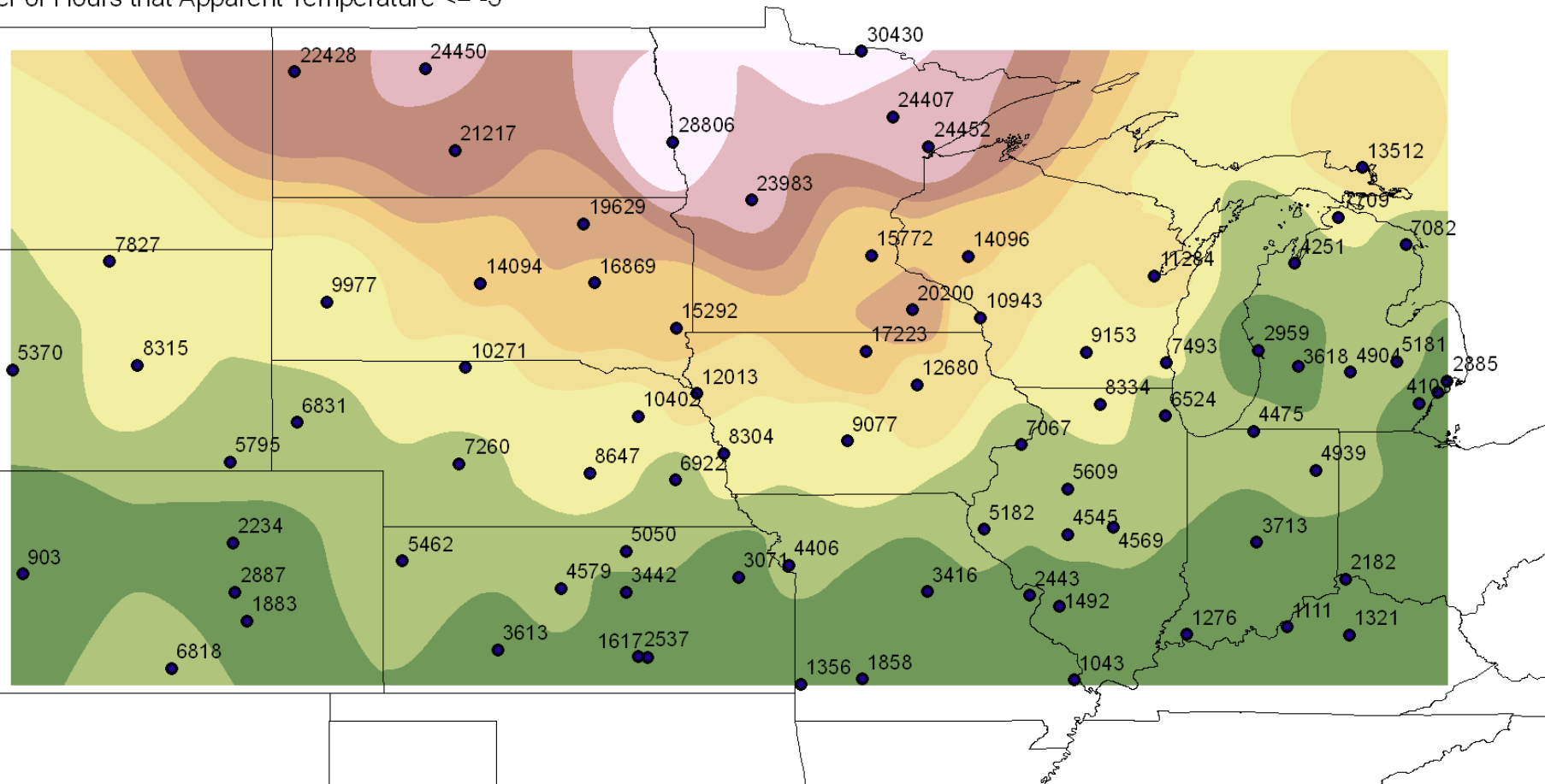
Frequency/Distribution Heat ≥ 115

Number of Hours that Apparent Temperature ≥ 115 F



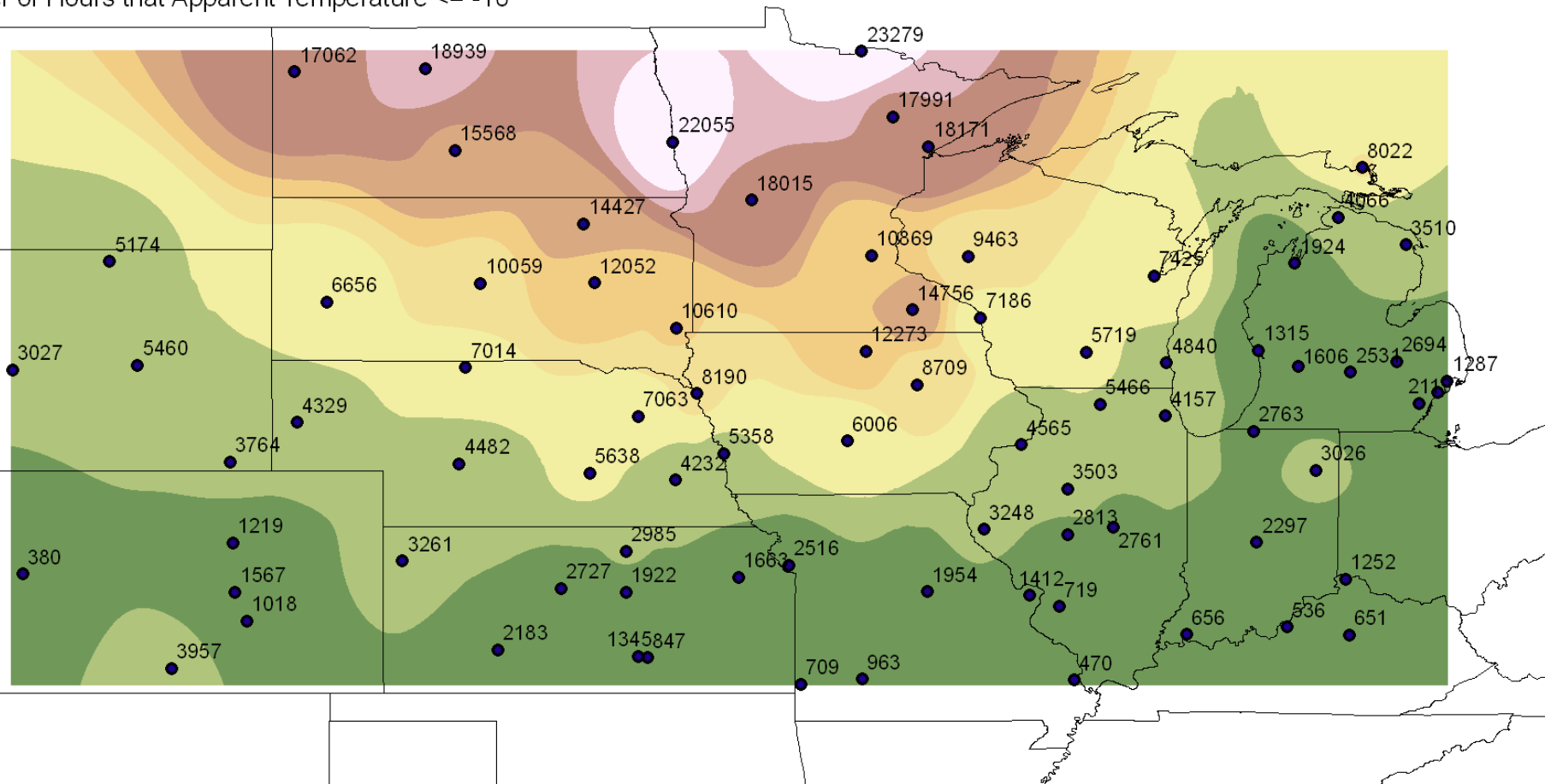
Frequency/Distribution Cold ≤ -5

Number of Hours that Apparent Temperature ≤ -5



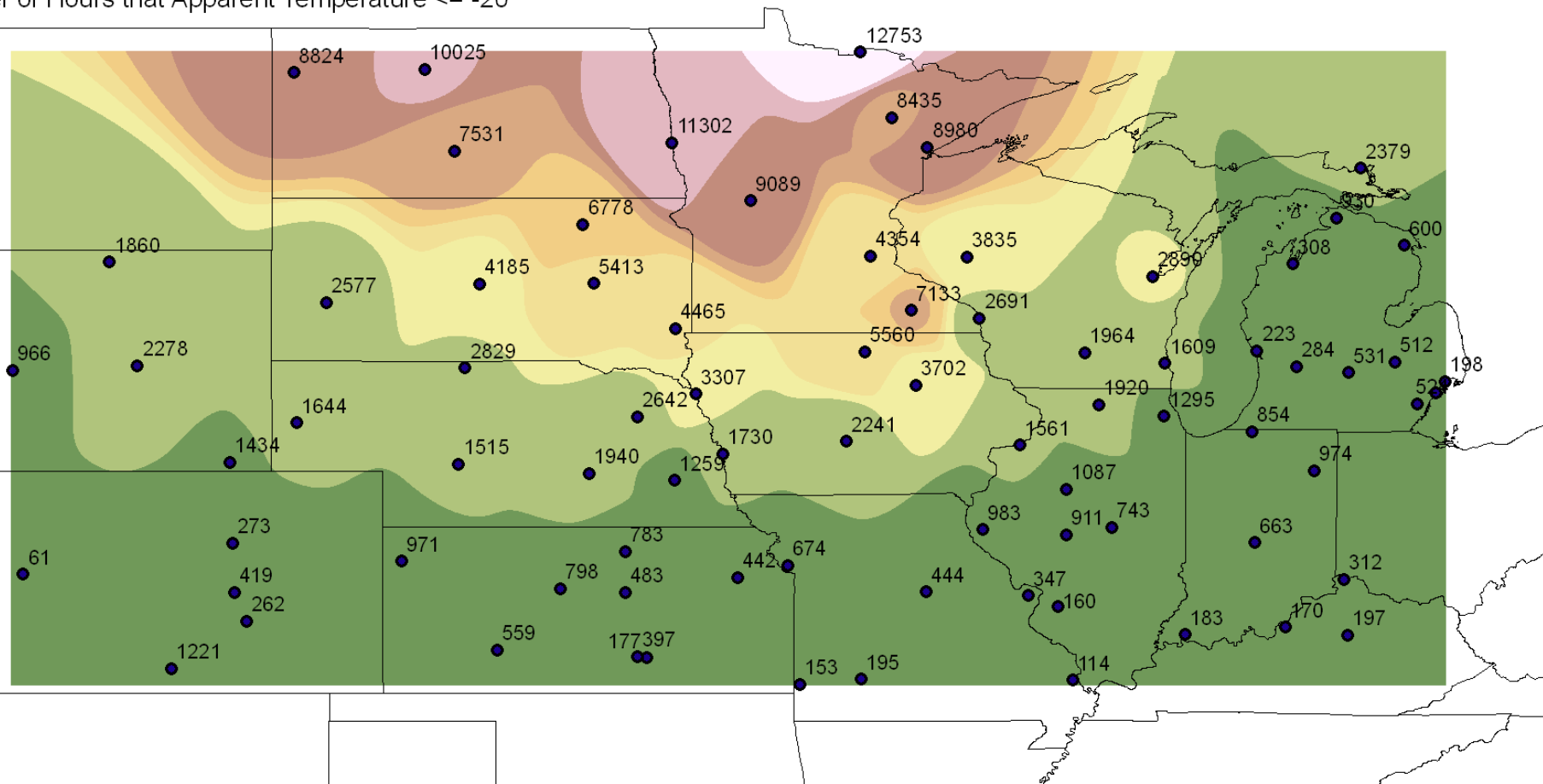
Frequency/Distribution Cold ≤ -10

Number of Hours that Apparent Temperature ≤ -10



Frequency/Distribution Cold ≤ -20

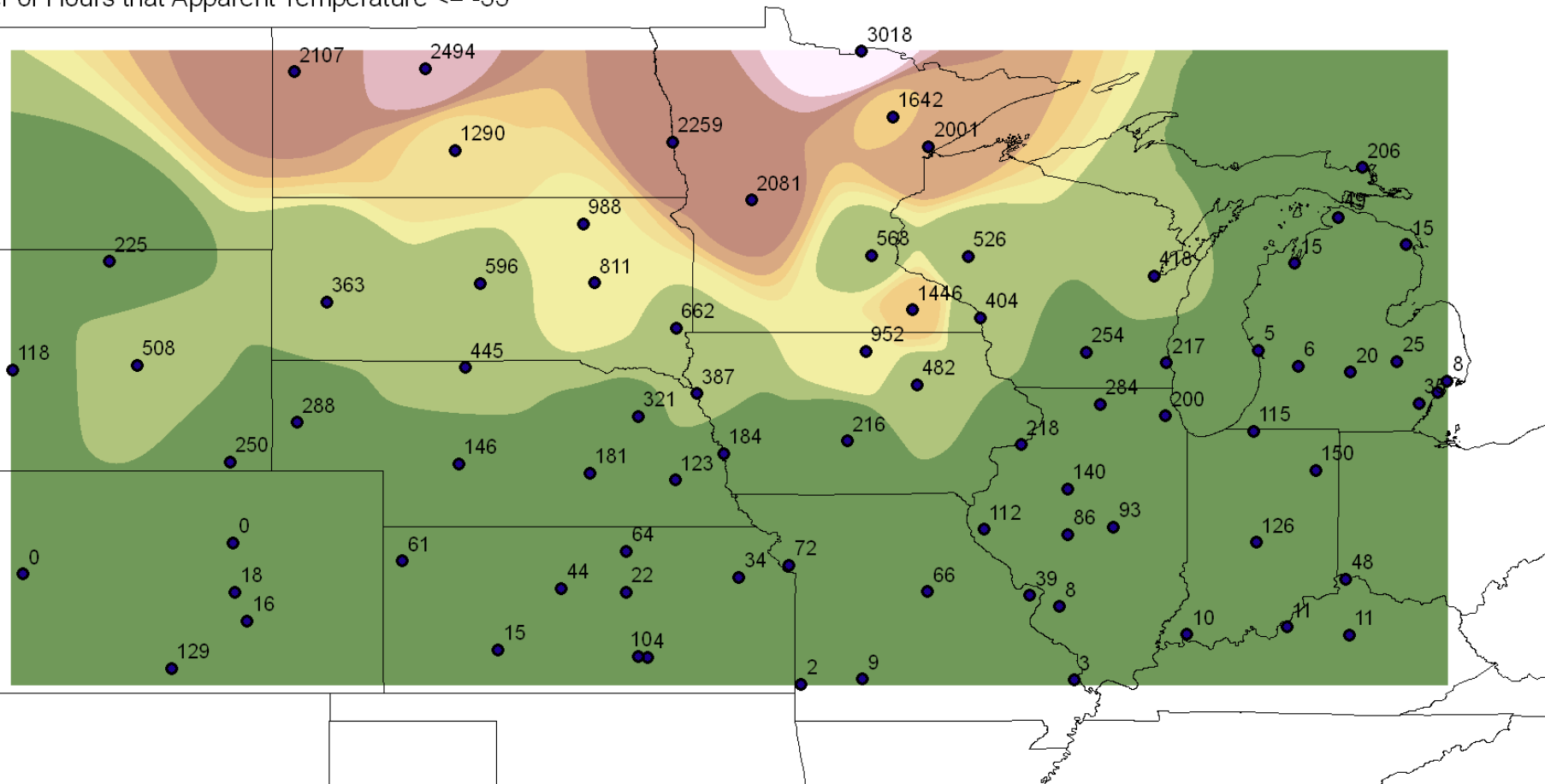
Number of Hours that Apparent Temperature ≤ -20



Frequency/Distribution

Cold ≤ -35

Number of Hours that Apparent Temperature ≤ -35



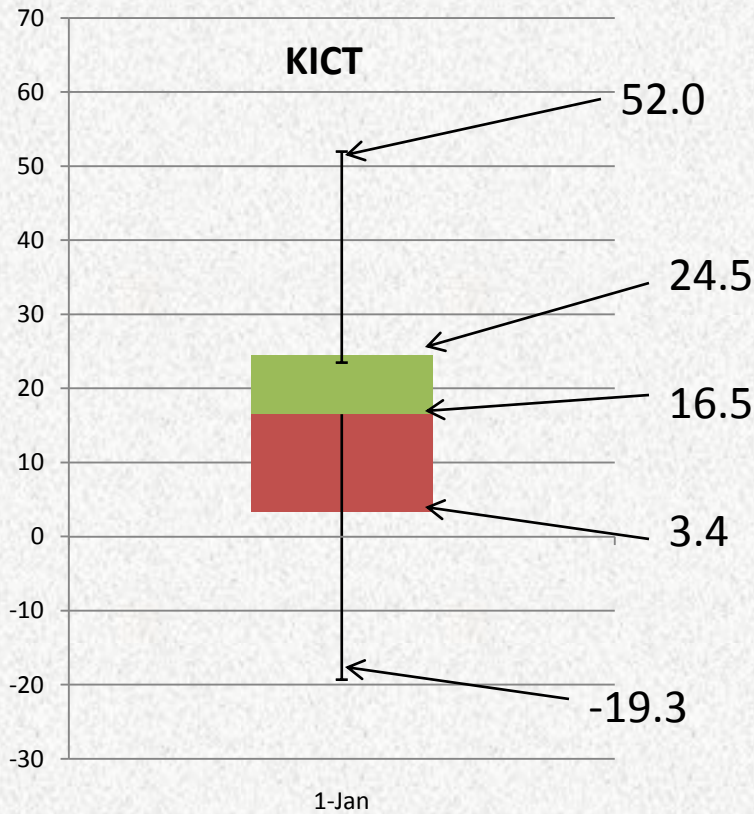
Slicing Bacon

(What to make of this data)

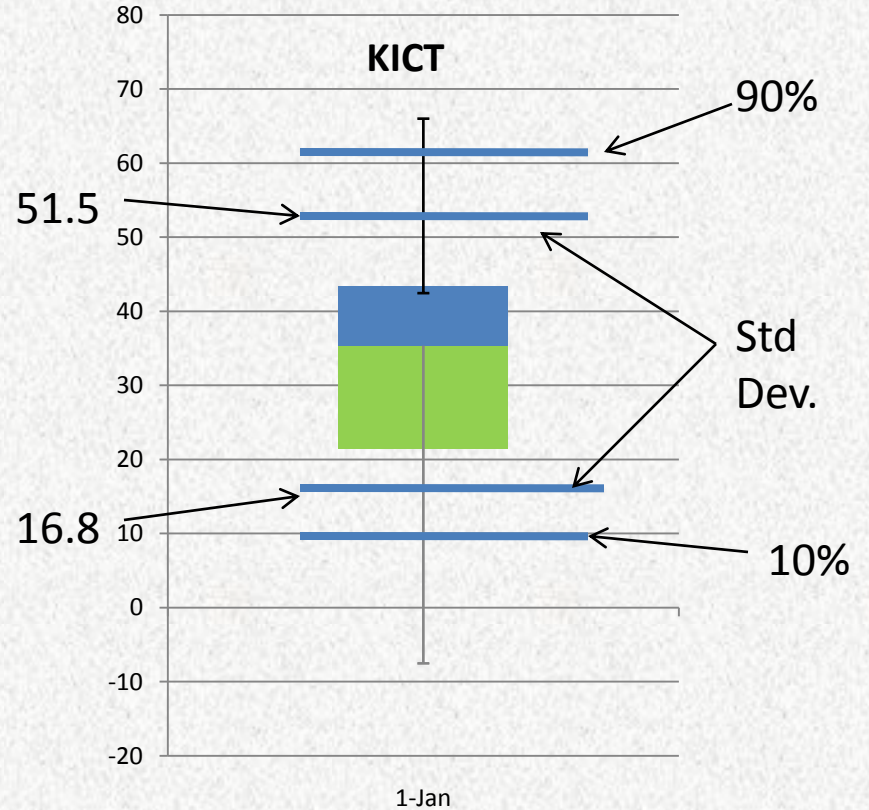
- What is normal (or typical) temperatures?
 - (lupo et. al., 2003)
- What defines extreme (hot or cold)?
 - Time of year variances
 - Seasonal acclimation issues
- What requires an action?
 - NWS advisory and warning issuances

Quartiles

KICT – 1 January



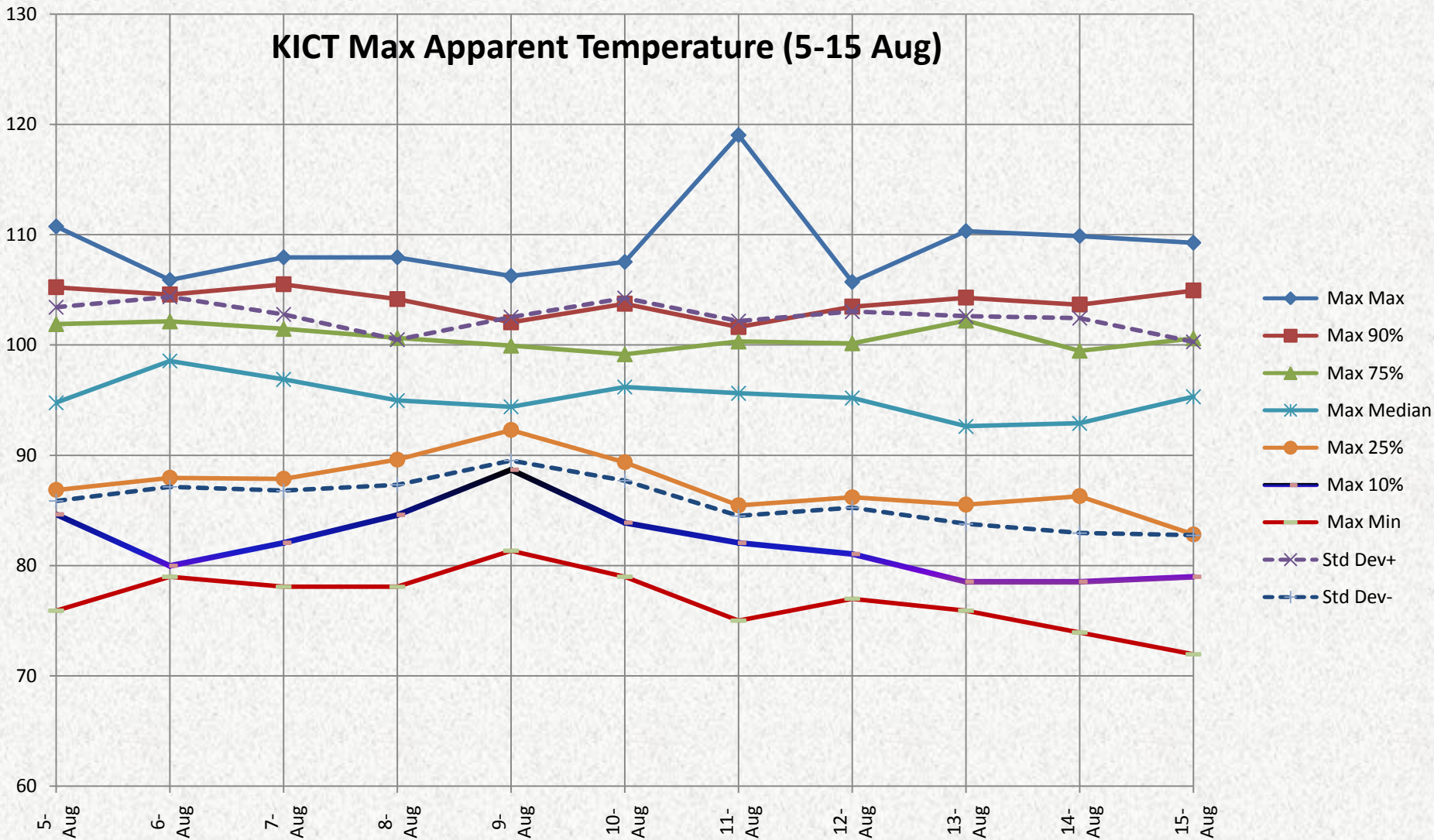
Minimum Apparent T



Maximum Apparent T

Daily Extreme Temp Climo

Example – KGRI (July and August)



Discussion

- Heat and cold impacts and service response
 - Frost bite when WCI < -10F regardless of acclimation
 - Schwerdt, R. W., 1995: Comments on “Wind chill errors”: Part III. *Bull. Amer. Meteor. Soc.*, **75**, **1631-1637**.
 - Social Science
 - Adaption
 - First occurrence of season
 - Seasonal normal (“its always this cold/hot here”)
 - Harvesting

Comments and Questions?