Virtual workshop series: Water Resource Management and Irrigation in Kansas

Natural Resources PFT

Kansas Center for Agricultural Resources and the Environment (KCARE)

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Theme 3: Water Resource Management and Irrigation in Kansas

- Offered as a Professional Development Event in PEARS for county extension agents

- 5 sessions in March and April, 8:30 am to 9:30 am
  - The next session is *March 31, 2021*

- **Zoom Meeting ID: 952 6066 1935, passcode: water**

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Today's format

- **Please mute** your microphones and sign in using the chat.
- Speakers will present for 30-40 minutes
- Panelists will join the discussion at the end
- Please ask questions through the **chat** function.
- Although our "end time" is posted for 9:30 a.m., participants are welcome to remain longer if they want to discuss the topic further.

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Water Resource Management and Irrigation in Kansas

Climate and weather resources to support water decisions

Tuesday, March 30, 2021

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Speakers

Mary Knapp
Climatologist, Kansas State University

Chip Redmond
Assistant Meteorologist, Kansas State University

Panelists

David Hallauer, Meadowlark Extension District
Cody Miller, Phillips Rooks Extension District

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Kansas Weather & Climate

Water Resources Training

March 30, 2021

Mary Knapp, Assistant State Climatologist

Chip Redmond, Assistant Meteorologist

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Weather vs. Climate

- Climate is the weather trend over long periods of time
  - Decades
  - Centuries
- Weather is the day to day state of the atmosphere
  - Short term
  - Immediate impact

Terminology

- “Normals”
  - 30 year averages updated every 10 years
- Serves as baseline to measure change
- Current US “Normals” use 1981-2010
- Updated normal 1991-2020 to be released in May

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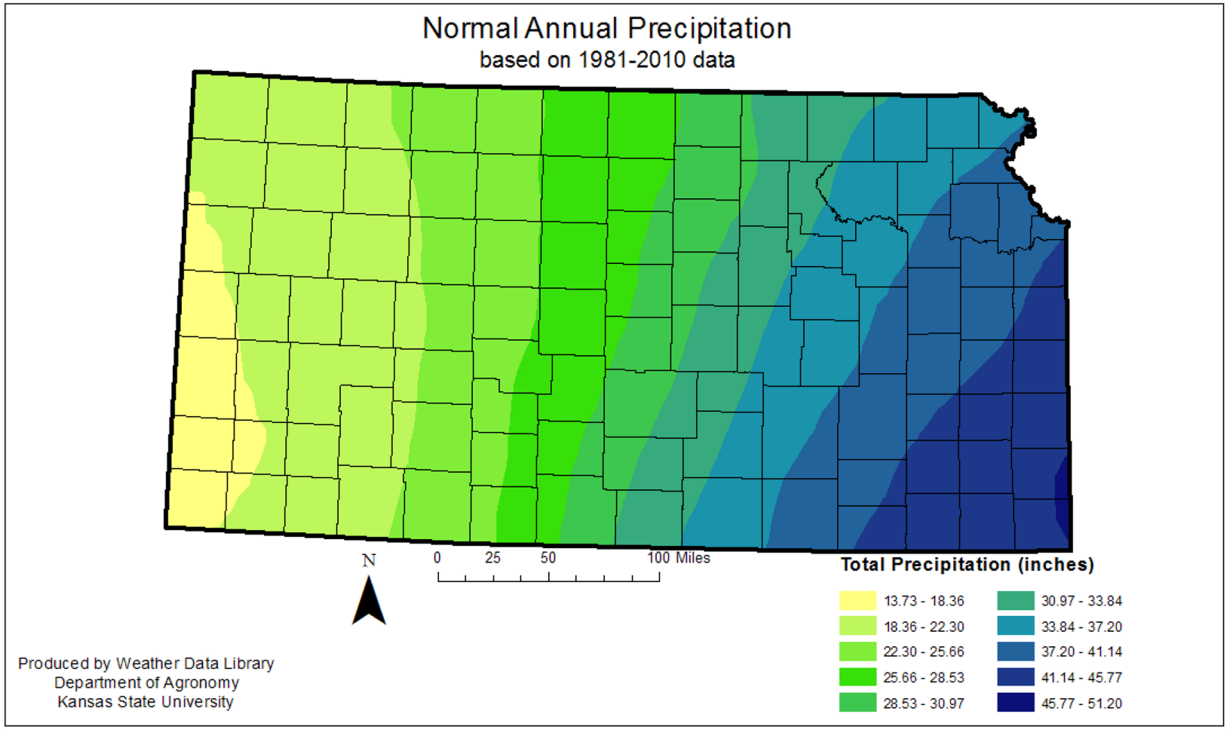
Seasonal Precipitation



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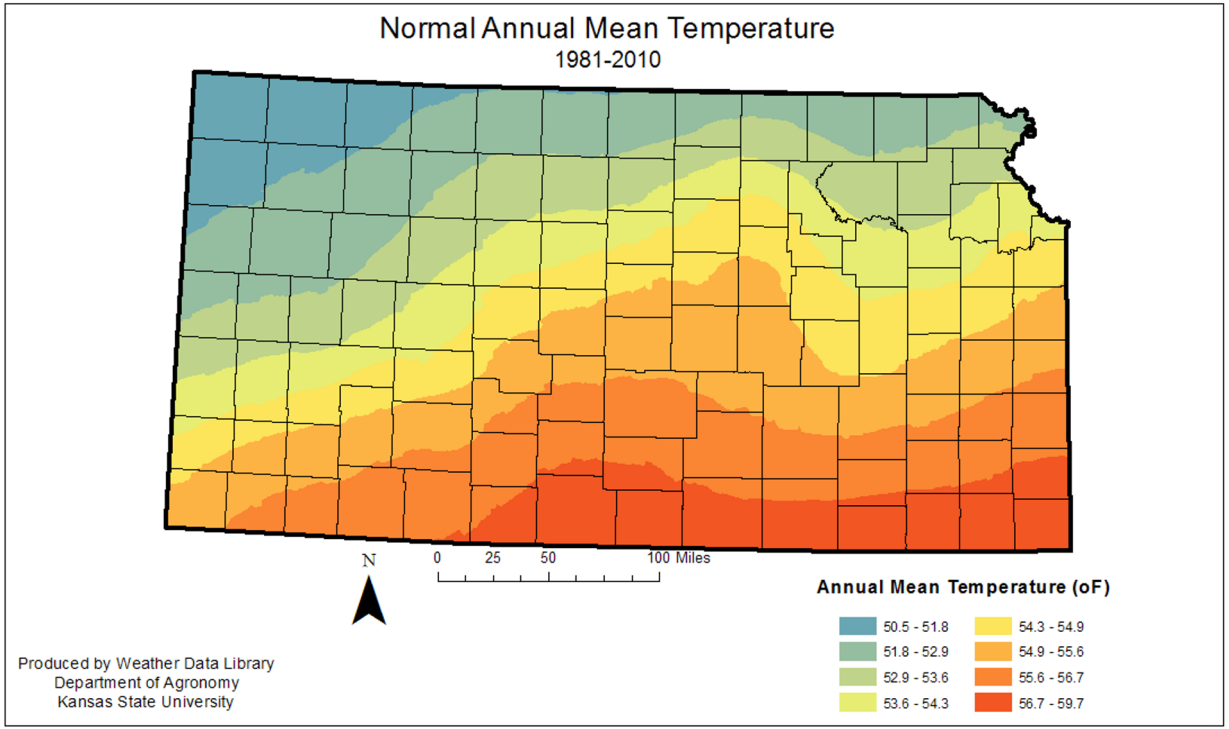
Temperature



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Impacts

- Increased wind erosion potential
- Stress on Winter Wheat
- Falling surface water supplies – particularly stock ponds
- Increased fire danger

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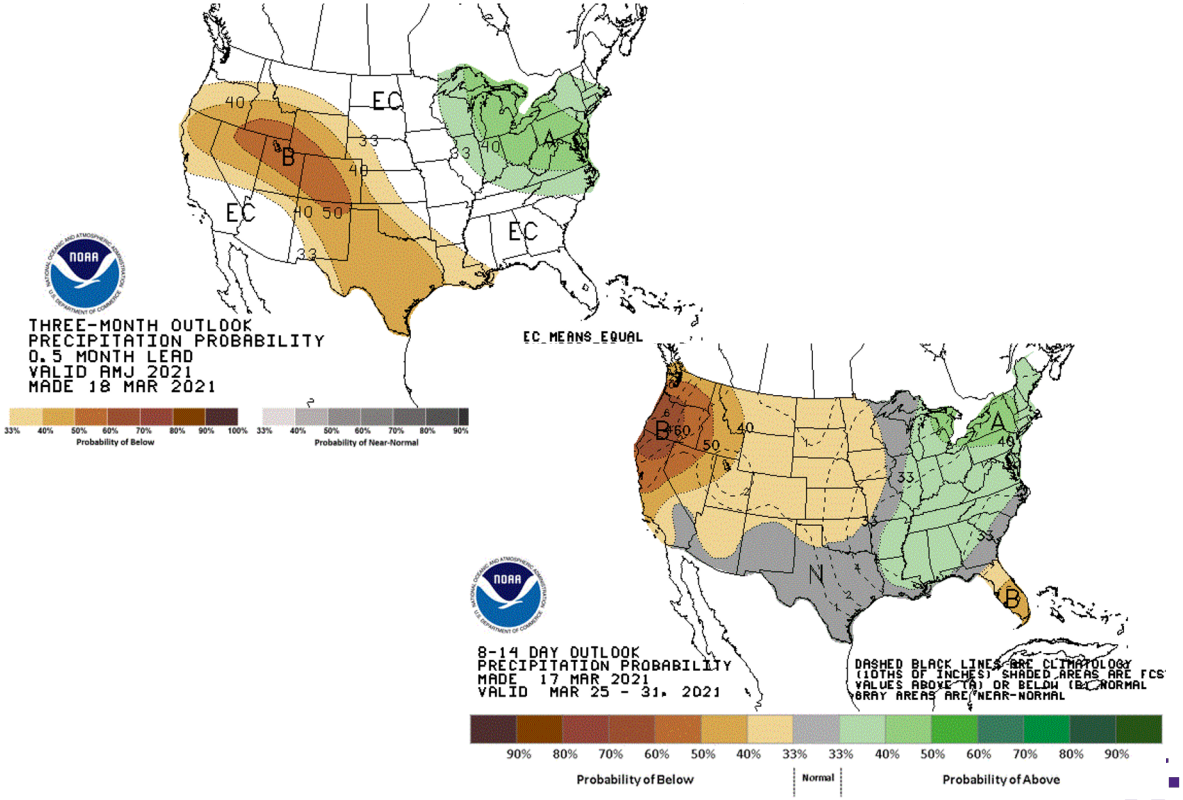
Finding Climate Data

- Kansas Climate website
  - http://climate.k-state.edu/
- National Climate website
  - https://climate.gov/
  - https://www.ncdc.noaa.gov/climate-monitoring/
- Climate Prediction Center
  - https://www.cpc.ncep.noaa.gov/

Understanding Climate Outlooks



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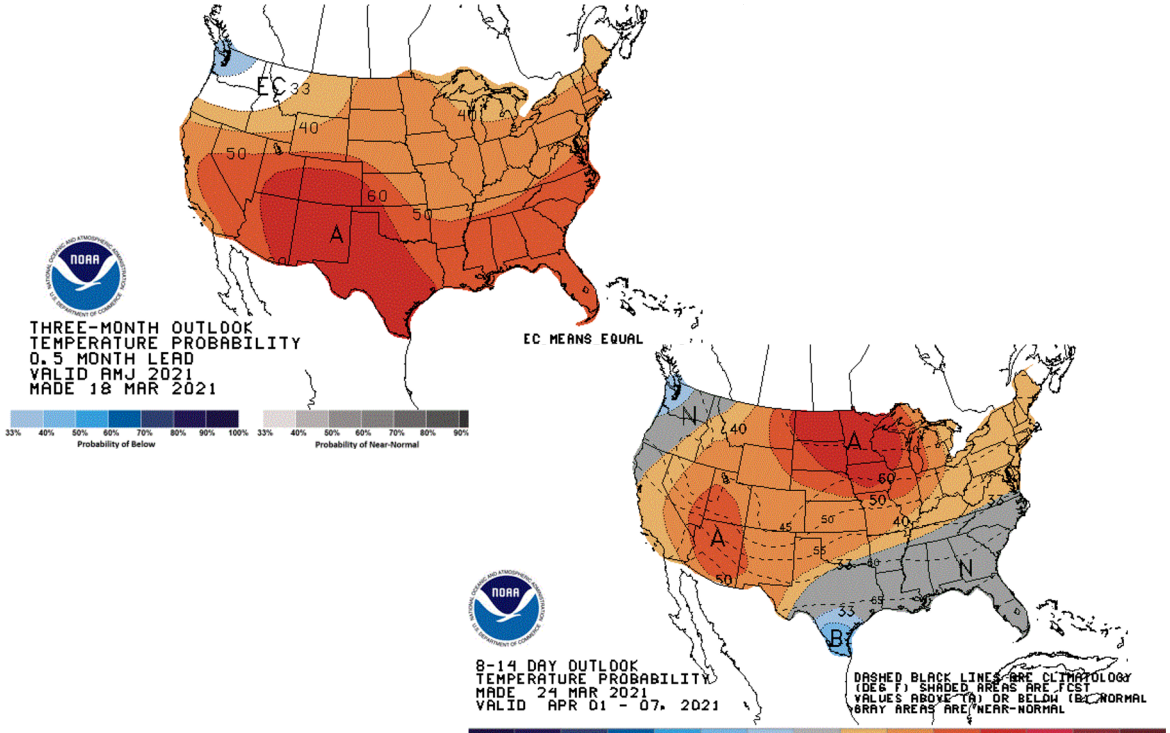
Understanding Climate Outlooks



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Climate Variability & Change

- What is changing and how it manifesting
  - Increase in average precipitation
  - Warming temperatures
    - Mostly winter time
    - Mostly increased low temperatures
    - Increased variability
  - Slight increase in average growing season length

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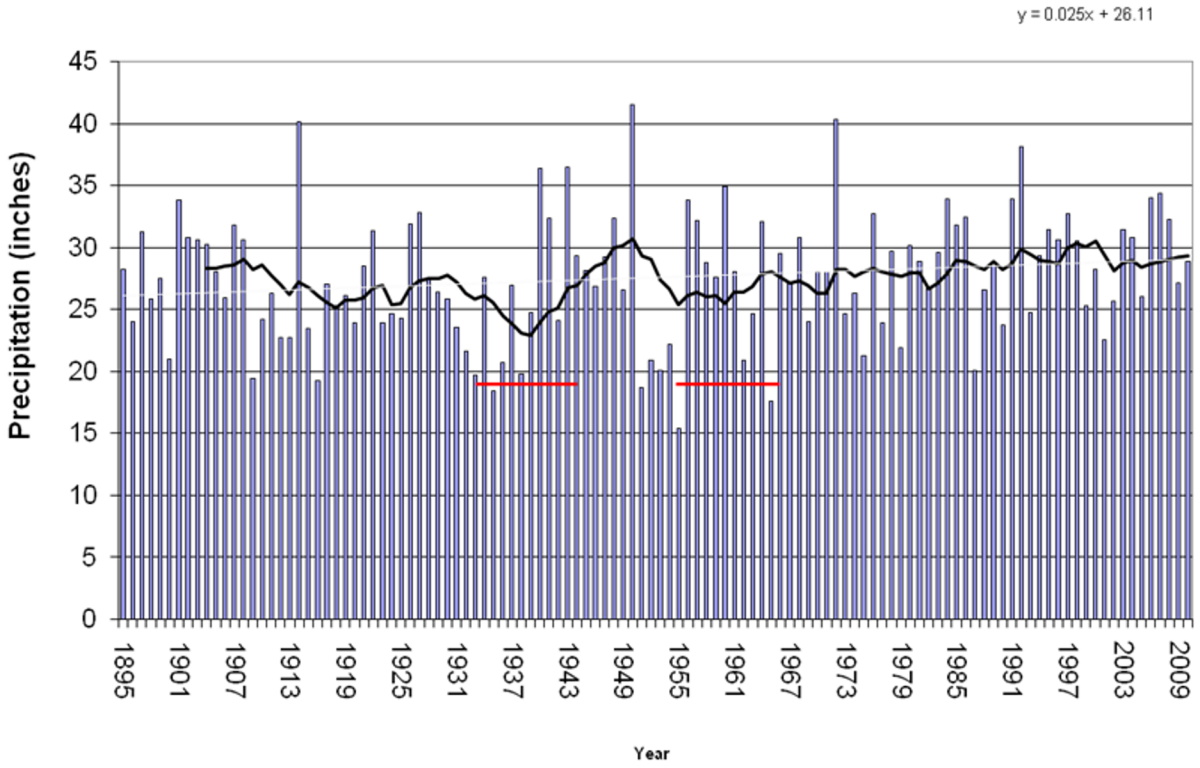
Kansas Annual Rainfall



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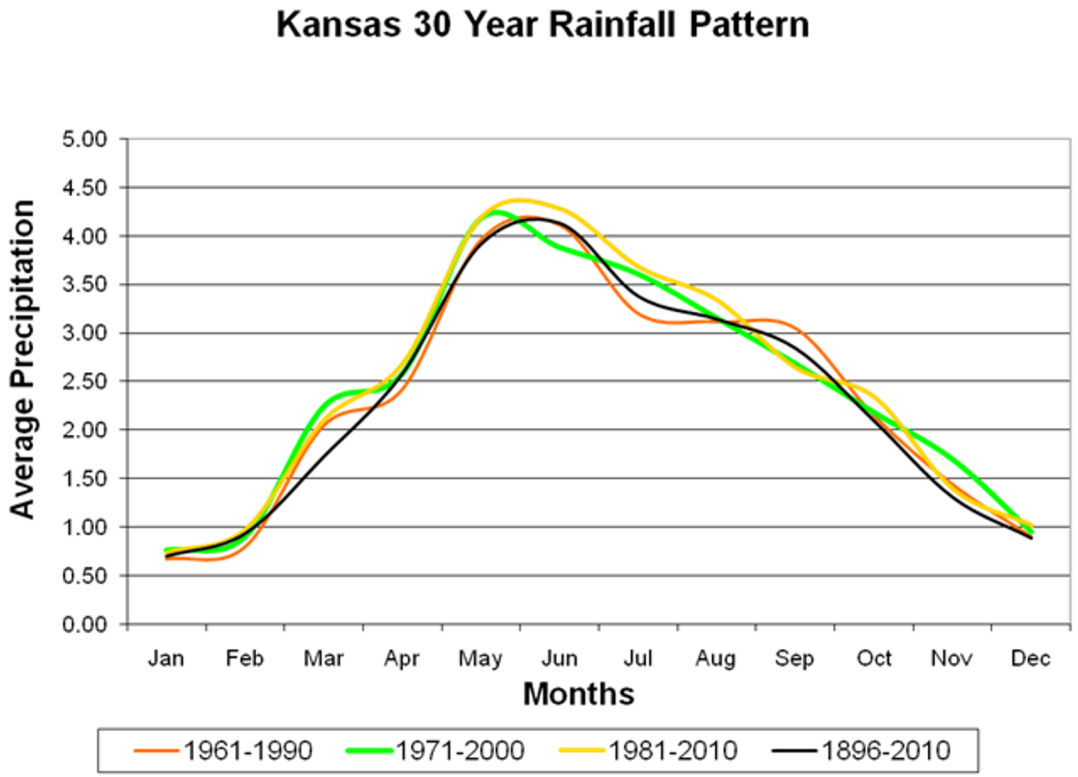
Seasonality



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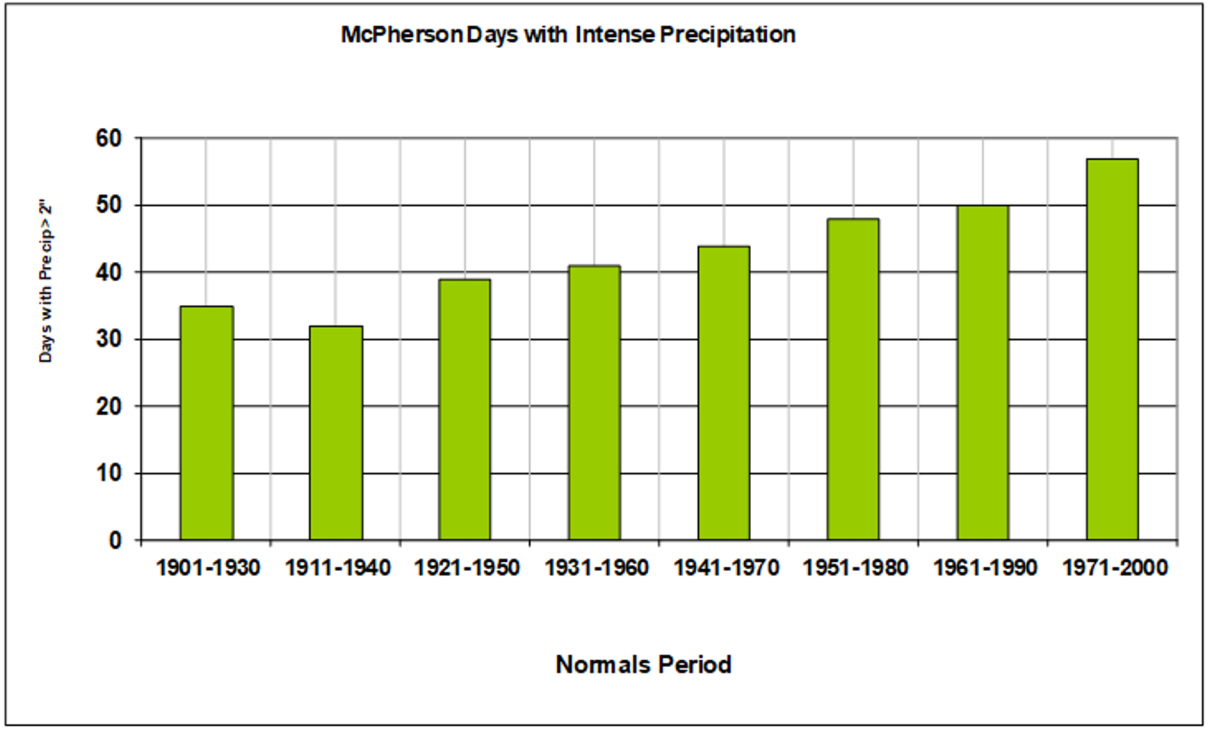
McPherson, KS



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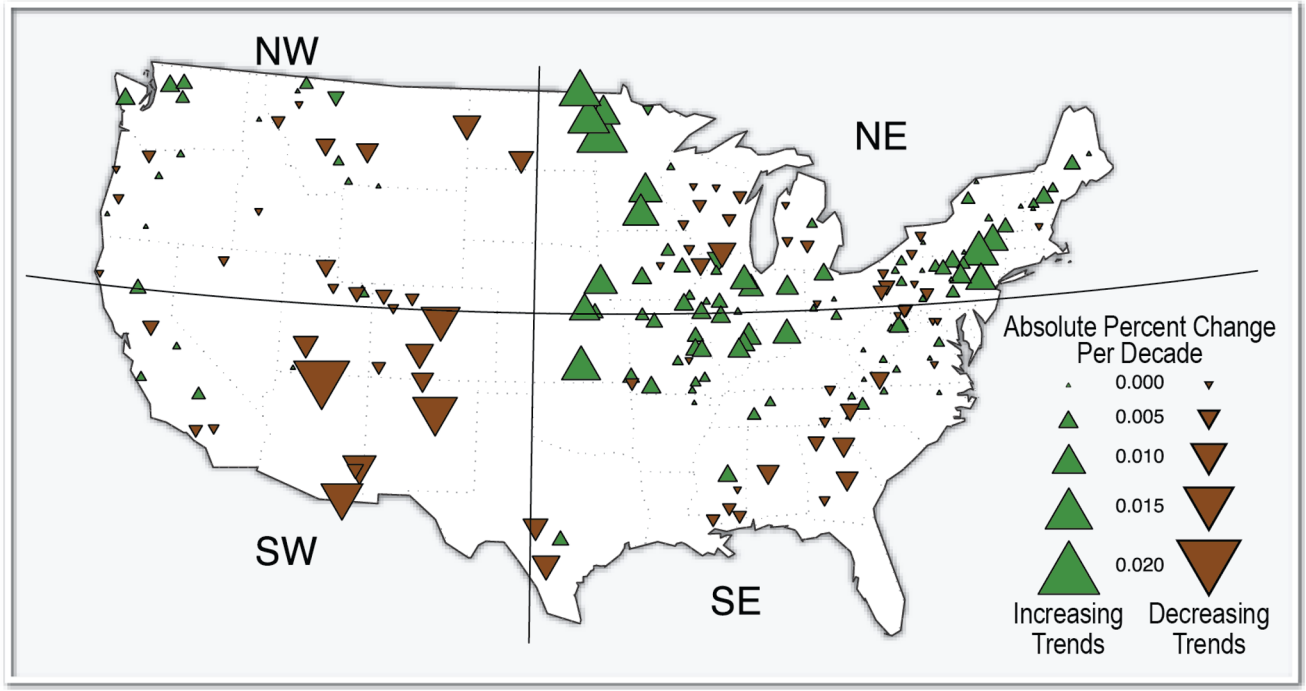
Trends in Flood Magnitude



Third National Climate Assessment Report

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3 September 2018 Manhattan, KS

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Resources

- National Weather Service
  - http://weather.gov
- Climate
  - http://climate.gov
- Climate Predication Center
  - http://www.cpc.ncep.noaa.gov/
- Community Collaborative Rain Hail Snow (CoCoRaHS)
  - http://cocorahs.org/

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Contact Information

Weather Data Library

- E-mail: kansas-wdl@k-state.edu
- URL: mesonet.k-state.edu
- URL: climate.k-state.edu

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Weather, Related Datasets to Water Resources

KANSAS STATE UNIVERSITY | Kansas Mesonet

3/30/21

Chip Redmond - Assistant Meteorologist, Mesonet Manager

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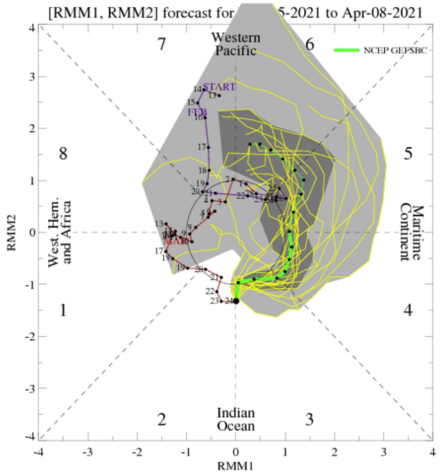
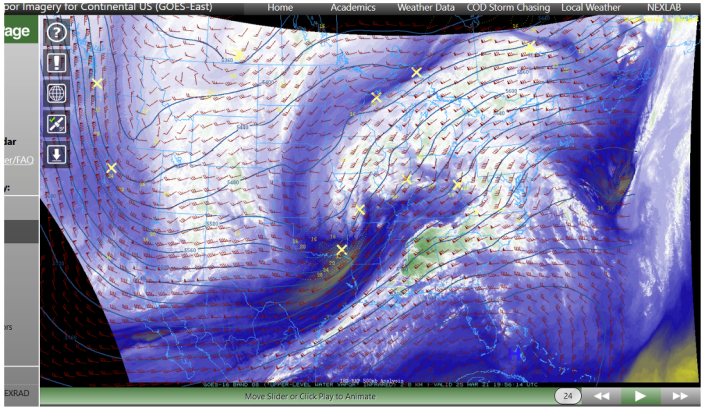
Weather data comes in many forms





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Some data isn't forecastable

- Evapotranspiration
- Inversions
- Irrigation needs

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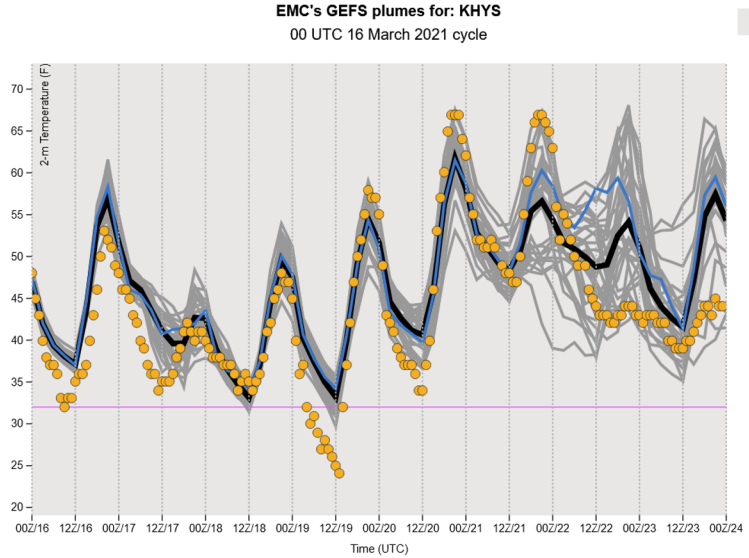
Observations play a critical role in forecast accuracy



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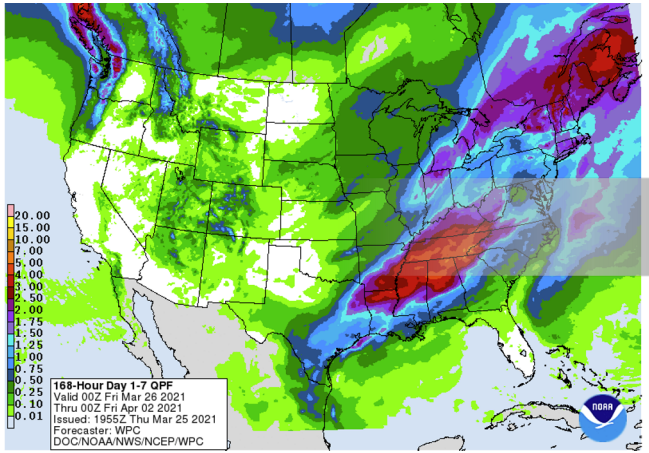
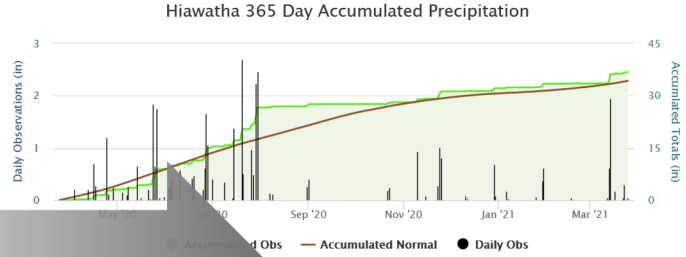
Data user must bridge between forecast & observations





•https://www.bestinhorticulture.co.uk/media/c/pg/2551/1598804650/rc/1000/562/75/an-impromptu-rain-gauge.jpg

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Observations critical - automated or manual

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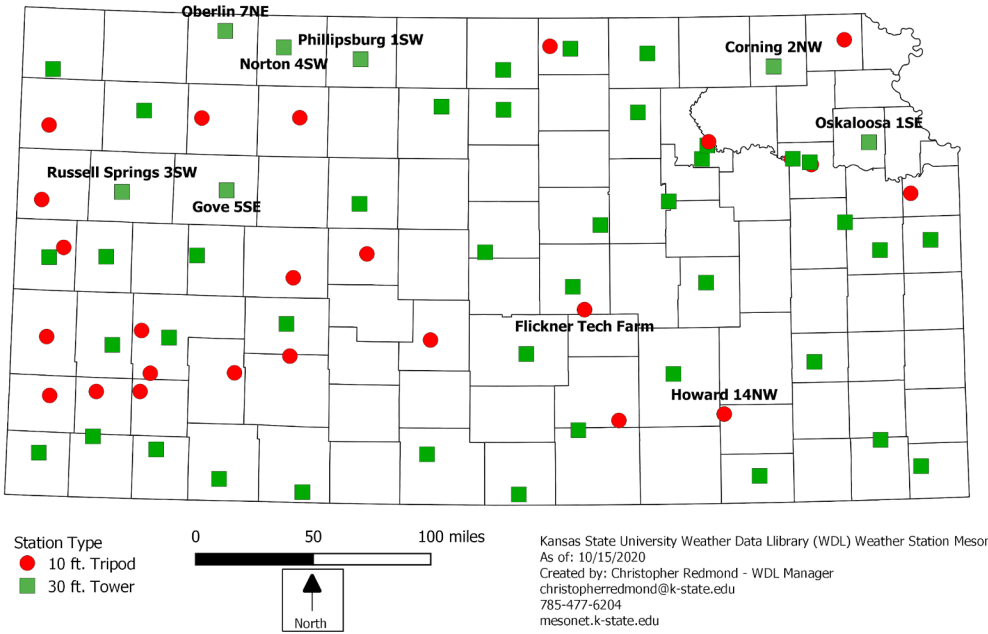
2020 K-State Kansas Mesonet Additions (10/15/20)



Kansas State University Weather Data Llibrary (WDL) Weather Station Mesonet
As of: 10/15/2020
Created by: Christopher Redmond - WDL Manager
christopherredmond@k-state.edu
785-477-6204
mesonet.k-state.edu

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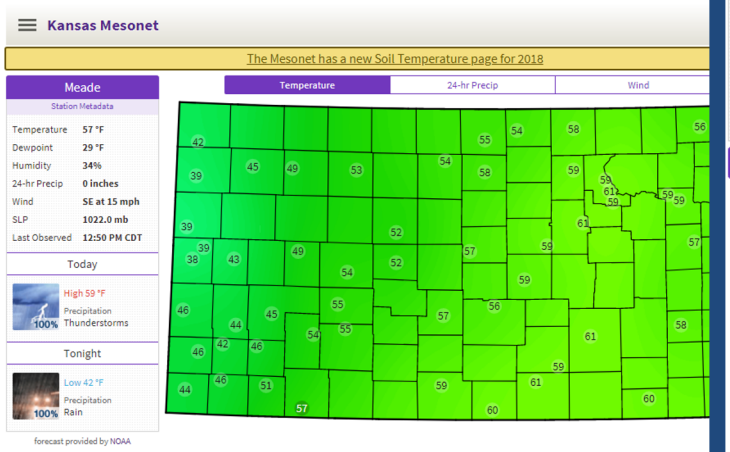
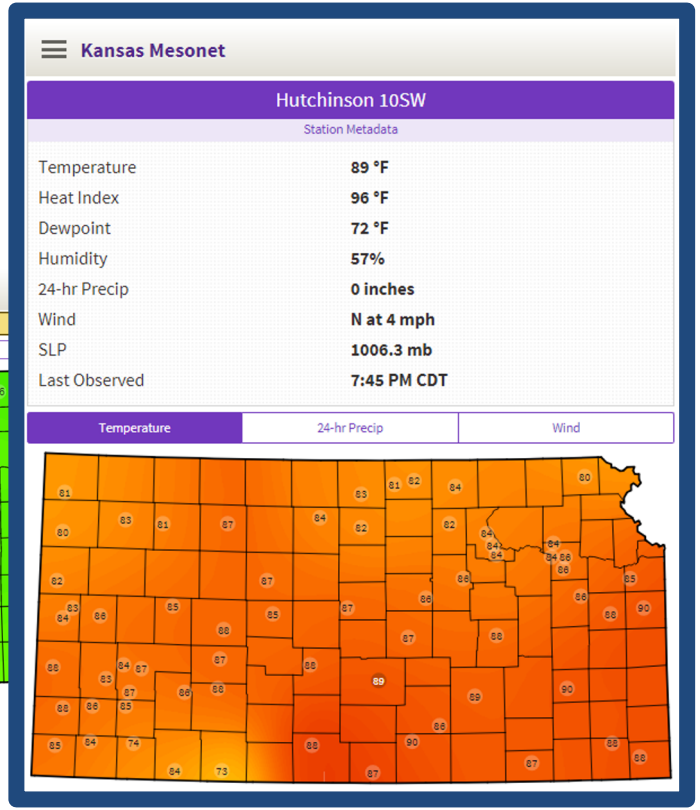
mesonet.ksu.edu





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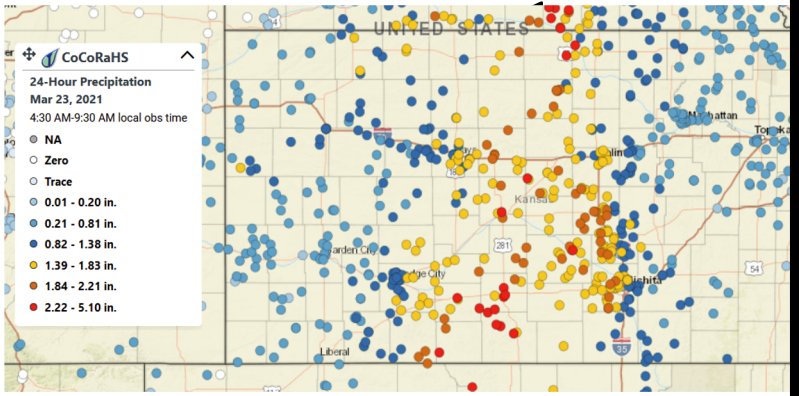
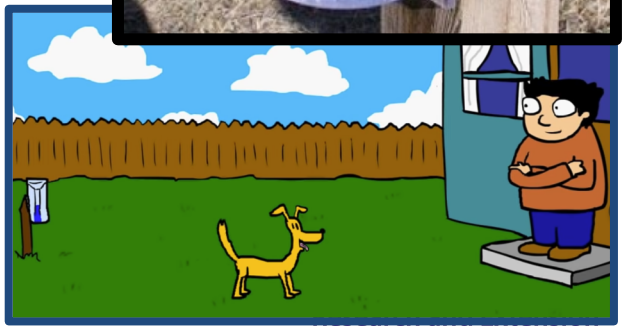


https://www.cocorahs.org/



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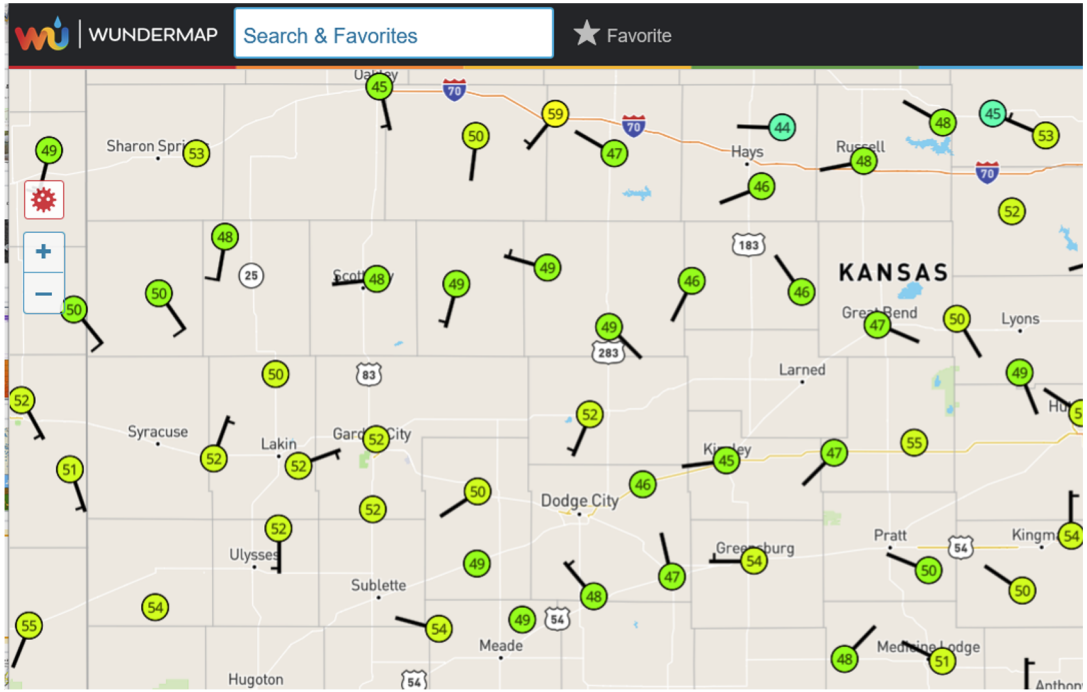
Weather apps



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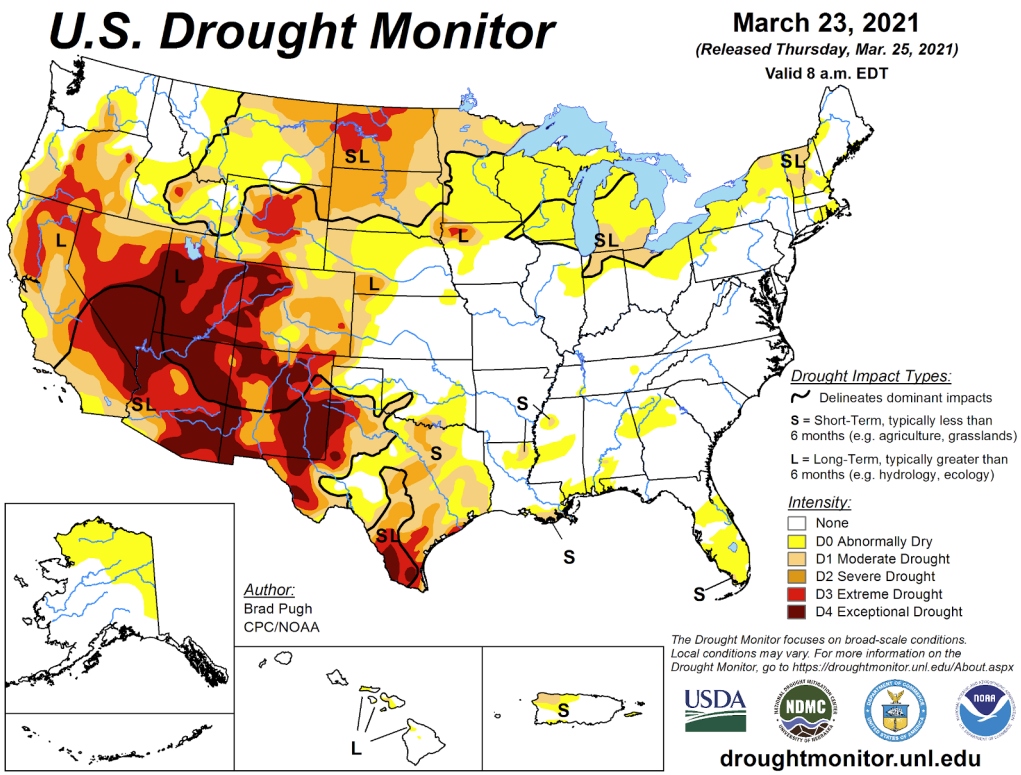

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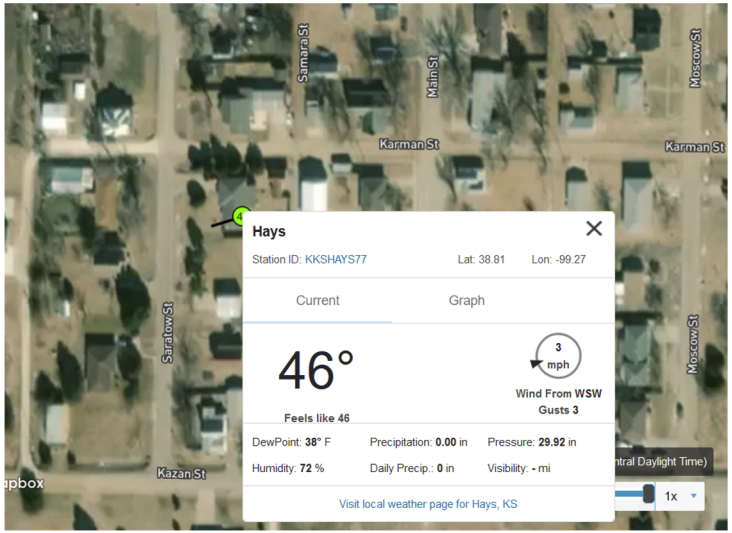
Local “micro-nets” best for small scale management



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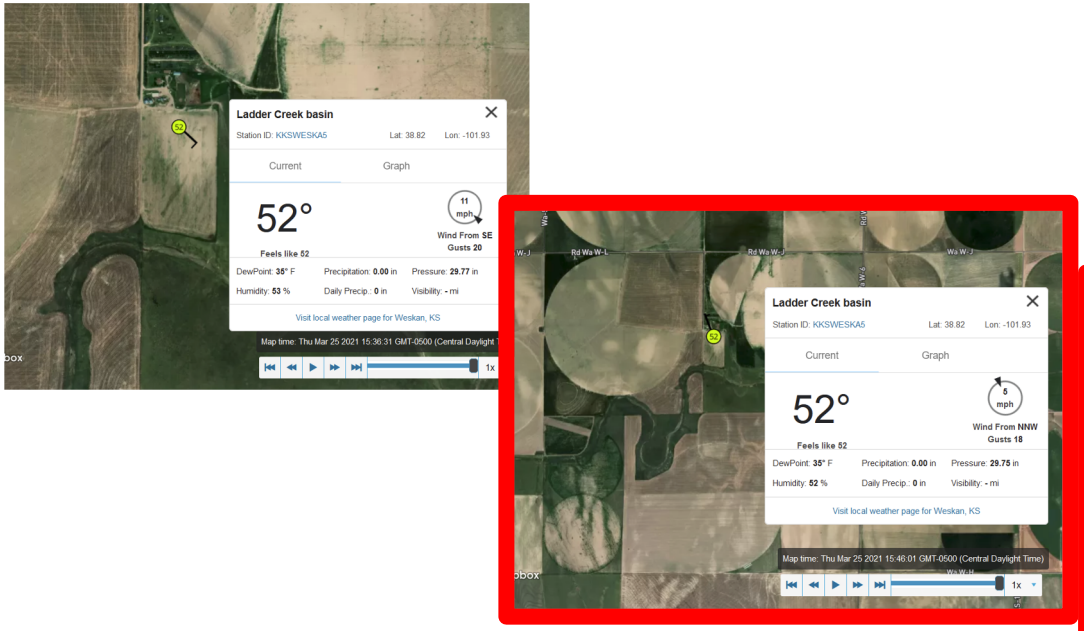
Understanding of local factors important



Wallace	
Station Metadata	
Temperature	49 °F
Dewpoint	33 °F
Humidity	55%
24-hr Precip	0 inches
Wind	SSW at 14 mph
SLP	1010.4 mb
Last Observed	3:30 PM CDT

Wallace	
Station Metadata	
Temperature	50 °F
Dewpoint	34 °F
Humidity	54%
24-hr Precip	0 inches
Wind	SSW at 13 mph
SLP	1010.0 mb
Last Observed	3:45 PM CDT

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Know where you get your data and its quality!

Ralphs Weather OBS @WeatherNut27 · Mar 24

My Backyard Data for this month so far:

Coldest Day was the 2nd with a max of 30.9° and a low of 17.1°.
Warmest day was yesterday max of 67.5°
Windiest day was the 14th

Name: City: West Norwalk State: Connecticut
Elevation: 260 ft Lat: N 41° 15' 00" Lon: W 073° 50' 00"

Temperature (°F), Rain (in), Wind Speed (mph)

Day	Mean Temp	High	Time	Low	Time	Heat Deg Days	Cool Deg Days	Rain	Avg Wind Speed	High	Time	Dom Dir
1	38.9	44.6	15:48	26.8	23:57	25.6	0.0	0.00	9.9	47.9	23:56	WNW
2	24.1	30.9	16:05	17.1	06:28	45.7	0.0	0.00	10.0	42.6	10:44	NW
3	39.5	47.9	15:49	26.4	00:19	35.4	0.0	0.00	2.7	22.2	14:49	WNW
4	33.7	42.1	11:47	24.1	23:48	30.6	0.0	0.00	6.0	34.1	16:47	NW
5	27.2	34.0	15:49	20.9	06:49	38.1	0.0	0.00	6.5	37.3	16:27	NW
6	27.7	30.8	13:49	23.7	23:19	37.3	0.0	0.00	4.6	25.7	10:19	NW
7	29.1	38.5	15:49	23.6	03:19	36.0	0.0	0.00	2.6	23.5	12:19	NNW
8	28.9	39.9	15:50	19.2	06:20	36.1	0.0	0.00	2.3	20.4	13:50	NNW
9	42.6	59.7	15:50	29.1	00:20	20.6	0.0	0.00	2.9	18.2	15:20	NW
10	40.6	53.6	15:50	28.2	06:20	24.2	0.0	0.00	1.1	8.5	00:20	S
11	53.3	65.0	15:20	37.4	00:20	15.9	0.0	0.00	0.5	12.8	14:20	NNW
12	56.6	65.0	15:50	47.7	23:50	8.4	0.0	0.00	5.3	25.7	23:50	N
13	38.3	47.7	00:20	30.2	06:16	26.3	0.0	0.00	5.2	34.1	04:20	NNW
14	37.8	48.2	14:48	27.7	23:51	27.0	0.0	0.00	10.4	58.6	14:48	NW

1 3

Ralphs Weather OBS @WeatherNut27 · Mar 24

I don't use the stations rain gauge in case your wondering why no precip. Not accurate especially with heavy rains so I disconnected it.

1 1

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Determine decision points and how data may inform them

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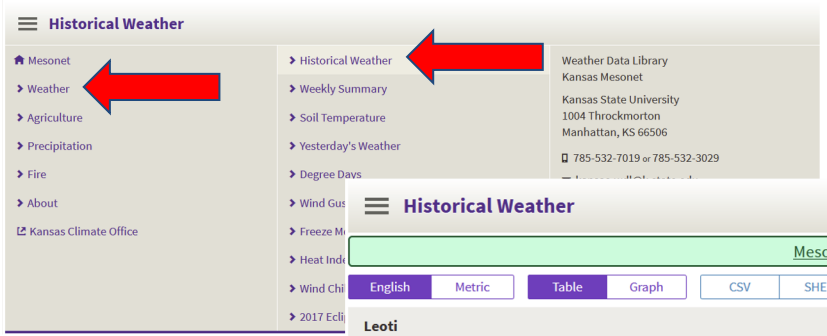
Irrigation Resources

- Build a mental model with ET, precipitation
  - ET = potential evapotranspiration (calculated, not measured)
  - Mesonet Menu > Weather > Historical Weather > Daily
- Precipitation (graphically)
  - Mesonet Menu > Precipitation > Daily Totals



Historical Weather

Mesonet Data Policy

English | Metric | Table | Graph | CSV | SHEF | Weather Parameters

Leoti

2020-07-01 — 2020-07-10

	Air Temperature		Relative Humidity	Precip	Wind Speed		2" Soil Temperature		4" Soil Temperature		Solar Radiation	ETo	
	Max °F	Min °F	Avg %	Total inches	Avg mph	Max mph	Max °F	Min °F	Max °F	Min °F	Total ly	Grass inches	Alfalfa inches
07-01	90.6	59.1	56.4	0.26	8.9	26.9	89.1	74.3	85.8	76.5	668.3	0.32	0.44
07-02	98.1	63.8	69.0	0	9.4	34.2	89.7	75.5	85.6	76.9	557.8	0.34	0.48
07-03	91.5	58.2	70.1	1.08	7.9	25.1	81.5	70.2	80.4	73.0	562.5	0.26	0.35
07-04	90.4	58.3	61.8	0	5.9	21.0	88.6	69.7	84.8	72.3	688.5	0.28	0.36
07-05	88.0	64.3	66.7	0	4.8	16.4	87.4	73.8	84.0	75.7	511.5	0.22	0.27
07-06	91.2	62.1	58.0	0	4.5	14.6	92.7	72.6	88.3	74.9	695.0	0.27	0.34
07-07	93.0	64.6	56.5	0	11.3	31.9	91.1	75.7	87.7	77.6	682.8	0.34	0.48
07-08	101.3	64.0	47.4	0	10.1	27.0	92.7	76.0	89.1	78.0	697.9	0.43	0.62
07-09	90.1	64.5	65.3	0	8.2	20.5	91.0	78.0	88.0	79.6	551.1	0.25	0.34
07-10	88.8	69.0	72.5	0	8.0	20.2	87.9	78.6	85.8	79.8	391.9	0.21	0.28
summary	92.3	62.8	62.4	1.34	7.9	34.2	89.2	74.4	86.0	76.4	600.7	2.91	3.97

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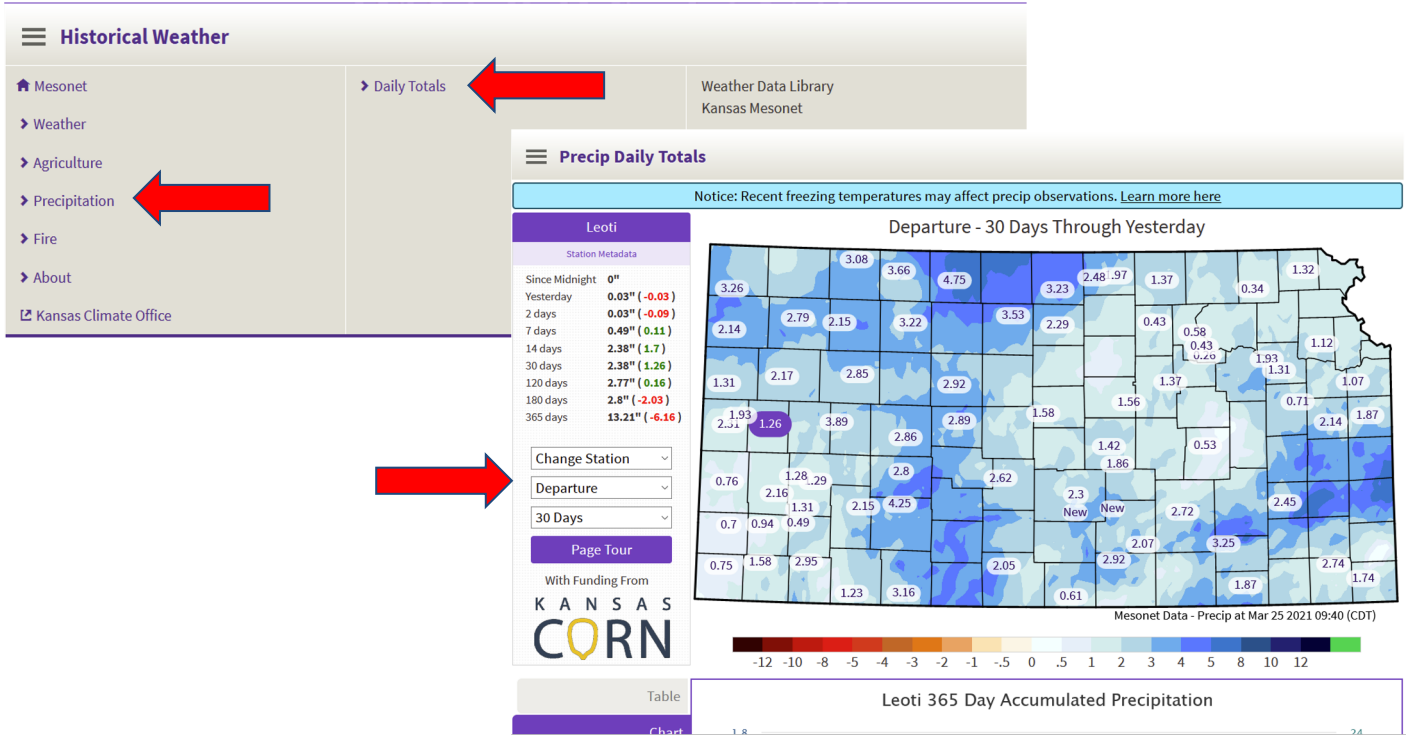

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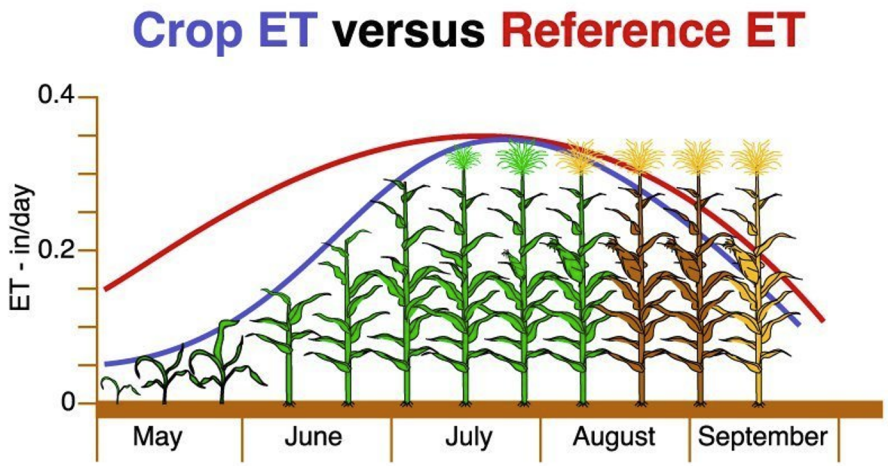

Mesonet Menu > Agriculture > Degree Days

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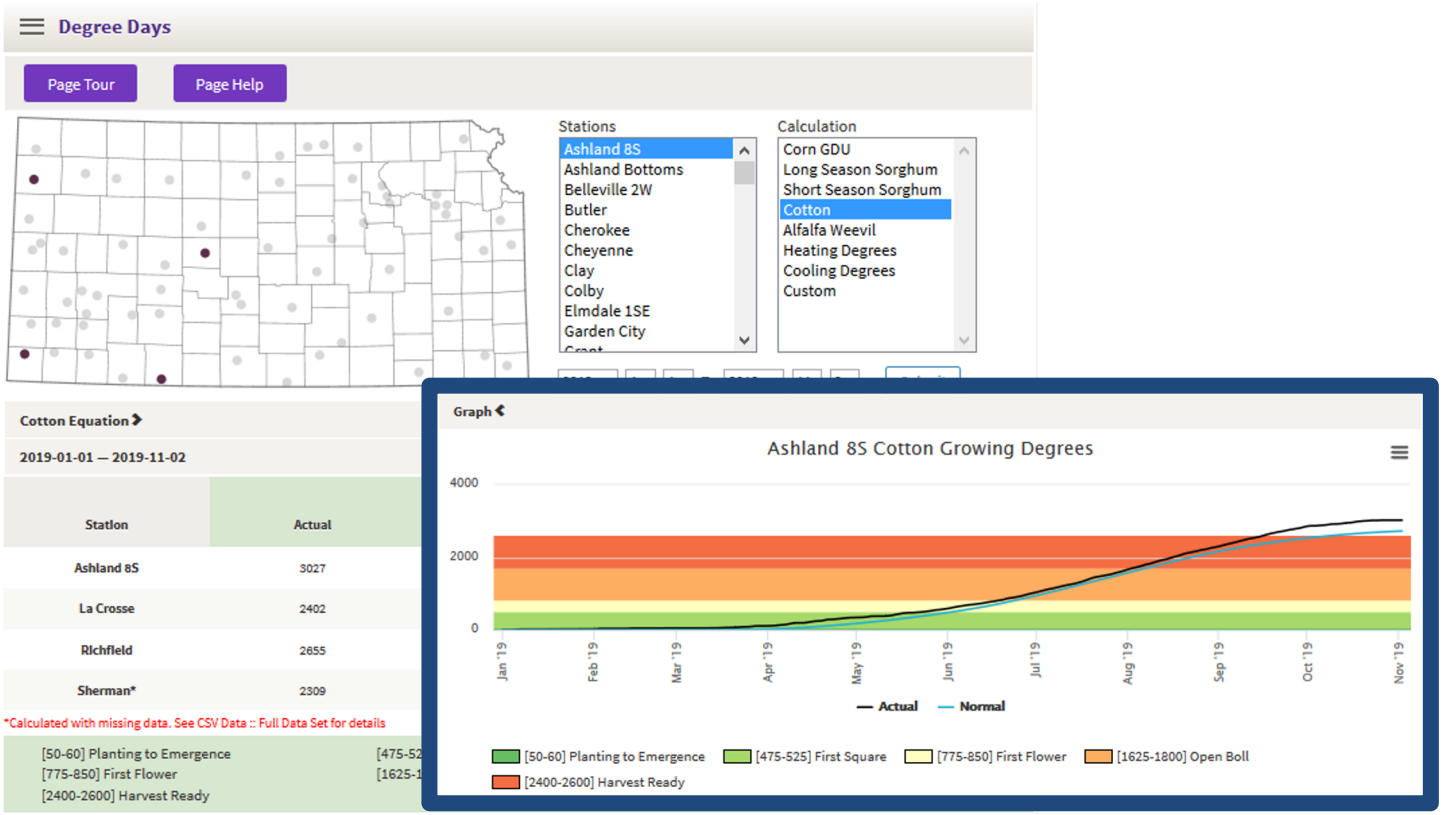

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Water Quality Resources

- Soil moisture and ground saturation
  - Mesonet Menu > Agriculture > Soil Moisture
- Spray tool provides inversion monitoring and wind data
  - Mesonet Menu > Agriculture > Inversion

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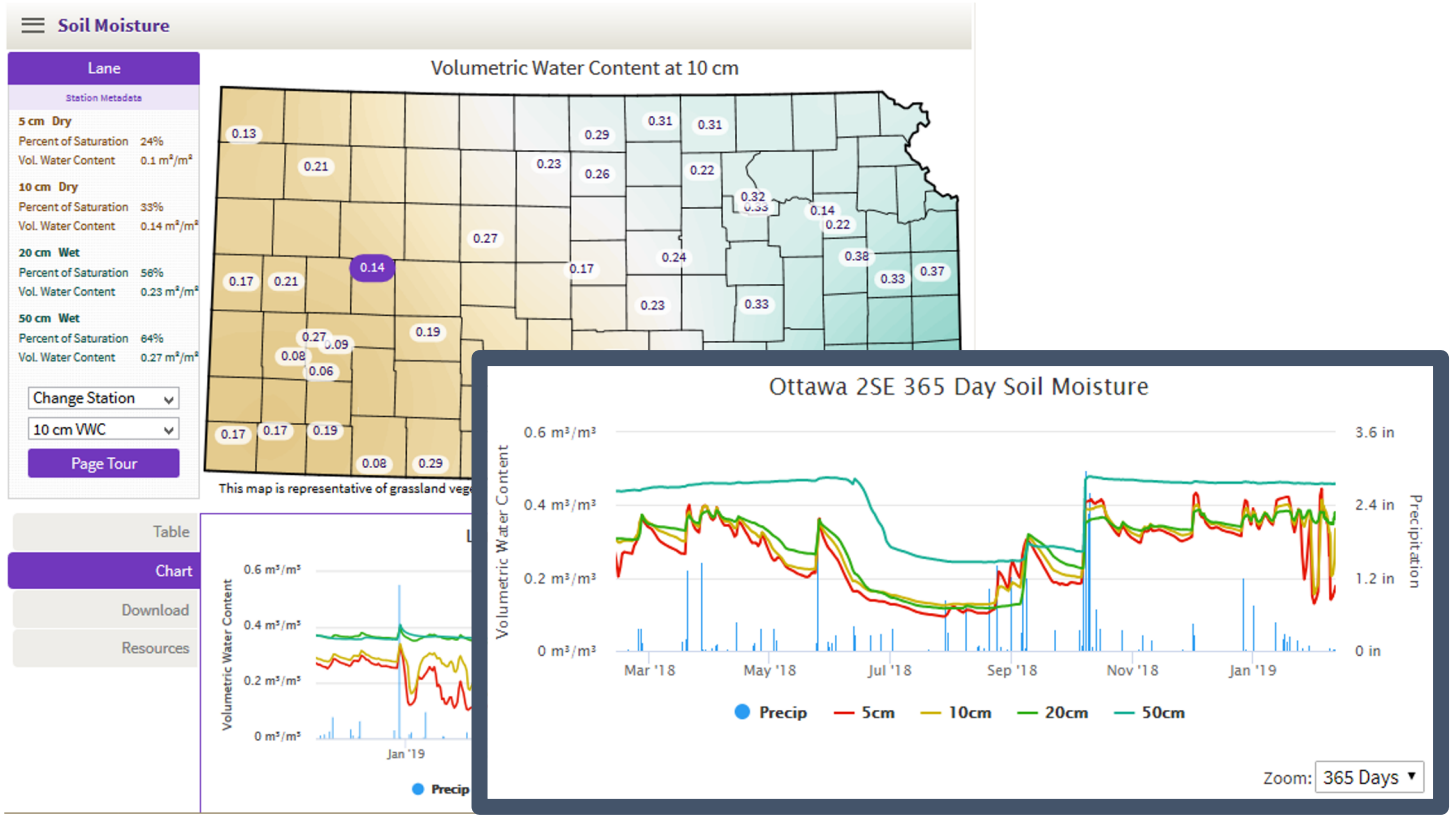

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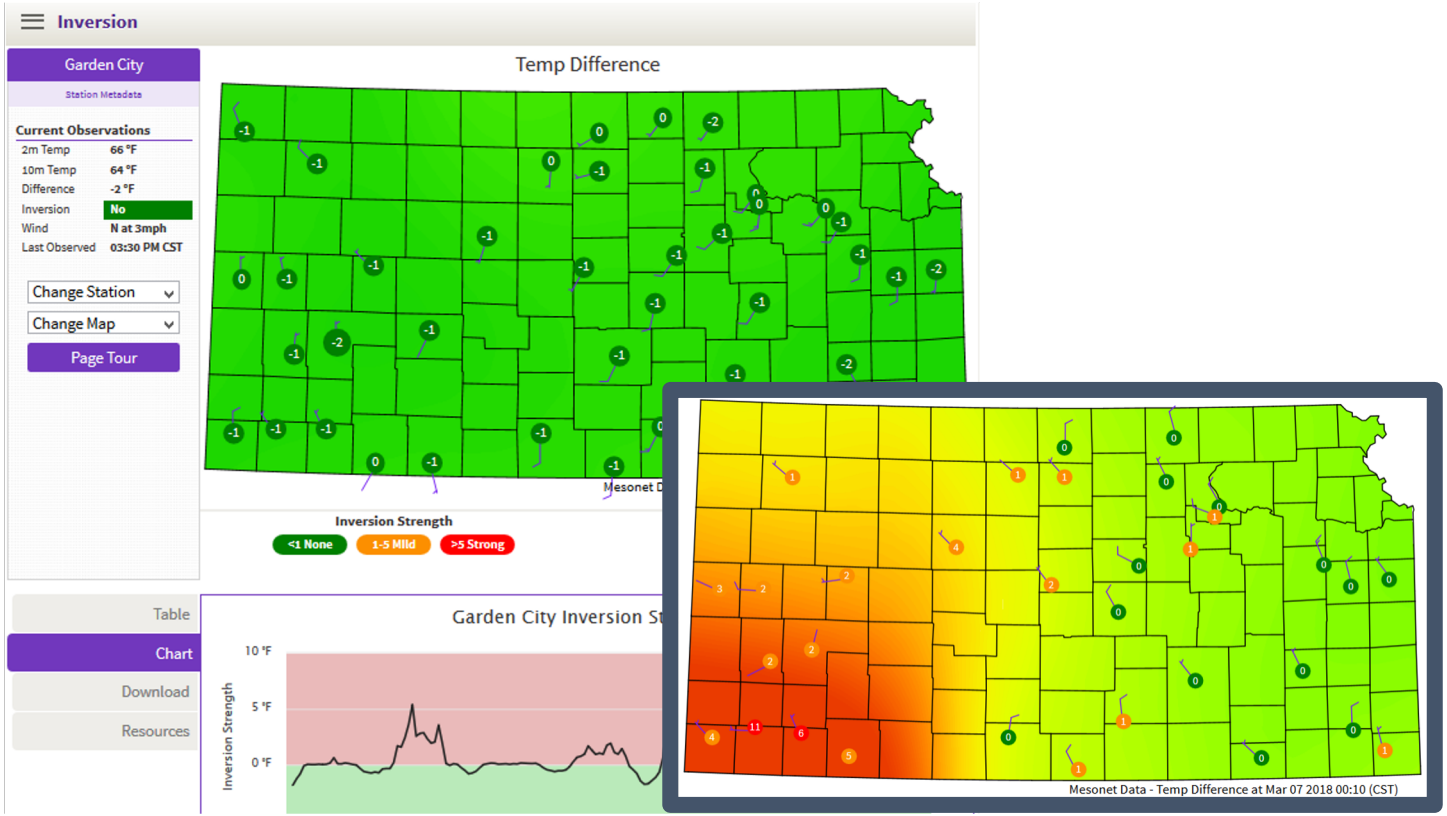

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Livestock

- During periods of excessive heat, water availability
  - Mesonet Menu > Agriculture > Animal Comfort
- Saturated soils increase cattle health concerns
  - Mesonet Menu > Agriculture > Soil Moisture
- Water retention ponds and surface water resources
  - Pan evaporation

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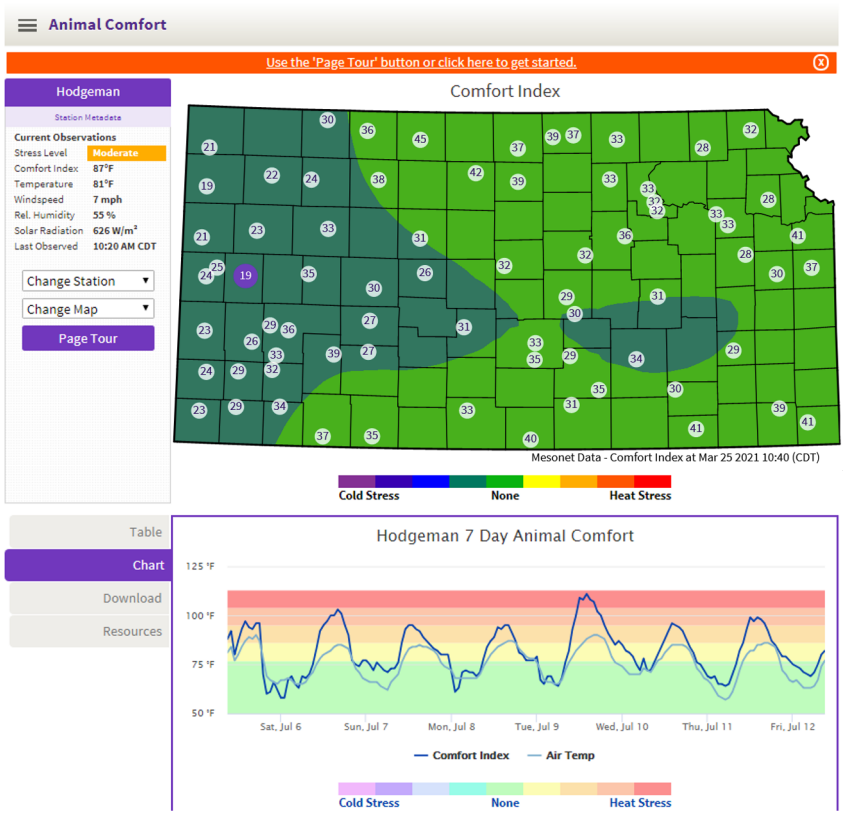

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Utilizing Forecast Data

- Weather FRET (forecast reference ET) data
  - https://digital.weather.gov/mobile/index.php
  - https://digital.weather.gov/?zoom=4&lat=37&lon=-96.5&layers=F000BTTTFTT&region=0&element=42&mxmz=false&barbs=false&subl=TFFFF&units=english&wunits=nautical&coords=latlon&tunits=localt
- National Weather Service (weather.gov)
- Phone apps 😬

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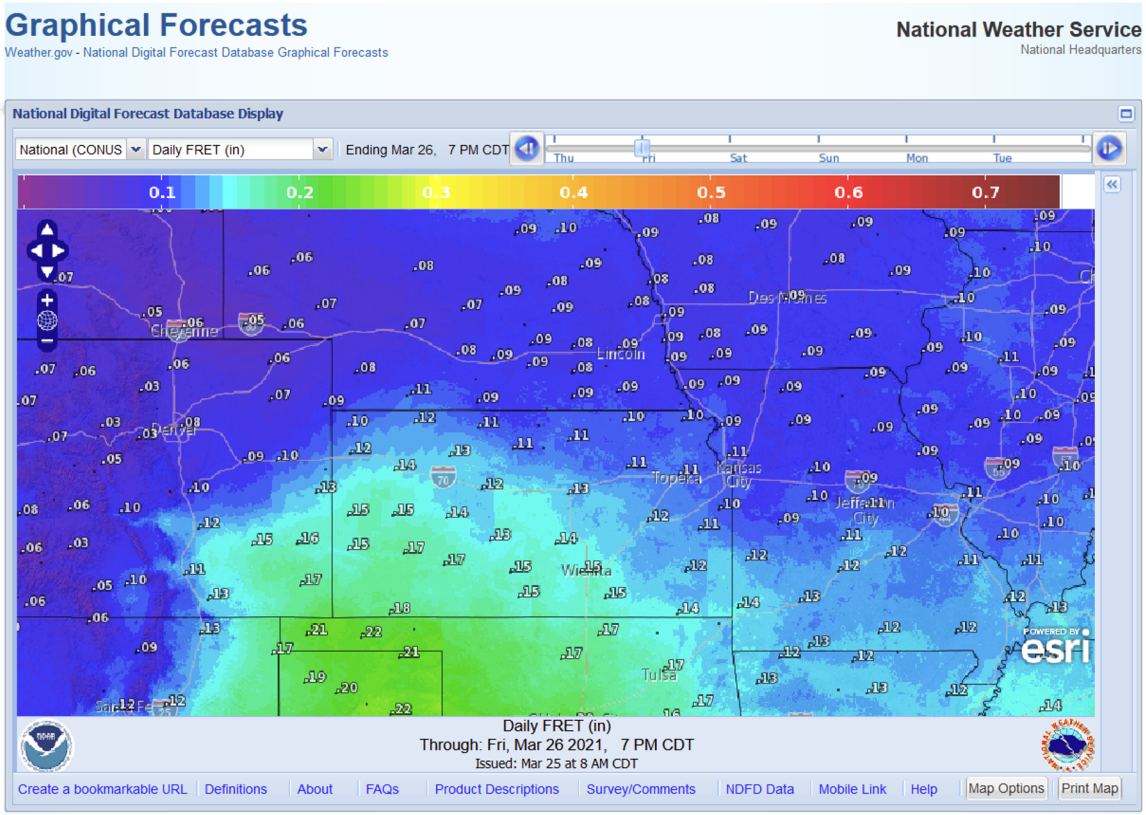

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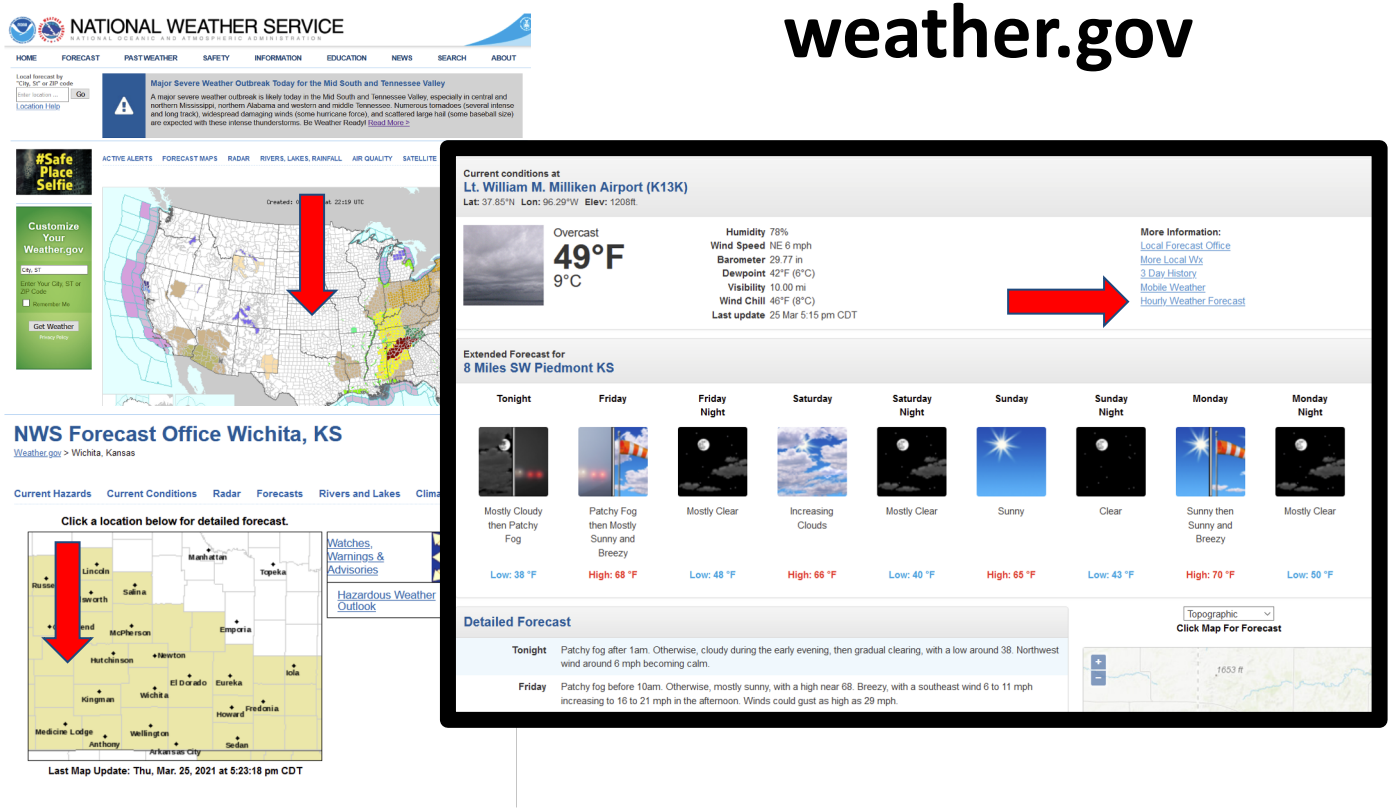
weather.gov



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Weather Data Library

- E-mail: kansas-wdl@k-state.edu
- URL: mesonet.k-state.edu
- URL: climate.k-state.edu

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Questions and Discussion

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Water resource management and irrigation in Kansas

Upcoming session: Wednesday, March 31, 8:30am

Topic: Innovative water management technologies

Presenters: Andres Patrignani, K-State Department of Agronomy; Ray Flickner, Flickner Innovation Farm, Moundridge; Jeff Davidson, KCARE Watershed Specialist

Hosted by: Natural Resources PFT and KCARE

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