Virtual workshop series: Water Resource Management and Irrigation in Kansas

Natural Resources PFT
Kansas Center for Agricultural Resources and the Environment (KCARE)
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
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.
Water Resource Management and Irrigation in Kansas

Climate and weather resources to support water decisions

Tuesday, March 30, 2021
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
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
Seasonal Precipitation

Normal Annual Precipitation
based on 1981-2010 data

Total Precipitation (Inches)
- 13.73 - 18.36
- 18.36 - 22.30
- 22.30 - 25.66
- 25.66 - 28.53
- 28.53 - 30.97
- 30.97 - 33.84
- 33.84 - 37.20
- 37.20 - 41.14
- 41.14 - 45.77
- 45.77 - 51.20

Produced by Weather Data Library
Department of Agronomy
Kansas State University
• Increased wind erosion potential
• Stress on Winter Wheat
• Falling surface water supplies – particularly stock ponds
• Increased fire danger
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
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
Kansas Annual Rainfall

\[ y = 0.025x + 28.11 \]
Seasonality

Kansas 30 Year Rainfall Pattern

Average Precipitation

Months

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

McPherson, KS

McPherson Days with Intense Precipitation

<table>
<thead>
<tr>
<th>Period</th>
<th>Days with Precip &gt; 2&quot;</th>
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<tr>
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<td>1931-1960</td>
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<td>1941-1970</td>
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<td>1951-1980</td>
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<td>1971-2000</td>
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Nominals Period
Trends in Flood Magnitude

Third National Climate Assessment Report
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/
Contact Information

Weather Data Library

• E-mail: kansas-wdl@k-state.edu
• URL: mesonet.k-state.edu
• URL: climate.k-state.edu
Weather, Related Datasets to Water Resources

3/30/21
Chip Redmond - Assistant Meteorologist, Mesonet Manager
Weather data comes in many forms
Some data isn’t forecastable

- Evapotranspiration
- Inversions
- Irrigation needs
Observations play a critical role in forecast accuracy
Data user must bridge between forecast & observations
Observations critical - automated or manual

Lake City
mesonet.ksu.edu
Weather apps
Local “micro-nets” best for small scale management
Understanding of local factors important
Know where you get your data and its quality!
Determine decision points and how data may inform them
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
<table>
<thead>
<tr>
<th>Date</th>
<th>Air Temperature Max °F</th>
<th>Air Temperature Min °F</th>
<th>Relative Humidity Avg %</th>
<th>Precip Total inches</th>
<th>Wind Speed Avg mph</th>
<th>Wind Speed Max mph</th>
<th>2nd Soil Temperature Max °F</th>
<th>2nd Soil Temperature Min °F</th>
<th>4th Soil Temperature Max °F</th>
<th>4th Soil Temperature Min °F</th>
<th>Solar Radiation Total ly</th>
<th>ETo Grass inches</th>
<th>ETo Alfalfa inches</th>
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<td>600.7</td>
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Degree Days

Stations
- Ashland 85
- Ashland Bottoms
- Belleville 2W
- Butler
- Cherokee
- Cheyenne
- Clay
- Colby
- Elmdale 1SE
- Garden City
- Gear

Calculation
- Corn GDU
- Long Season Sorghum
- Short Season Sorghum
- Cotton
- Alfalfa Weevil
- Heating Degrees
- Cooling Degrees
- Custom

Cotton Equation
2019-01-01 – 2019-11-02

<table>
<thead>
<tr>
<th>Station</th>
<th>Actual</th>
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<td>Ashland 85</td>
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<td>La Crosse</td>
<td>2402</td>
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<td>Richfield</td>
<td>2655</td>
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<td>Sherman*</td>
<td>2530</td>
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*Calculated with missing data. See CSV Data for full data set for details.

Graph
Ashland 85 Cotton Growing Degrees

- [50-60] Planting to Emergence
- [475-825] First Square
- [775-850] First Flower
- [1425-1800] Open Boll
- [2400-2600] Harvest Ready

Actual vs Normal
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
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
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&mzmz=false&barbs=false&subl=TFFFF&units=english&wunits=nautical&coords=latlon&tunits=loalt

• National Weather Service (weather.gov)

• Phone apps 😞
Weather Data Library

• E-mail: kansas-wdl@k-state.edu
• URL: mesonet.k-state.edu
• URL: climate.k-state.edu
Questions and Discussion
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