Heavy Rainfall in a Changing Climate

TRENT FORD

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Illinois State Water Survey

PRAIRIE RESEARCH INSTITUTE

Illinois is Getting Warmer

Last 120 Years:

- Central Illinois annual average temperature has increased by 0.20°F per decade
- Warming trends in winter & spring are much larger than summer & fall
- Largest change in daily minimum temperatures

Woodford County Average Temperature	Winter	Spring	Summer	Fall
Trend (°F per decade)	+0.27	+0.25	+0.12	+0.19
Source: NOAA NCEI				



We're Getting Wetter



Precipitation Trends (1895 – 2020)	Winter	Spring	Summer	Fall
Woodford County(inches per decade)	+0.04	+0.12	+0.17	+0.09

Source: NOAA NCEI



Intense Precipitation

- More frequent extreme rainfall events in recent decades
- Highest 1-day rainfall total in 125 years in Minonk was 5.01"
- In both 2019 and 2020, single day totals exceeded 6"





Intense Precipitation

July 16, 2020 in Roanoke: 6.65"

- 1.25% annual occurrence probability according to 1989 estimates
- **2.5%** annual occurrence probability according to **2019** estimates





Intense Precipitation

April 15-19, 2013 in Roanoke: 5.69"

- 10% annual occurrence probability according to 1989 estimates
- 20% annual occurrence probability according to 2019 estimates



Source: Pantagraph



Model Precipitation Projections: Much of the Same

Model Projections:

- Continued higher annual precipitation
- More intense precipitation, but is more sensitive to emissions
- All models project increase in very heavy precipitation days – between 0.5 and 1 additional day per year





More Intense Precipitation

- Increased runoff and more rainfall going to streamflow
- Higher risk of flooding, nutrient runoff, erosion/sedimentation
- Less precipitation "yielded" for surface storage, could increase likelihood of drought impacts

Annual average precipitation, streamflow, and evapotranspiration for the Vermilion River Watershed (inches yr⁻¹).

Periods	Precipitation	Streamflow	Estimated Evapotranspiration	
1932-2016	37.1	9.9	27.2	
1932-1964	35.0	7.7	27.3	
1970-2016	38.5	11.6	26.9	







SOIL & WATER CONSERVATION – CLIMATE CHANGE

Summary

- The likelihood of intense or heavy rain has increased substantially over the past several decades in central Illinois
- Model projections suggest a continuation of increasing trends in rainfall and rainfall intensity
- Climate change is not the only driver of flooding in Roanoke, but it is working against efforts to reduce flooding and impacts

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