Environmental Resiliency and Sustainability in Ulster County, NY: Interim Report

August 2024

Emerging Trends in Climate and Weather Affecting Agriculture

This interim report was prepared as part of the process to update Ulster County's Agricultural and Farmland Protection Plan.

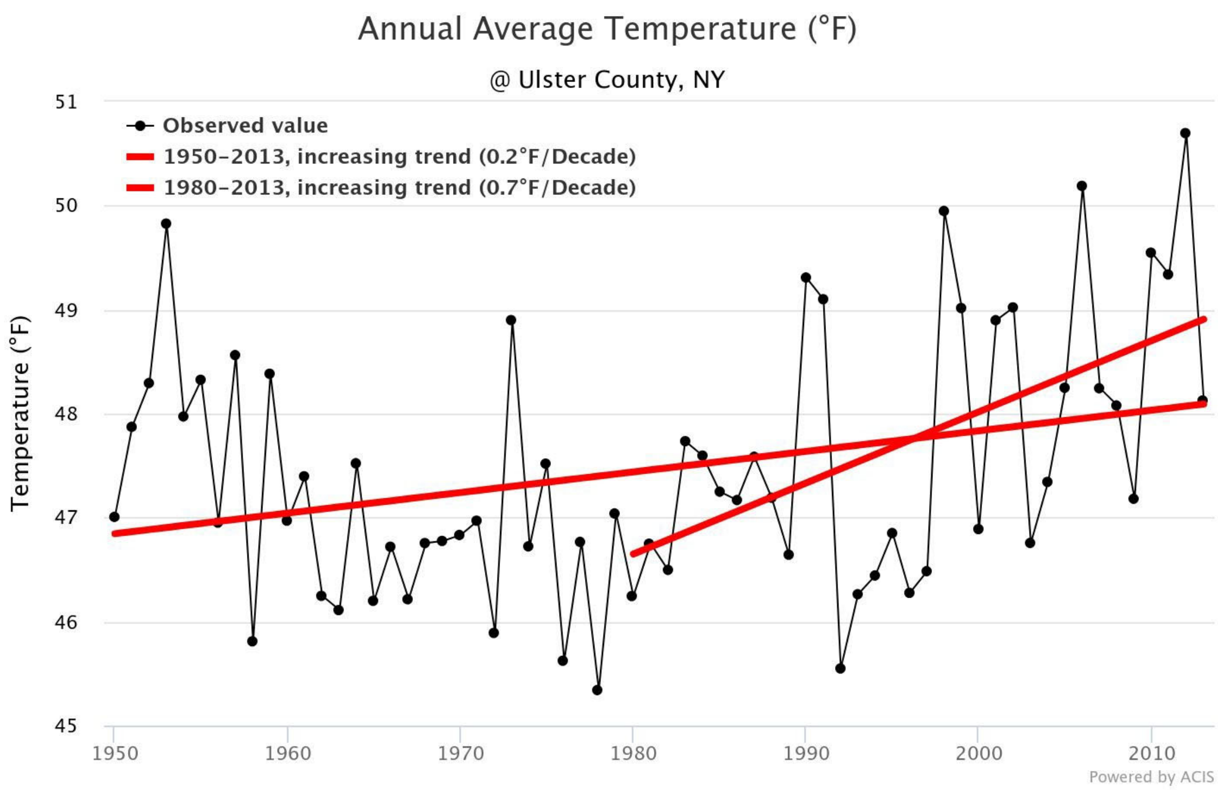
Table of Contents – Climate and Weather Report

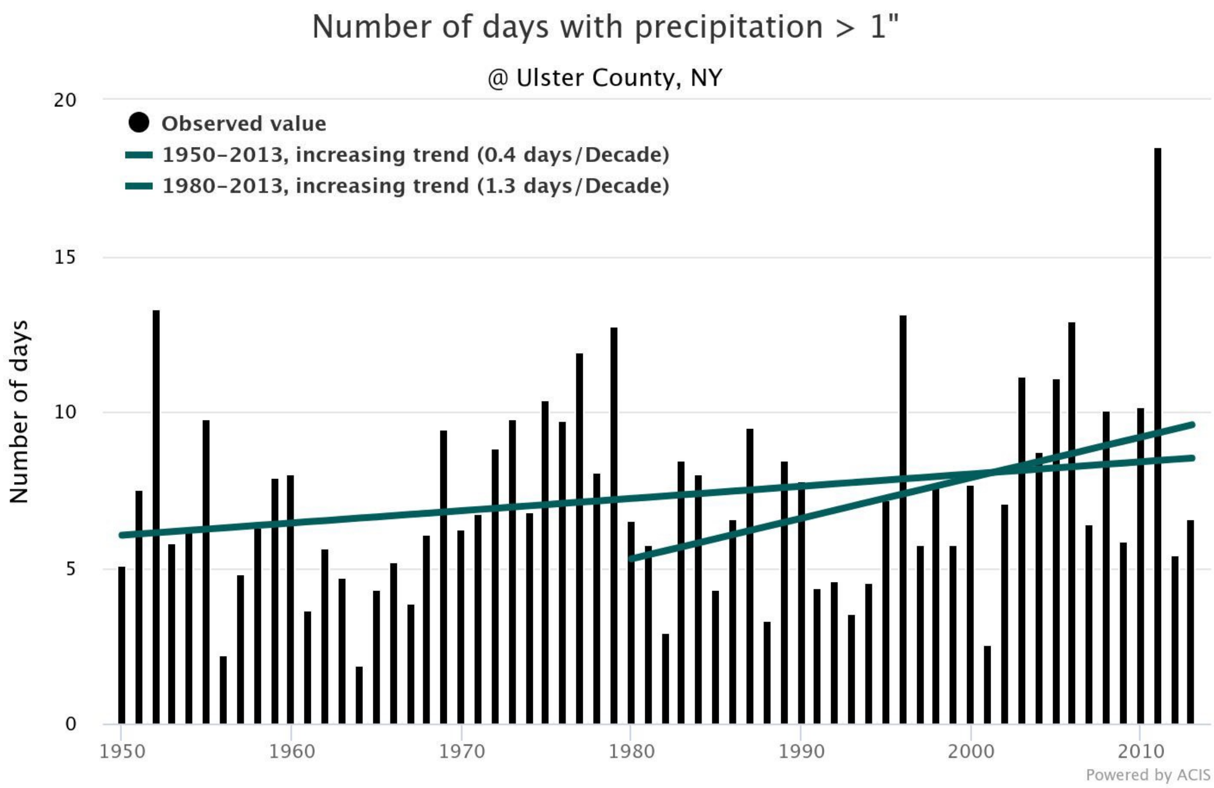
List of Graphs, Tables, and Maps

Report prepared by Community Planning and Environmental Associates, E.M. Pemrick & Company, and Upstate GIS

Climate and Weather Trends in Ulster County

The following data and charts summarize Ulster County climate trends from 1980 to 2013 from the Cornell Climate Smart Farming website:
http://climatesmartfarming.org/tools/csf-county-climate-change/





Other trends include:

- Annual Average Temperature: +0.7 degrees Fahrenheit per decade
- Annual Average High Temperature: +0.7 degrees Fahrenheit per decade
- Annual Average Low Temperature: +0.6 degrees Fahrenheit per decade
- Number of Days with High Temperature >90 degrees: +1.6 days per decade
- Growing Season Length (Consecutive Days > 32 degrees Fahrenheit): +2.36 days per decade
- Annual Growing Degree Days (50 Degrees Fahrenheit Base): +114.7 GDD per decade
- Total Annual Precipitation: +4.1 inches per decade
- Annual Number of Days with Heavy Precipitation (> 1 inch): + 1.3 days per decade

The 2024 New York State Climate Impacts Assessment projects temperatures across the state to increase from 2.5 to 4.4 degrees Fahrenheit by the 2030s.

Potential impacts on agriculture include[1]:

- Annual average and seasonal air temperatures are increasing
  - Number of hot days and hot nights is increasing
  - Warmer winters
  - More late spring freezes/ earlier budbreak
  - Warmer temperatures increase the potential for soil moisture stress and drought
  - Greater heat stress to crops and livestock
- Seasons are shifting (the length of the frost-free season has increased by 10 days in the Northeast US) and include earlier spring thaws and later first frosts
- Precipitation patterns are changing. Annual precipitation increased in the Northeast and a shift to larger precipitation events occurred.
  - More short-term droughts/flooding
  - Increase of flood

These shifts can cause:

- Higher concentrations of atmospheric carbon dioxide may disproportionately benefit corn but not other plant species
- Increased pressure from pests/invasive species
- Higher production costs
- Increased risk of damage to crops, soils, and infrastructure
- Competition from weeds and invasive plant species may increase
- Populations of damaging insects and plant pathogens may increase

As per the USDA AgRisk Viewer (https://swclimatehub.info/rma/rma-data-viewer.html), climate-related causes of crop losses were due to heat, drought, freezing, cold/wet, hail, and rain. All these weather-related issues are anticipated to increase as climate change continues.

Most losses were in the apple industry and corn. Between 1989 and 2022, most monthly losses occurred in April, May, and June. Starting in 2019, payment for loss by acreage significantly increased: in 2019, 558 acres received payment losses and in 2022, there were 319,310 acres.

[1] From USDA Climate Hubs: https://www.climatehubs.usda.gov/sites/default/files/adaptation_resources_workbook_ne_mw.pdf

Flood Risk Analysis

A basic agricultural flood risk assessment was completed that classifies the risk of each farm field on a five-tier scale from High to Minimal Flood risk. See the table below and the Agricultural Flood Risk Map.

Risk of Farm Field Flooding

	Fields	Acres
High Flood Risk	444	6,572
Moderate Flood Risk	131	1,436
Elevated Flood Risk	955	11,551
Slight Flood Risk	1,446	13,991
Minimal Flood Risk	1,183	7,538

Points: High 8-11 points, Moderate 5-7 points, Elevated 2-4 points, Slight 1 point, Minimal 0 points

Methodology of Flood Risk Analysis

To assess the flood risk, points were assigned to each field using the formula "Points = Flood Risk (FR) 3 / 10 + FR2 / 20 + FR1 / 30 + Risk area". In this formula:

- FR3 = percent of field within 1% annual flood risk and flood zones,
- FR2 = percent of field within 0.2% annual flood risk,
- FR1 = percent of field within areas outside FEMA flood zone, that are a riparian buffer area and/or soils that have poor or very poor drainage during wettest conditions and/or frequent ponding, and
- Risk area = 1 point if field center within 1/2-square mile hexagon that is < 50% wooded and > 5% impervious.

We also assigned points based on the following:

- Parcels with FR3 of any amount minimum of 2 points,
- Parcels with FR2 of any amount minimum of 1 point,
- Parcels with FR1 of 10 percent or more minimum of 1 point.

The final flood risk score would be the maximum of the two methods.

The Risk Area was created using a 1/2-square mile hex grid and then calculated the percentage of trees and impervious cover using NOAA's newly released (2021 data) 1-meter data. The rationale is that less trees and more impervious area would lead to higher instances of run-off during storm events. Also, during the summer these areas would likely have hotter conditions, which while not directly flood-related, could impact crops and also could dry out the soil more between rain events making them more susceptible to loss during storms.