

November 19, 2020



# Draft Clinton Kirkland Climate Vulnerability Assessment

# Climate Smart Communities Program



## Climate Smart Communities

MAP VIEW LIST VIEW

**Filter This Map**

**By Status**

- Registered
- Bronze Certified
- Silver Certified
- Any Certified
- Any

**FILTER** **RESET**

**By Certified Action**

- [1. Build a climate-smart community.](#)
- [2. Inventory emissions, set goals, and plan for climate action.](#)
- [3. Decrease energy use.](#)
- [4. Shift to clean, renewable energy.](#)
- [5. Use climate-smart materials management.](#)
- [6. Implement climate-smart land use.](#)
- [7. Enhance community resilience to climate change.](#)
- [8. Support a green innovation economy.](#)
- [9. Inform and inspire the public.](#)
- [10. Engage in an evolving process of climate action.](#)
- [11. Innovation](#)
- [12. Performance](#)

A map of New York State with numerous blue and brown location pins indicating participating communities. The map includes labels for major cities like Albany, Buffalo, Rochester, and Syracuse, and shows surrounding states like Pennsylvania, Vermont, and Connecticut. A search bar and map controls are visible at the top of the map interface.

**Search Features**

**Participating Communities:** To see the municipalities participating in the program, their contacts, and current certification report, use the "Map View" or "List View" buttons at the top of the page. You can then sort the list alphabetically by municipality or county.

**Certified Action Filter:** This filter can be used to search for actions approved in currently certified communities.

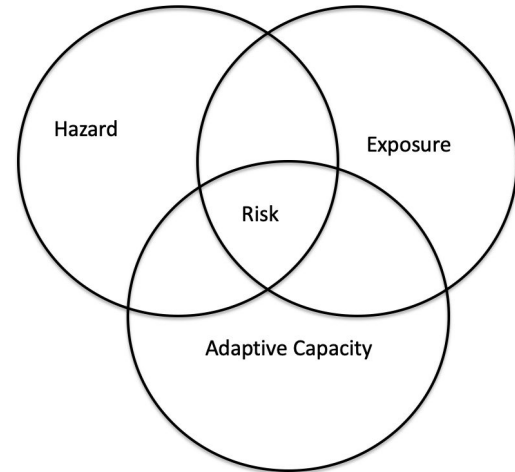
# Our Approach to Climate Risk

**Hazard:** The dangers of the climate event itself (i.e. increased heat)

**Exposure:** What is affected by a climate hazard, i.e. the impacts of changes in temperature and precipitation on life here

**Adaptive Capacity:** A community's ability to address the impacts of future climate hazards

Climate Risk =  
Hazard x Exposure x Adaptive Capacity





# Outline of Our Assessment

We have been hard at work producing models for impacts we identified in class and during October's meeting!

Today we will cover:

- Our Models and Scenarios
- Future Temperature and Precipitation
- Winter Impacts
- Flooding Impacts
- Agricultural Impacts
- Public Health Impacts
- Biodiversity Impacts
- Social Vulnerability / Adaptive Capacity
- Next Steps

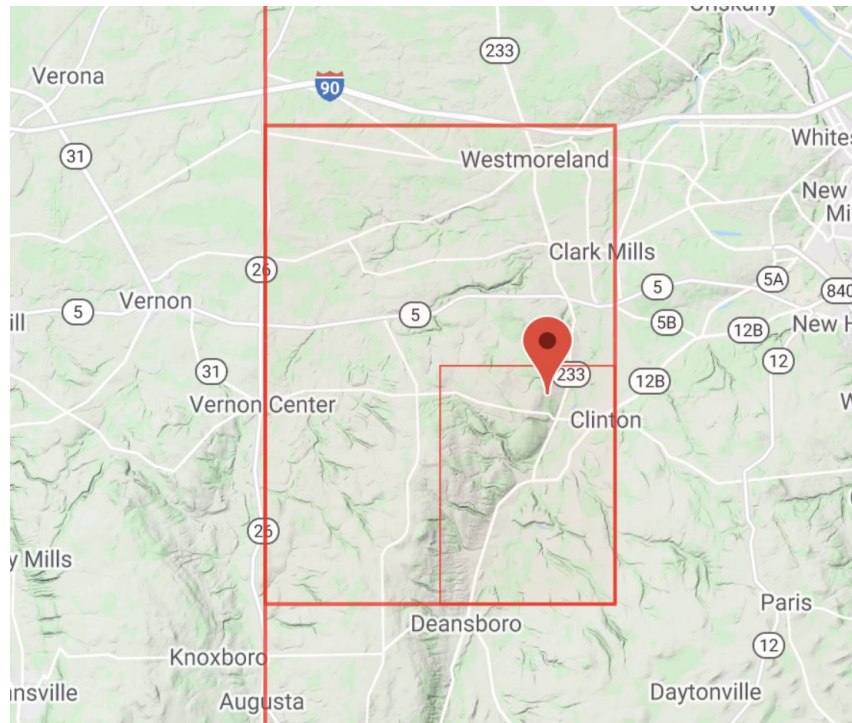


# Where We are Analyzing These Frameworks

Small Red Box: About 37km<sup>2</sup> in area, represents the focus point for our assessment

It is from global climate models (GCM) downscaled to 1/16th of a degree of latitude and longitude

These models have data up to the year 2100 and can be adjusted based on the level of climate action we take in the future

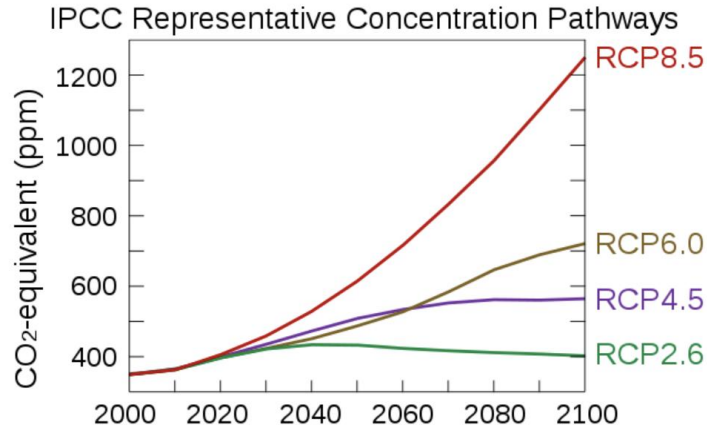


# What We Use to Analyze

RCPs: The most credible scenario projections used in climate models worldwide

- Created in the IPCC AR5 (2014) last major climate scenarios. The most universally accepted model inputs
- We are using RCP4.5 (middle-ground response), and RCP8.5 (business-as-usual)

Hindcasting: A way of verifying the historical accuracy our models by comparing the model to past reality (we did this for observational data from 1960-2007)



## Numerical Models

Hindcasting

Nowcasting

Forecasting

Past

Present

Future

## Data Assimilation = Model + Observations

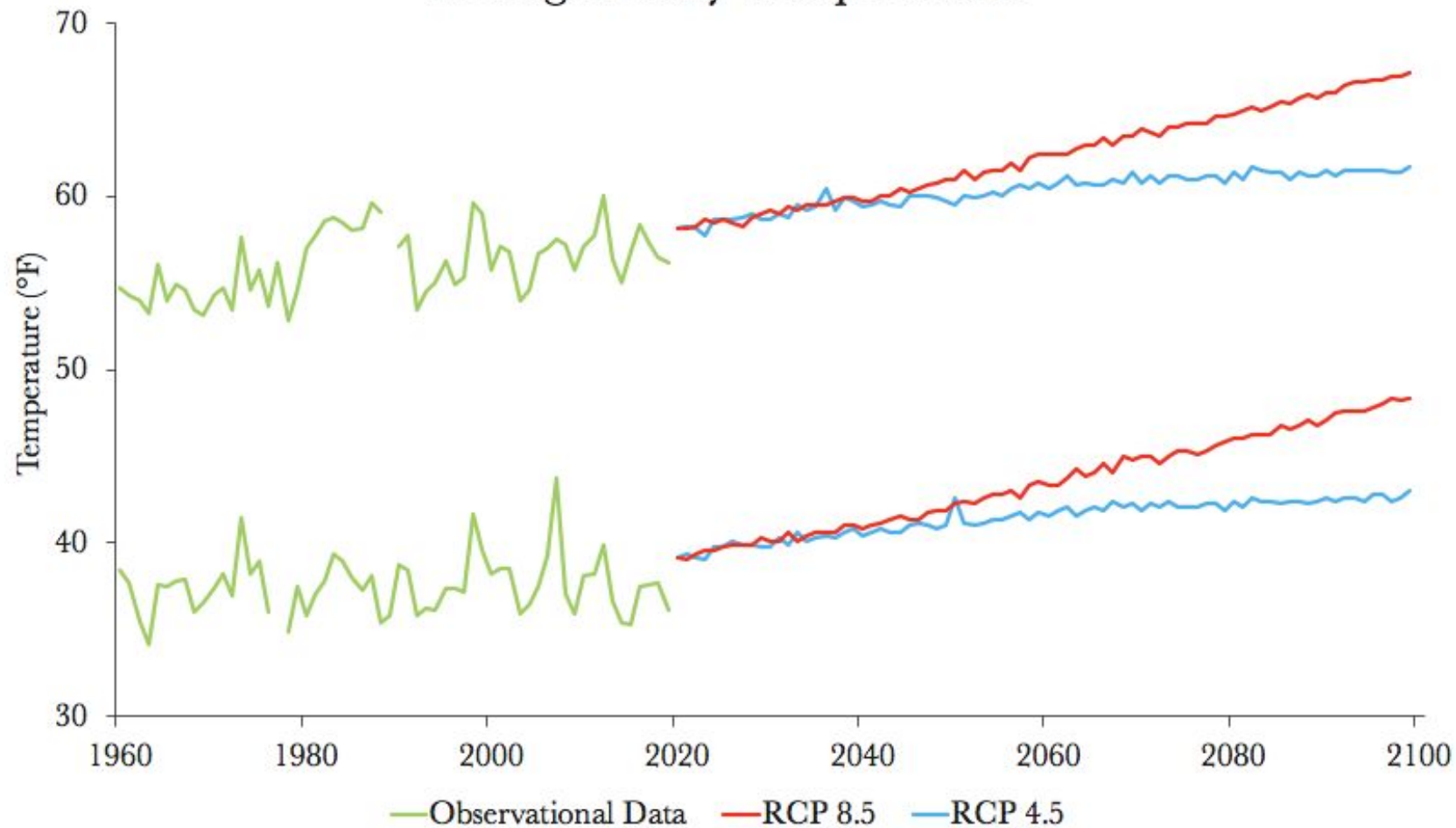
Re-Analysis

Analysis

Past

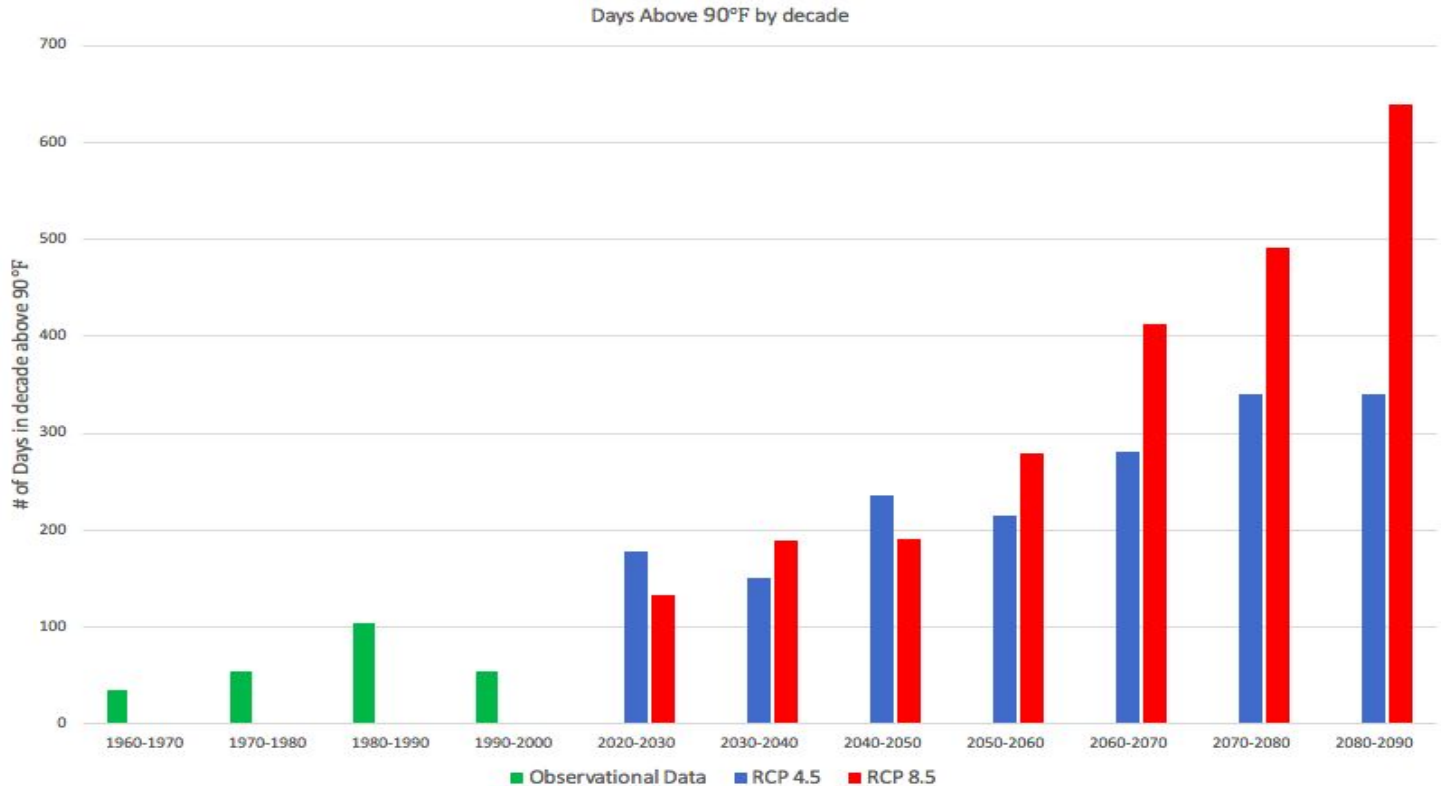
Present

# Average Yearly Temperatures



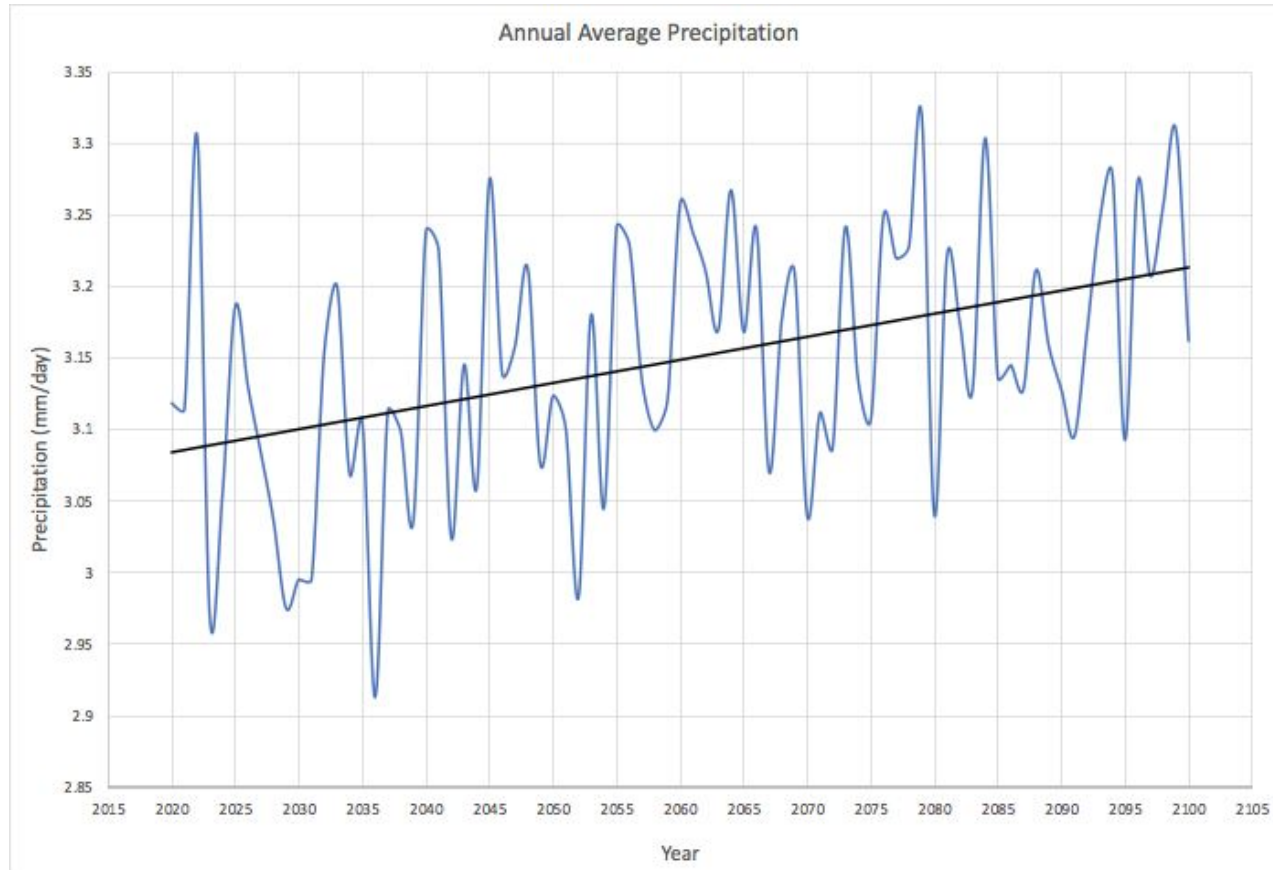
# Observed and Projected Extreme Heat Events

Defined as the temperature reaching 90°F within a 24hr period



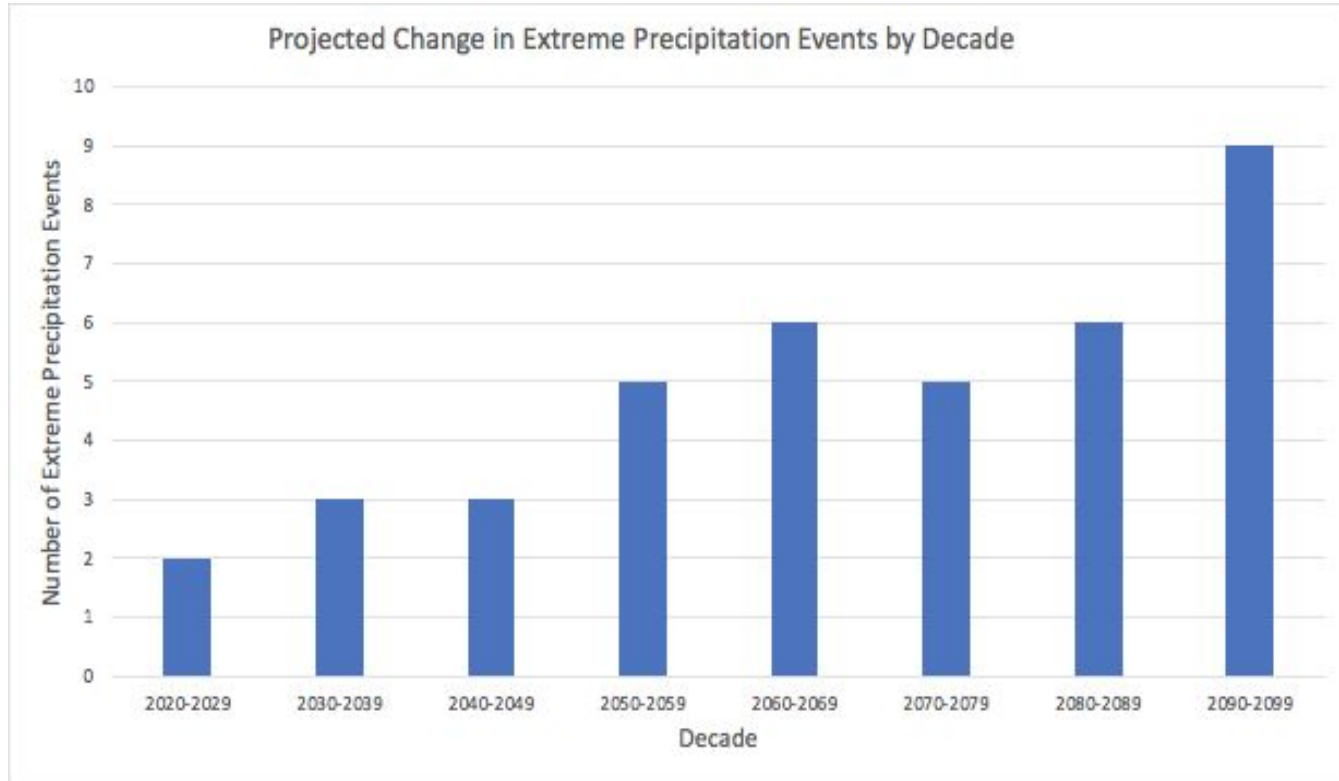


# Modelled Average Precipitation for 2020-2100



# Extreme Precipitation Events

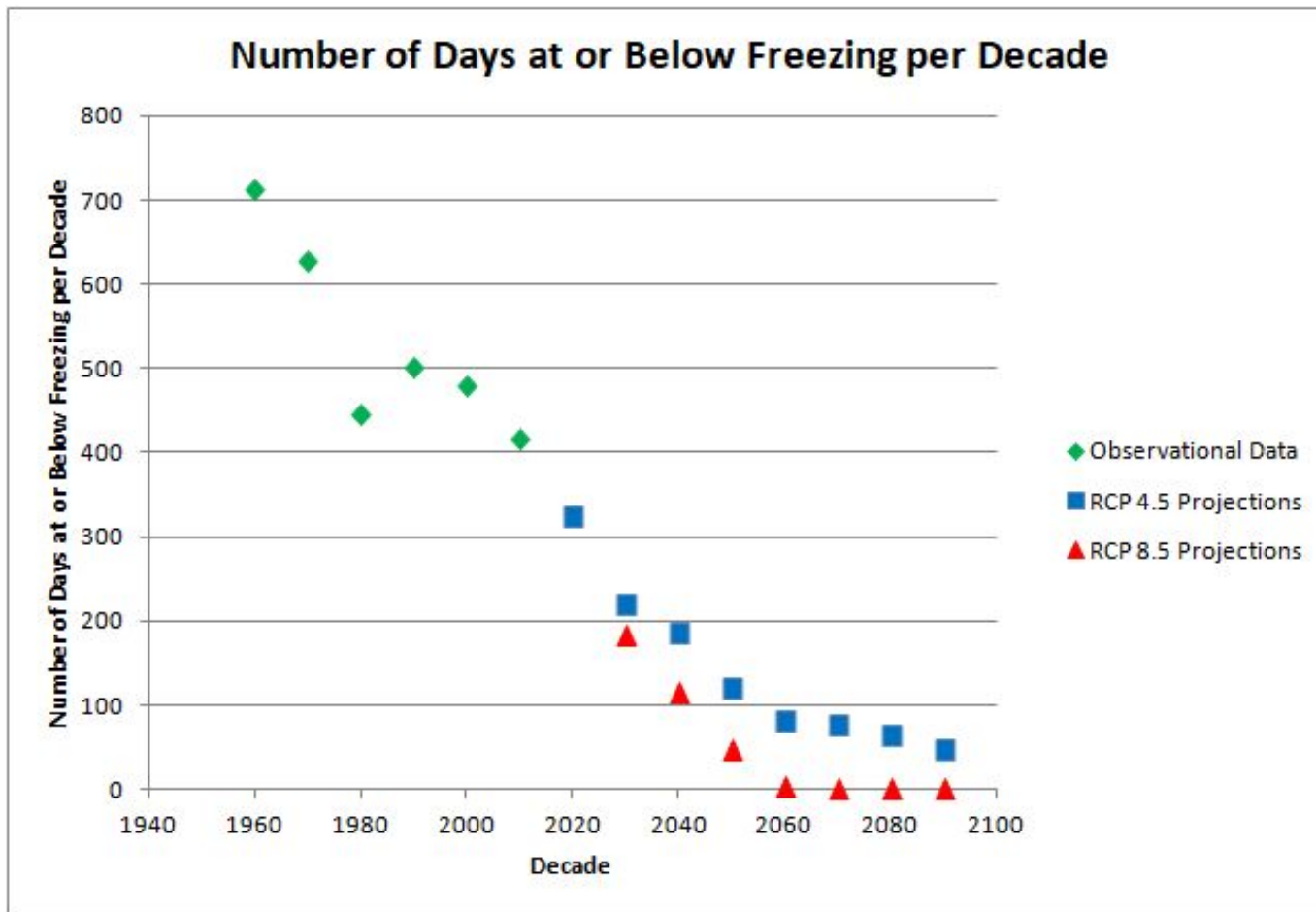
Defined as over 50 mm (2+ in) of precipitation within a 24 hour period



# Winter

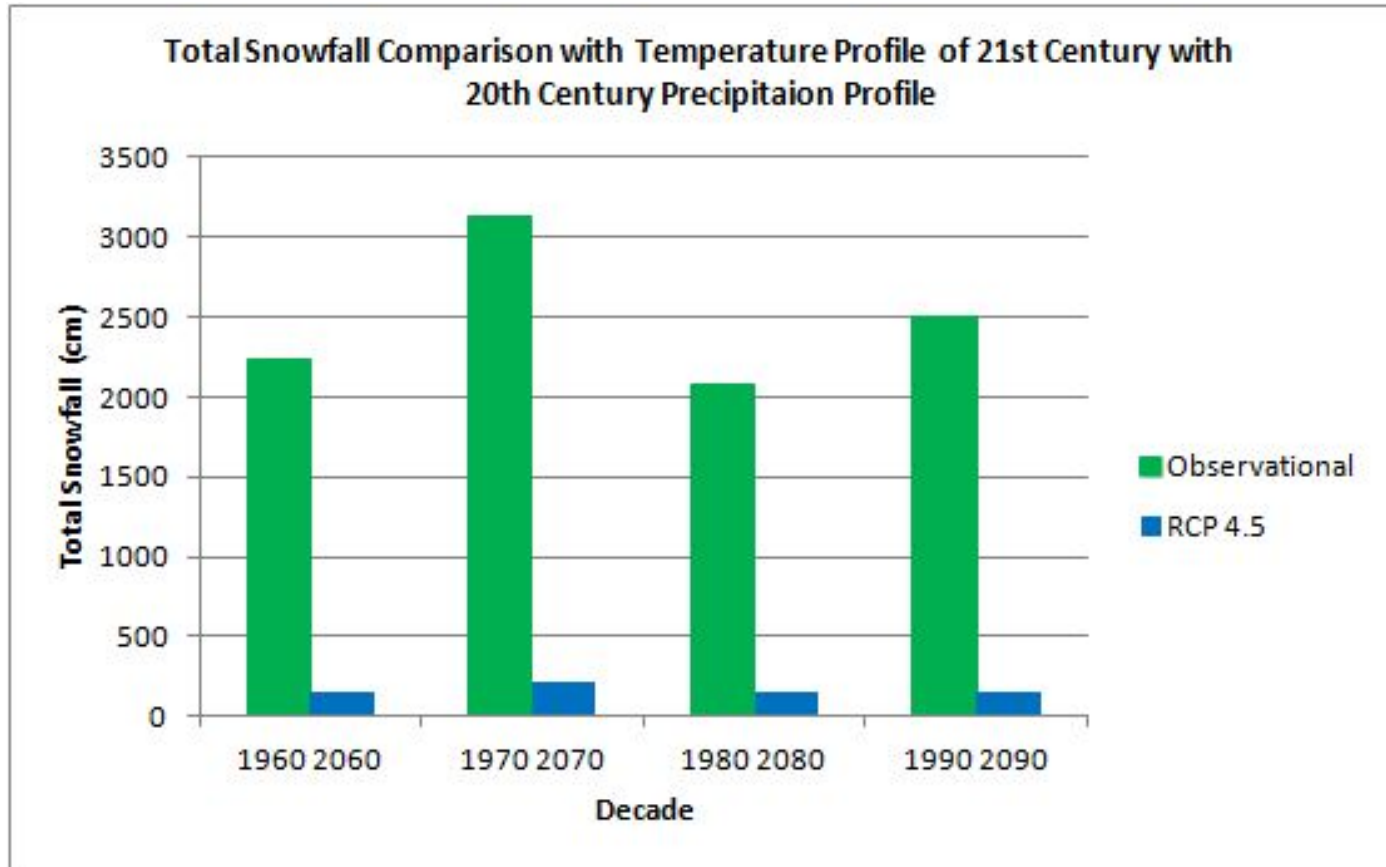


# Observational and Projected Days at or Below Freezing

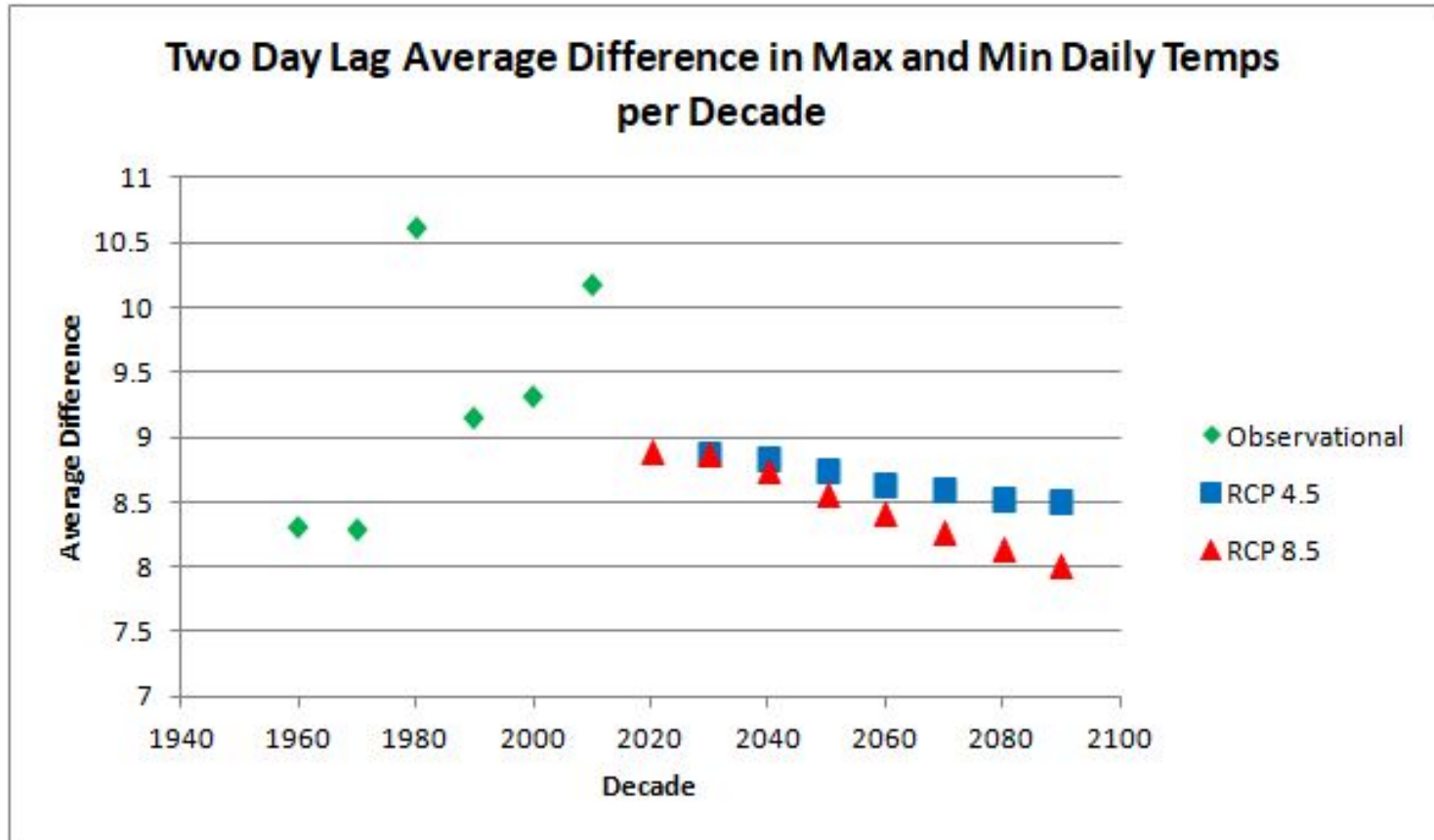




# Snowfall Comparisons



# Metric of Winter Variability



# Floodplain Maps for Clinton/Kirkland

Recurrence Interval (yrs)	Current Stream Discharge (cfs)	Predicted Future Discharge (cfs) [Mean]	Stage Height (ft)
100	1350	1712	5.17
200	1540	1938	5.47
500	1820	2284	5.92

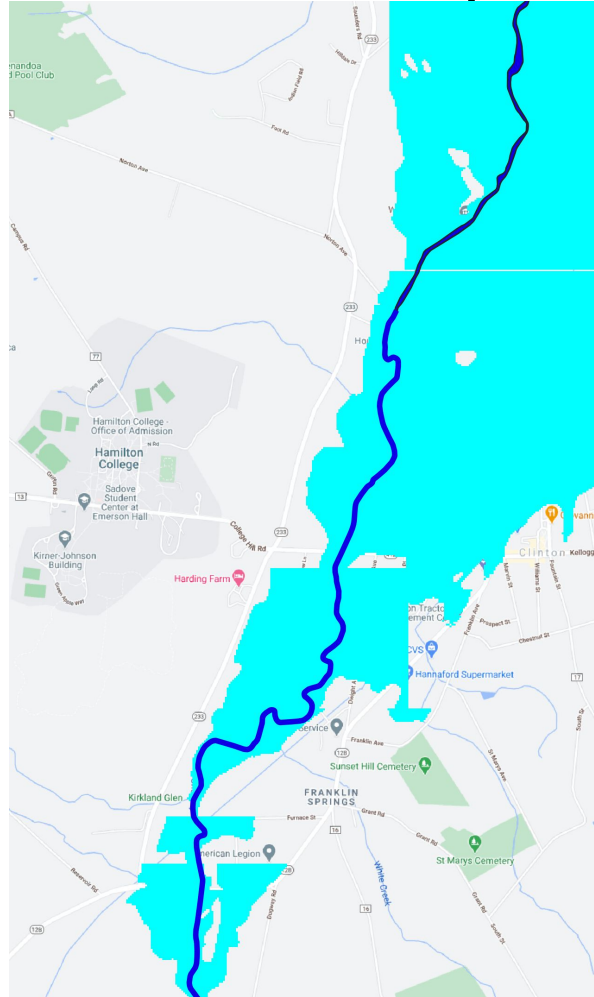
*Data retrieved from Site 1 along Sherman Brook Creek and predicts its future discharge under RCP 8.5 for the years 2075-2099. Data source: USGS.*

**Discharge:** volume of water moving down a stream or river per unit of time.

**Stage Height:** height of the water surface above stream. The greater the discharge, the higher the stage height.

**Recurrence Interval:** the probability that the given event (flood) will be equaled or exceeded in a given year. For example, if you look above, Sherman Brook has a predicted future discharge of 2,284 cfs for a flood event that is likely to occur once in every 500 years.

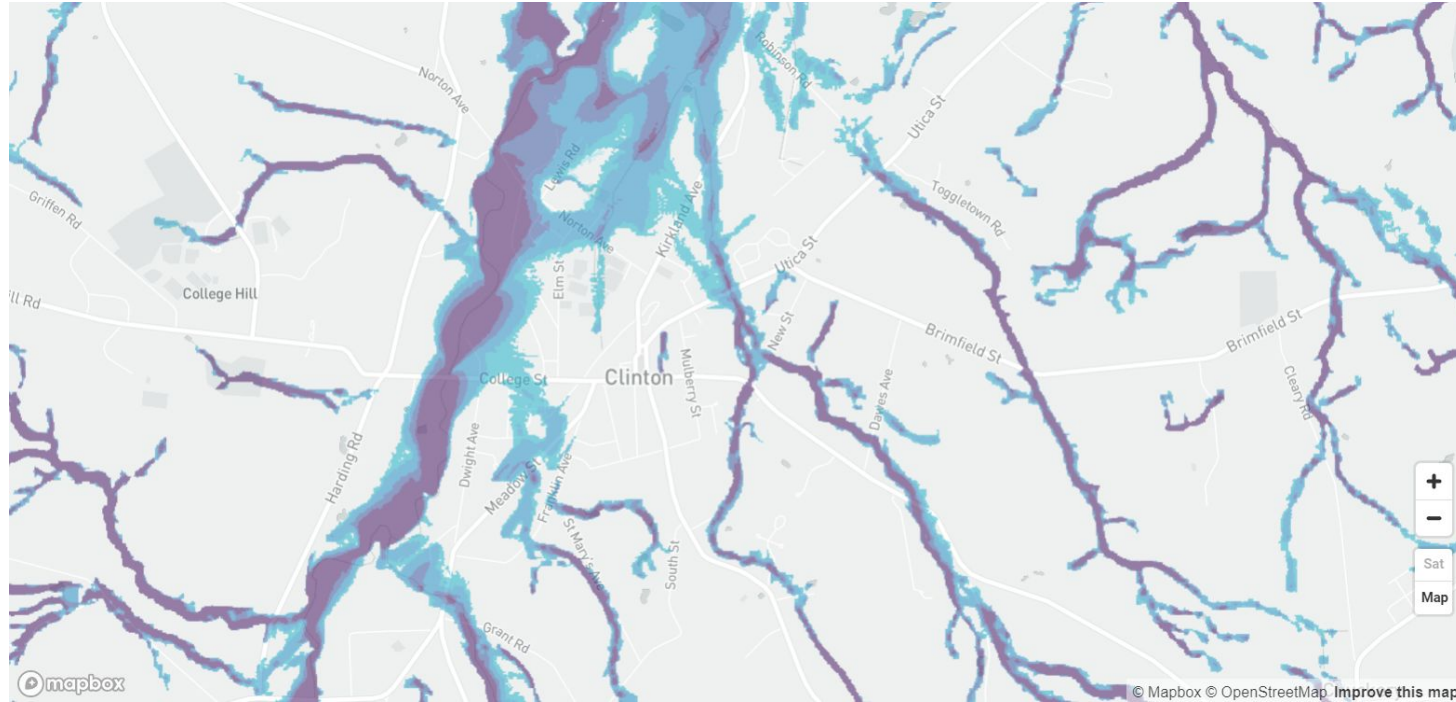
# Clinton Flood Map: Rough Draft



*Oriskany Creek flood map with a 500 year flood for RCP 8.5 at the end of the 21st century*



# First Street Foundation: 100 Year Flood 2050

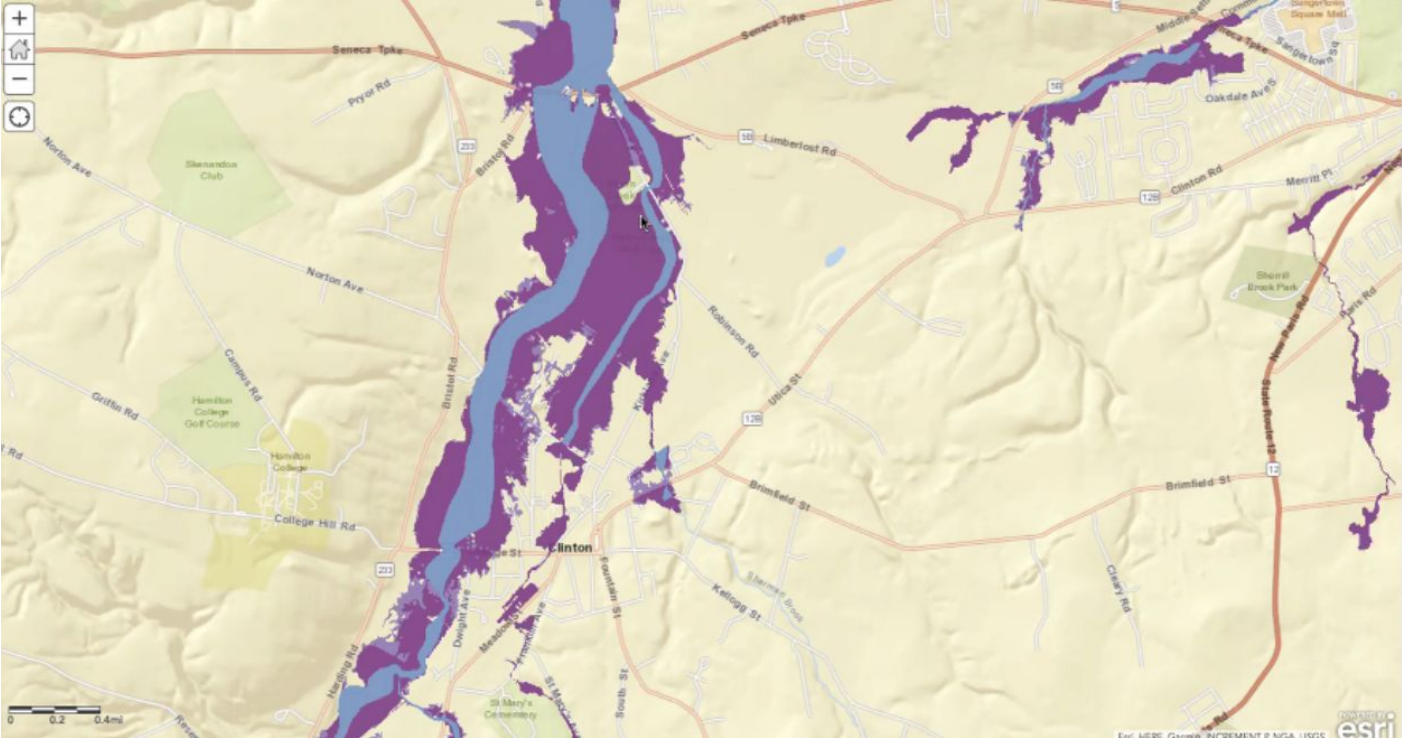


# Existing FEMA Flood Zone Map

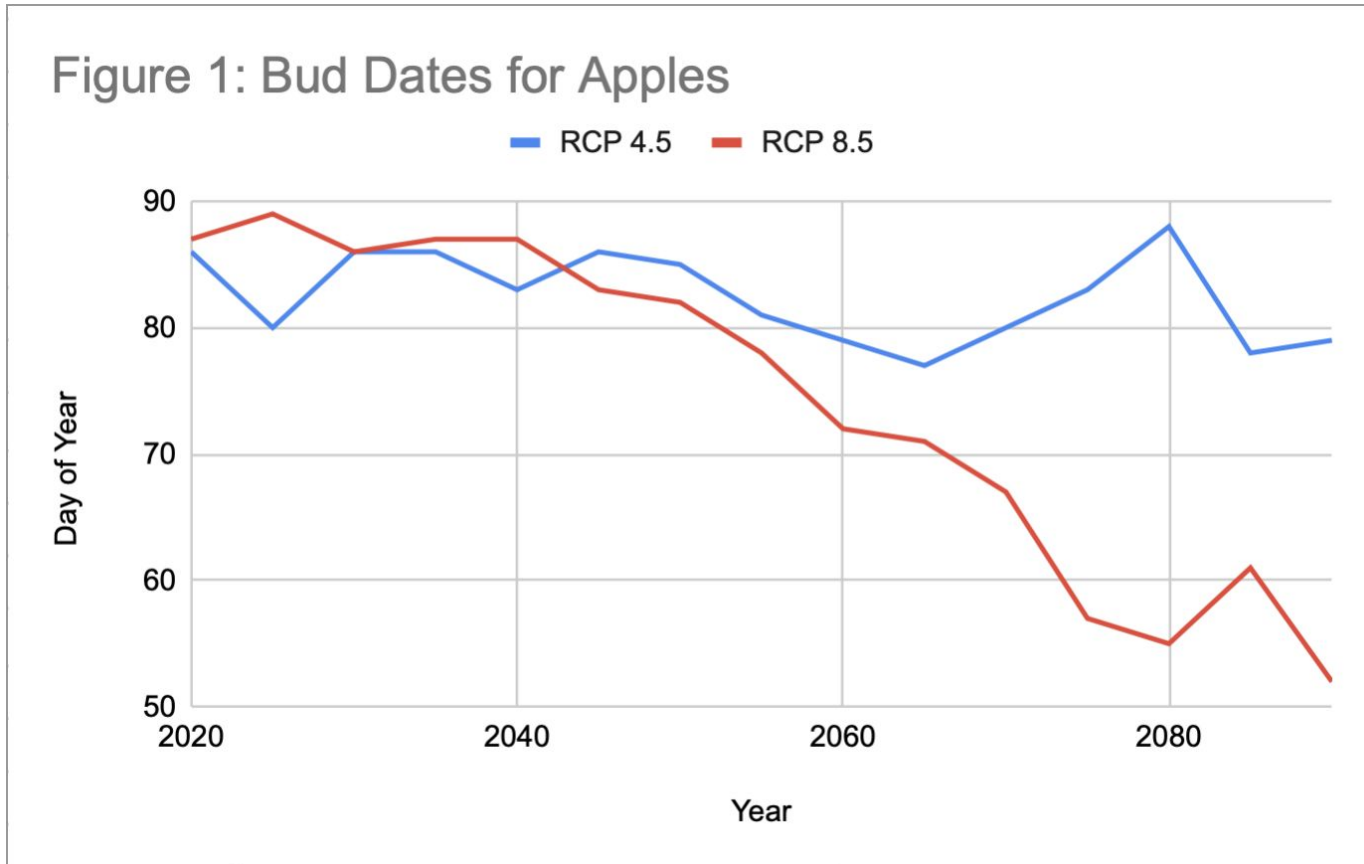
## Legend

### USA Flood Hazard Areas

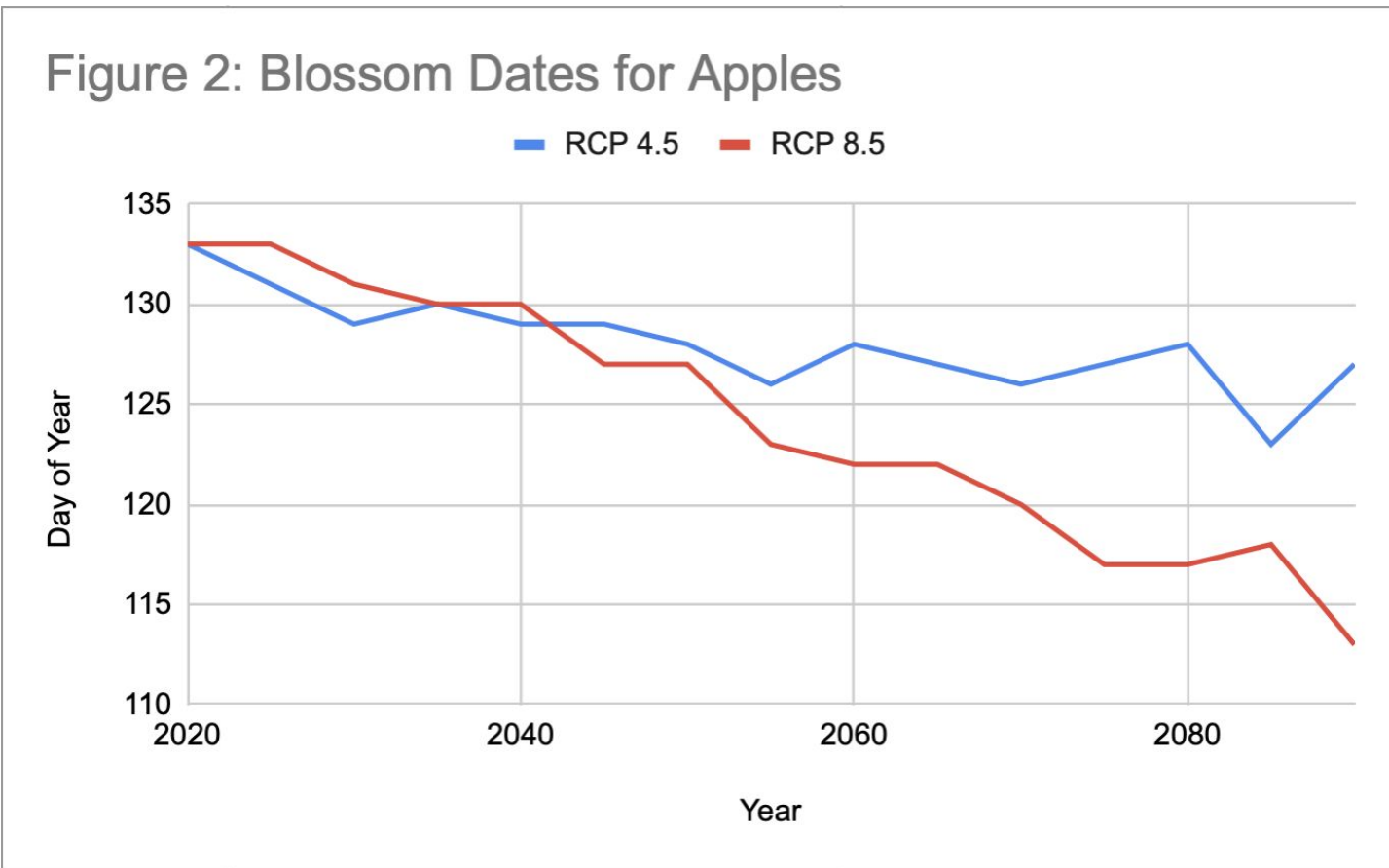
- 1% Annual Chance Flood Hazard
- Regulatory Floodway
- Special Floodway
- Area of Undetermined Flood Hazard
- 0.2% Annual Chance Flood Hazard
- Future Conditions 1% Annual Chance Flood Hazard
- Area with Reduced Risk Due to Levee
- Area of Minimal Flood Hazard



# Agriculture: Changes in Bud Dates for Apples

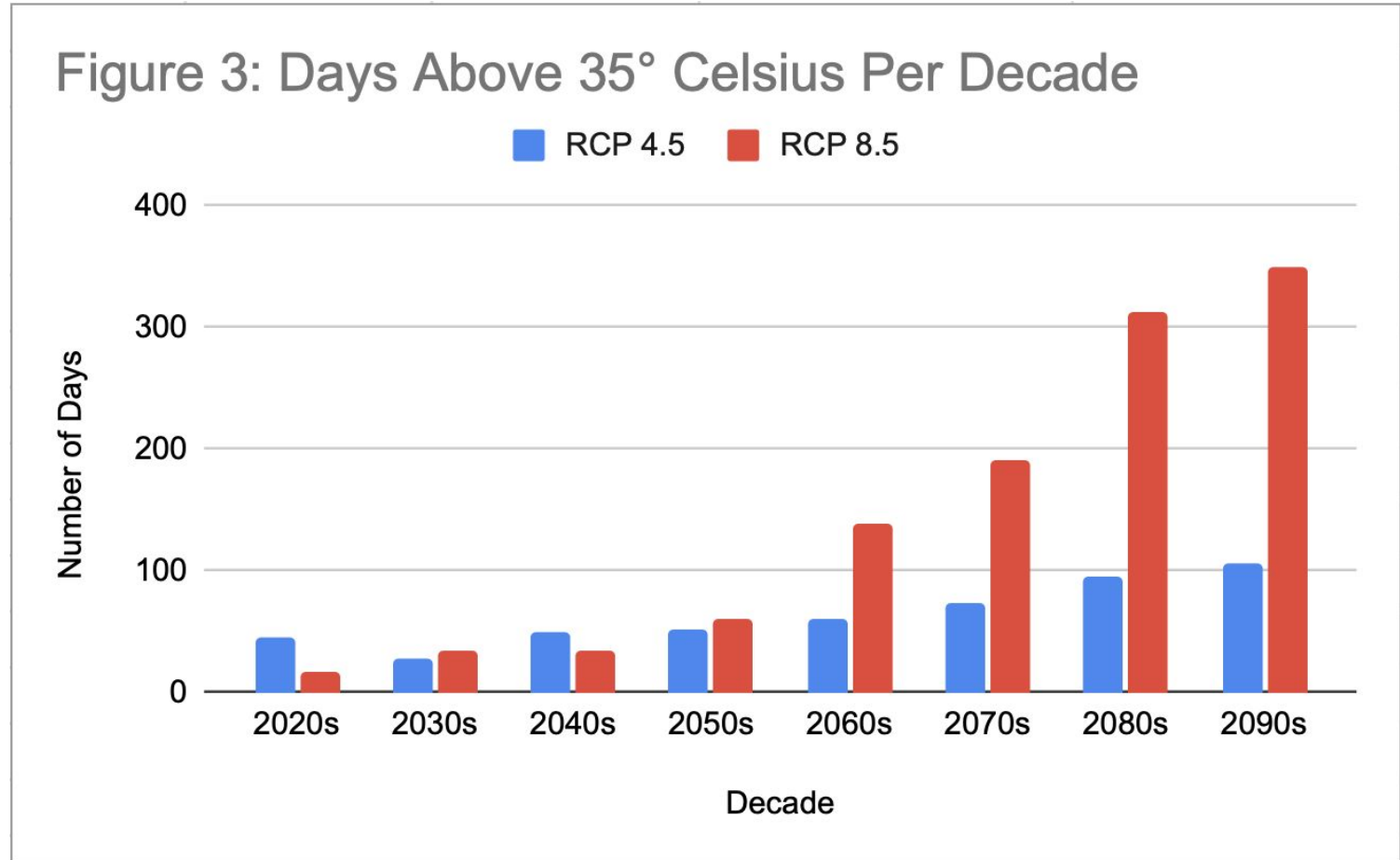


# Agriculture: Changes in Blossom Dates for Apples





# Agriculture: Changes in Corn Vulnerability



# Agriculture: Average Losses in Cow Milk During Summer Months

**- 45 gallons/cow**

1960-2020

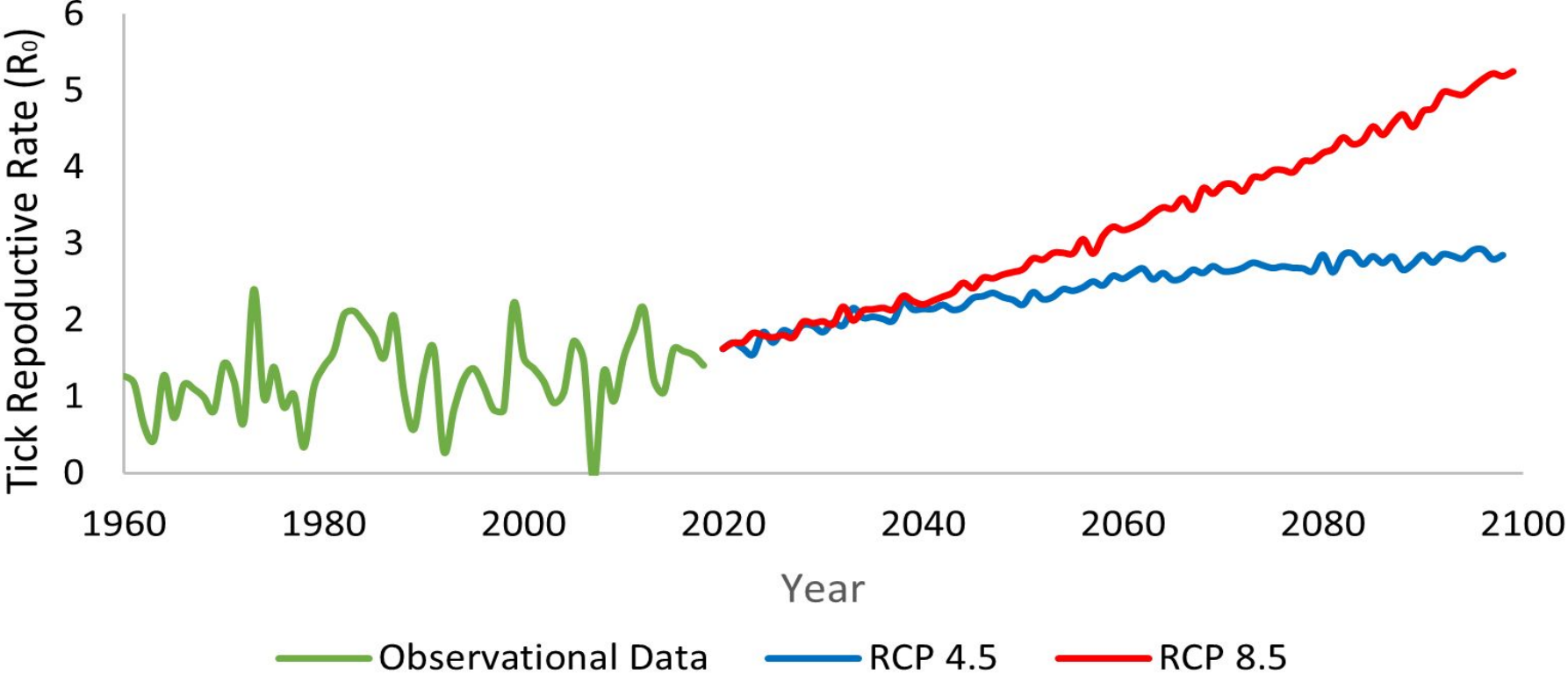
**- 70 gallons/cow**

2020-2080 under RCP 4.5

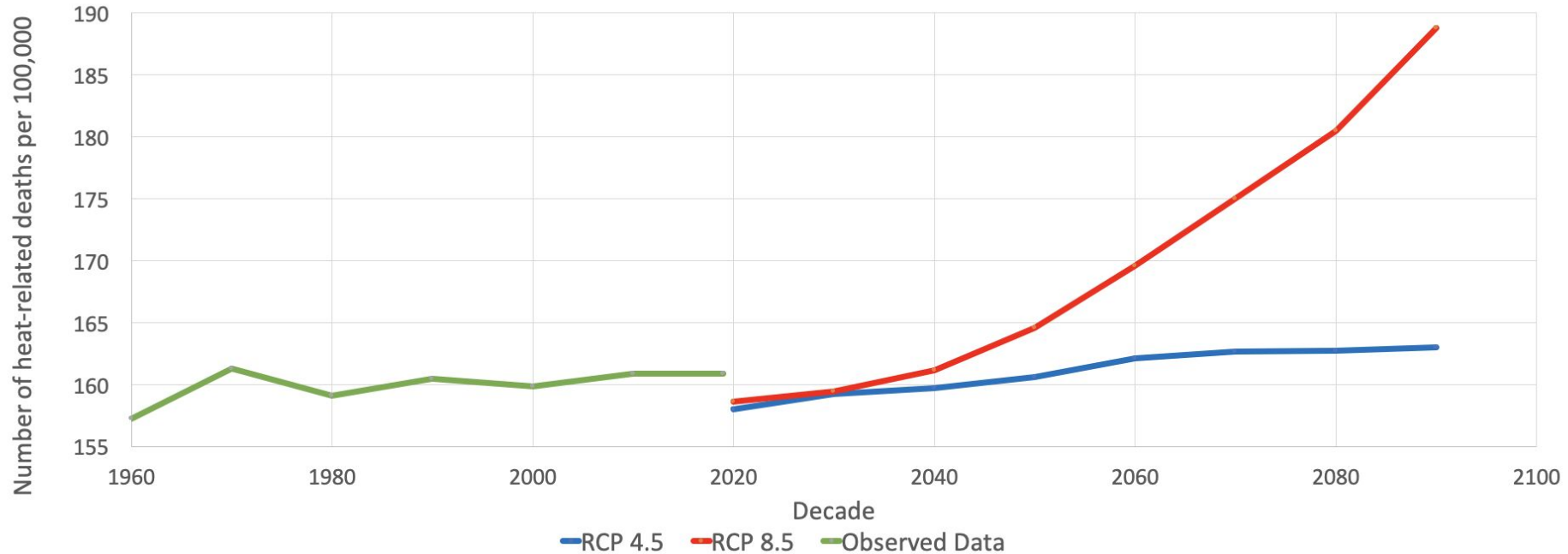
**- 91 gallons/cow**

2020-2080 under RCP 8.5

# Projected Change of Tick Reproductive Rate Over Time in Clinton, NY



# Projected Excess Heat-Related Mortality Due to Climate Change



# The Climate Crisis's Impact on Mental Health

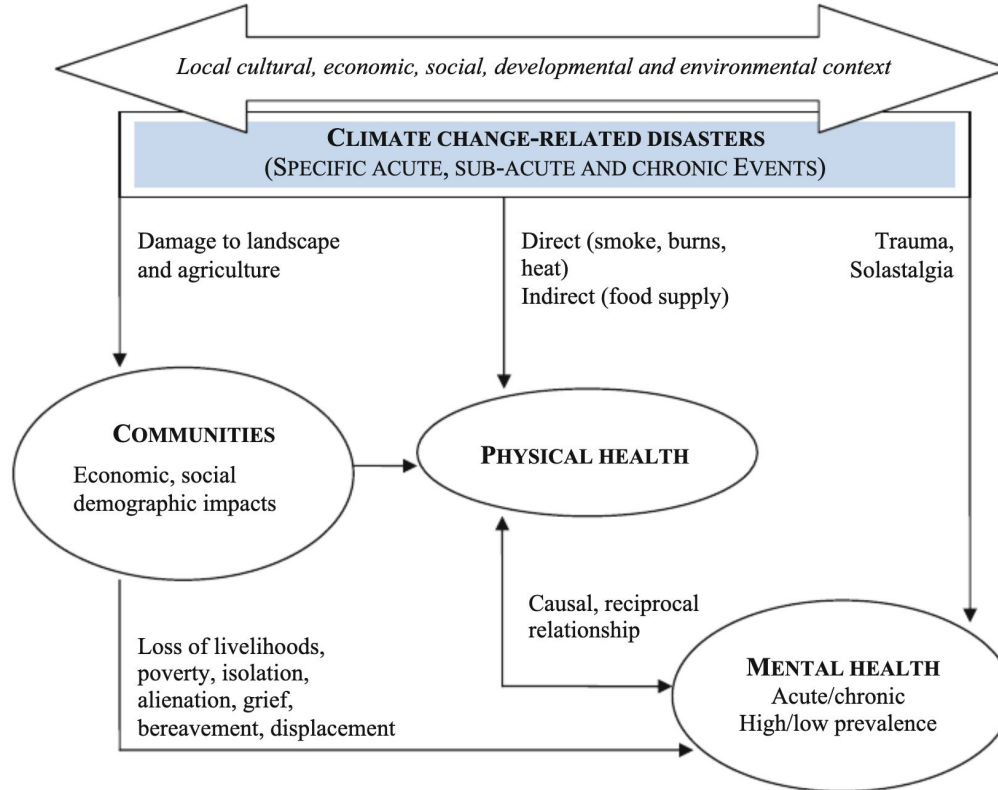


Figure from Berry et al., 2009



# Bird Habitat Movement

- Current bird species will move north
- More southern birds will move in

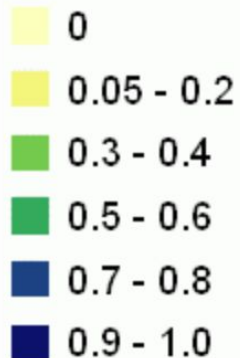


Turkey Vultures

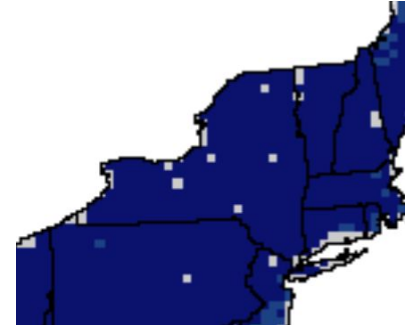
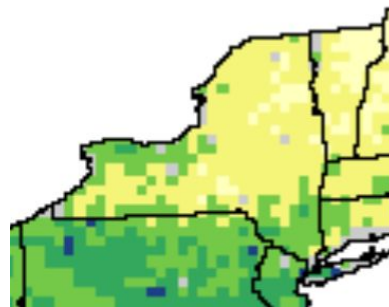


American Goldfinch

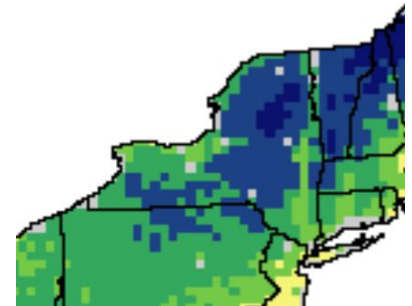
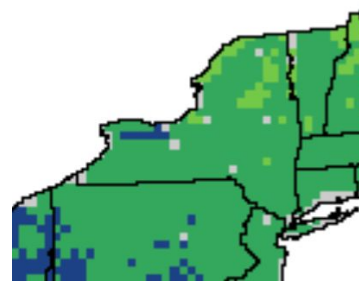
## Incidence



Current



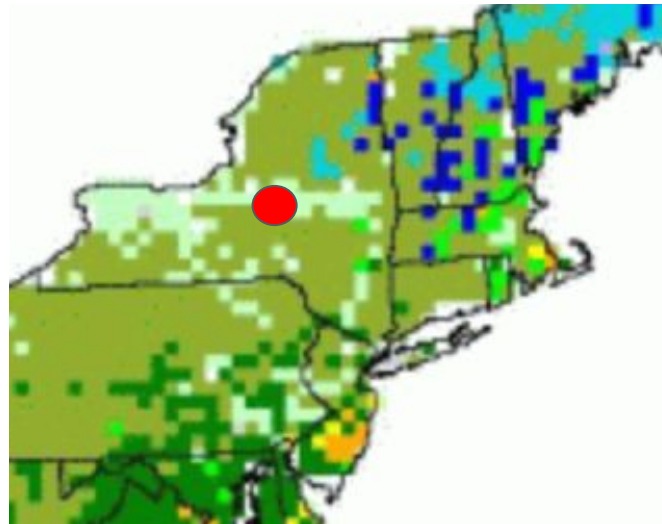
Future  
Hadley  
2100



# Tree Species Movement in the Northeast

- We will transition from a mostly Maple and Elm\Ash forest to a mostly Oak and Hickory

Current distribution of trees in the northeast



Current

Projected movement of trees in the northeast

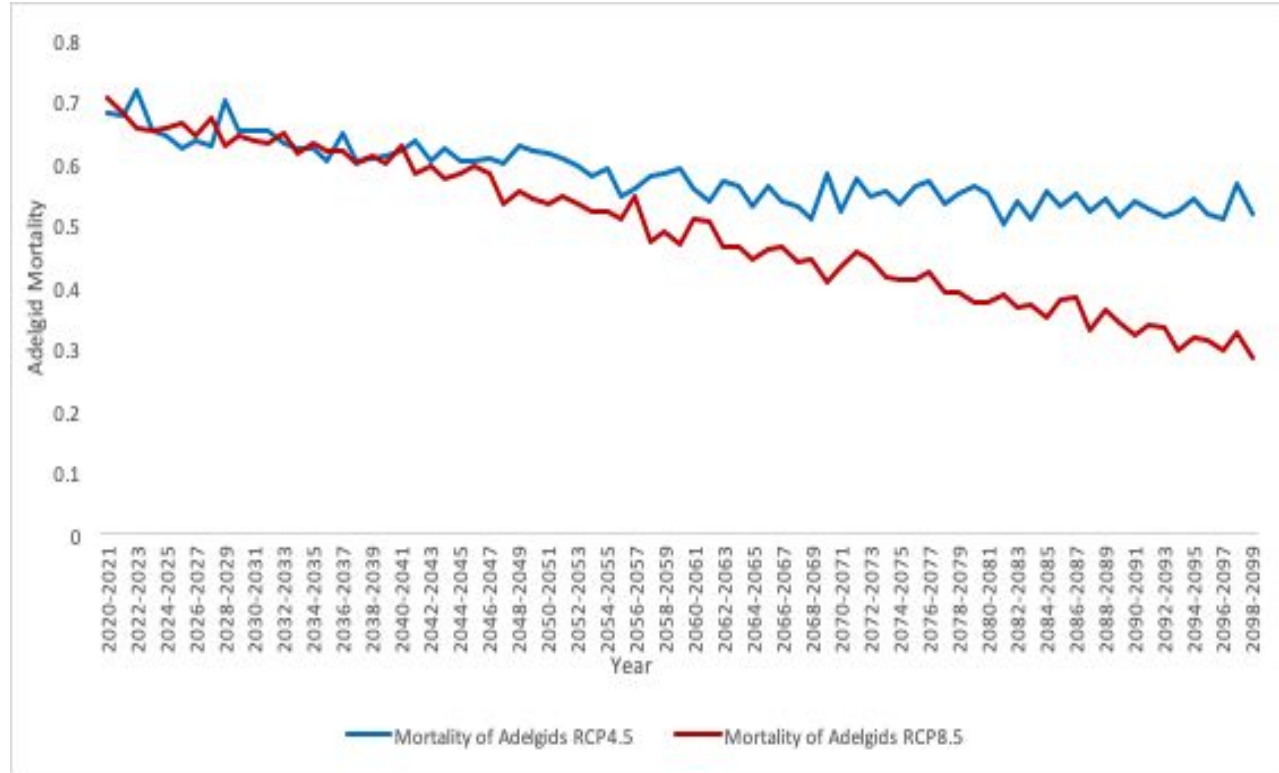


Hadley 2100



# Projected Hemlock Woolly Adelgid Mortality

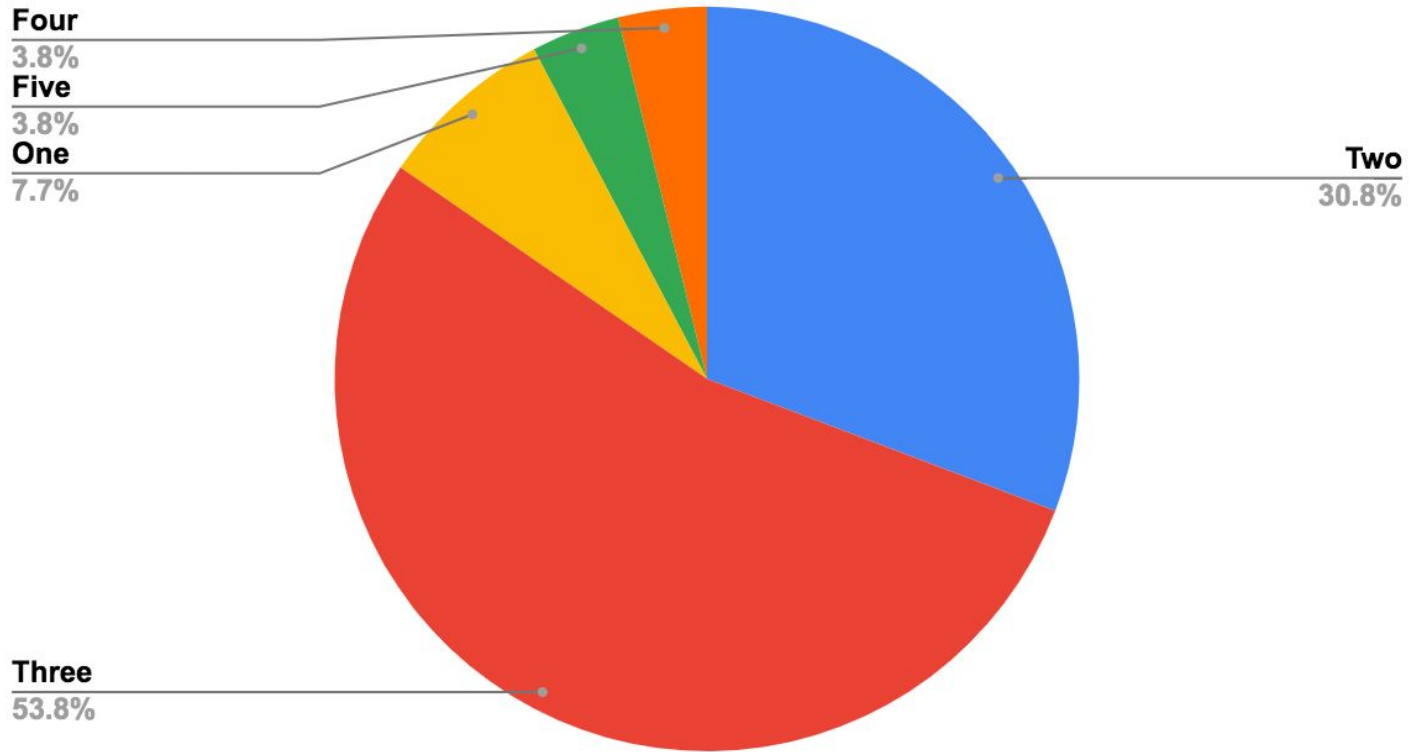
- Based on the average daily mean winter (DJFM) temperature
- DJFM = December, January, February, March



# Social Vulnerability / Adaptive Capacity

	<b>Age</b>	<b>Race</b>	<b>Income</b>	<b>Education</b>
<b>United States of America</b>	<b>Percent of Population Over 65</b>	<b>Percent White Population</b>	<b>\$150,000 to \$200,000+</b>	<b>Graduate or professional degree</b>
	13%	72.04%	15.04%	11.27%
<b>Separator</b>				
<b>Kirkland/Clinton</b>	<b>Percent of Population Over 65</b>	<b>Percent White Population</b>	<b>\$150,000 to \$200,000+</b>	<b>Graduate or professional degree</b>
	20.09%	91.55%	15.70%	17.80%

## Confidence in ability to adapt (Scale of 1-5)





**Figure X: Average Value of Homes in Town of Kirkland and Clinton Village (Inside and Outside of Flood Zones)**

	100 Yr Flood Zone	500 Yr Flood Zone	100 Yr and 500 Yr Flood Zone	Outside Flood Zone
Clinton	\$206,500	\$204,500	\$211,889	\$209,505

# What do you think Kirkland and Clinton should do?

Given what you just heard, what do you think we should do about it?

