NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

NEW YORK STATE OF OPPORTUNITY™ | Climate Smart Communities

Agriculture & Climate Change Adaptation: A Role for Communities

This webinar will start shortly.

Office of Climate Change
December 7, 2017

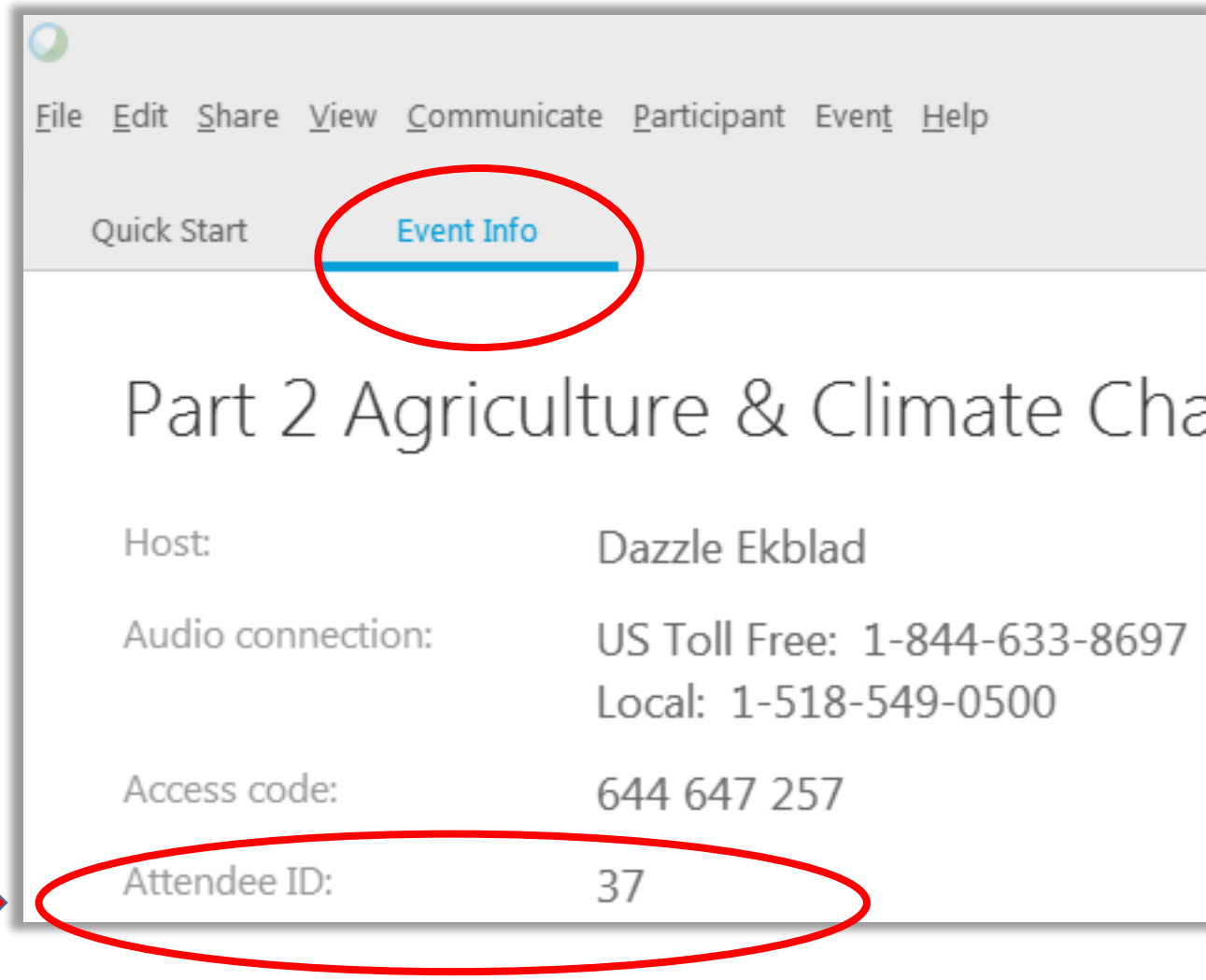
Welcome!

Today's webinar: ***Ag & Adaptation***

Connect to the audio with your phone:

1) **Go to the "*Event Info*" tab for call-in details, and**

2) **Enter *your unique attendee ID* when prompted.**



Today's webinar topic:

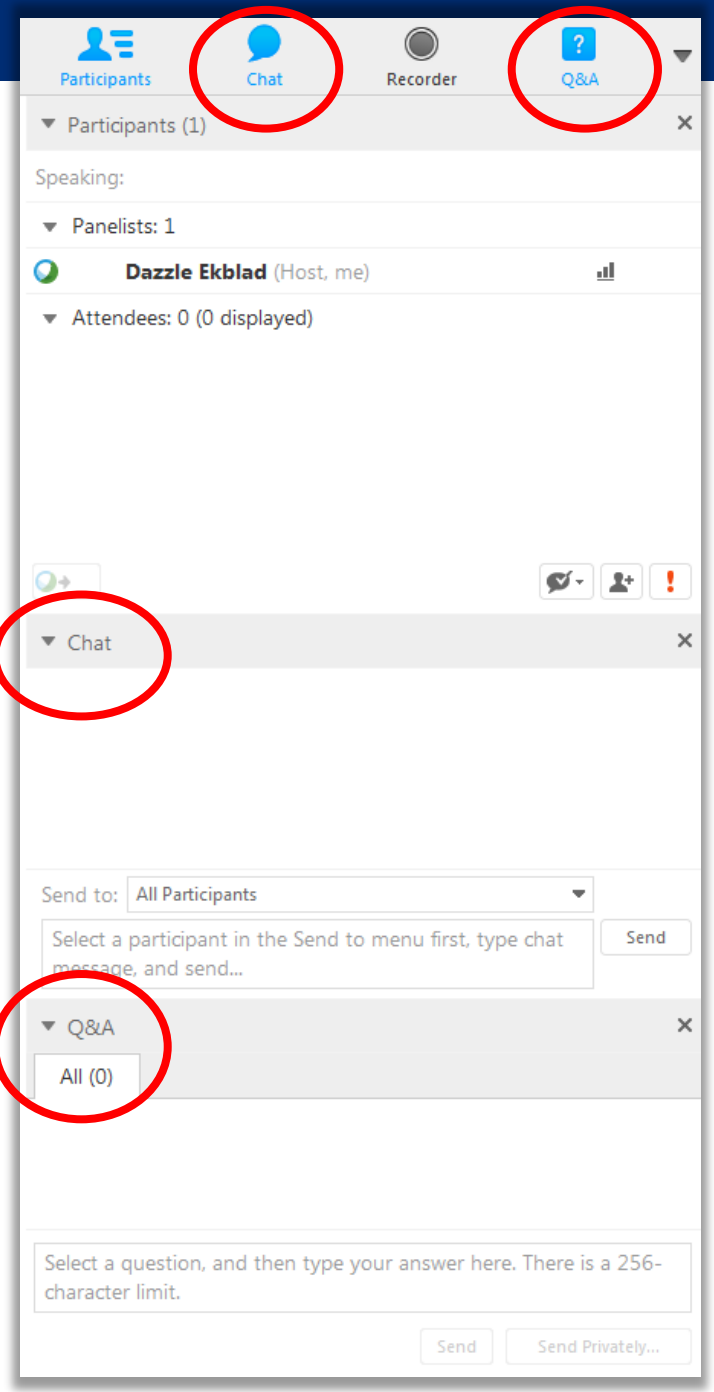
Ag & Climate Adaptation

Problems or technical questions?

Use WebEx Chat

Content questions for speakers?

Use WebEx Q&A



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Agenda

- **Announcements**
  - *Dazzle Ekblad, DEC*
- **Climate Change Impacts to Ag in NYS & Cornell Climate Smart Farming Tools and Resources**
  - *Allison Chatrchyan, Cornell Institute for Climate Smart Solutions*
- **Q & A**
  - *All speakers*

Save on EVs through NYS Programs

DEC Municipal ZEV Rebates - Now open!

- For local gov’ts only
- Purchases/leases of eligible zero-emission vehicles (ZEVs)
  - Up to $5k for eligible **plug-in hybrid or battery electric** or hydrogen fuel cell vehicles
- Eligible **infrastructure** for charging/fueling ZEVs (20% match)

NYSERDA Drive Clean Rebate

- Up to $2k for plug-in electric hybrids or battery-powered cars
- Local gov’ts are eligible; stackable w/ DEC ZEV rebates

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Upcoming Events

- Dec. 8, **Green Procurement** – Choosing Safer Materials for Your Business, 8-10 AM in Valhalla (workshop organized by Westchester Green Business)
- Dec. 11, CCE Workshop: **Managing Your Flood Risk in the Hudson Valley**, 6-8 PM in Kingston; **REGISTER TODAY**: online at http://ulster.cce.cornell.edu/ or call 845-340-399 x 327
- Jan. 11, CSC Webinar: **Role of Community Engagement in Creating Local Climate Action Plans**

Get Help from Regional Coordinators

- Coordinators provide free consulting services to local governments participating in NYSERDA's Clean Energy Communities Program
  - Approximately 50 hrs of free, on-demand technical assistance per municipality
  - Includes support for becoming a Certified Climate Smart Community
- Contact the coordinator in your region: https://www.nyserda.ny.gov/Contractors/Find-a-Contractor/Clean-Energy-Community-Coordinators

From left, CEC Coordinators for Mohawk Valley (Dan Sullivan), North Country (Jamie Rogers), Capital Region (Robyn Reynolds), and Mid-Hudson (Carla Castillo)

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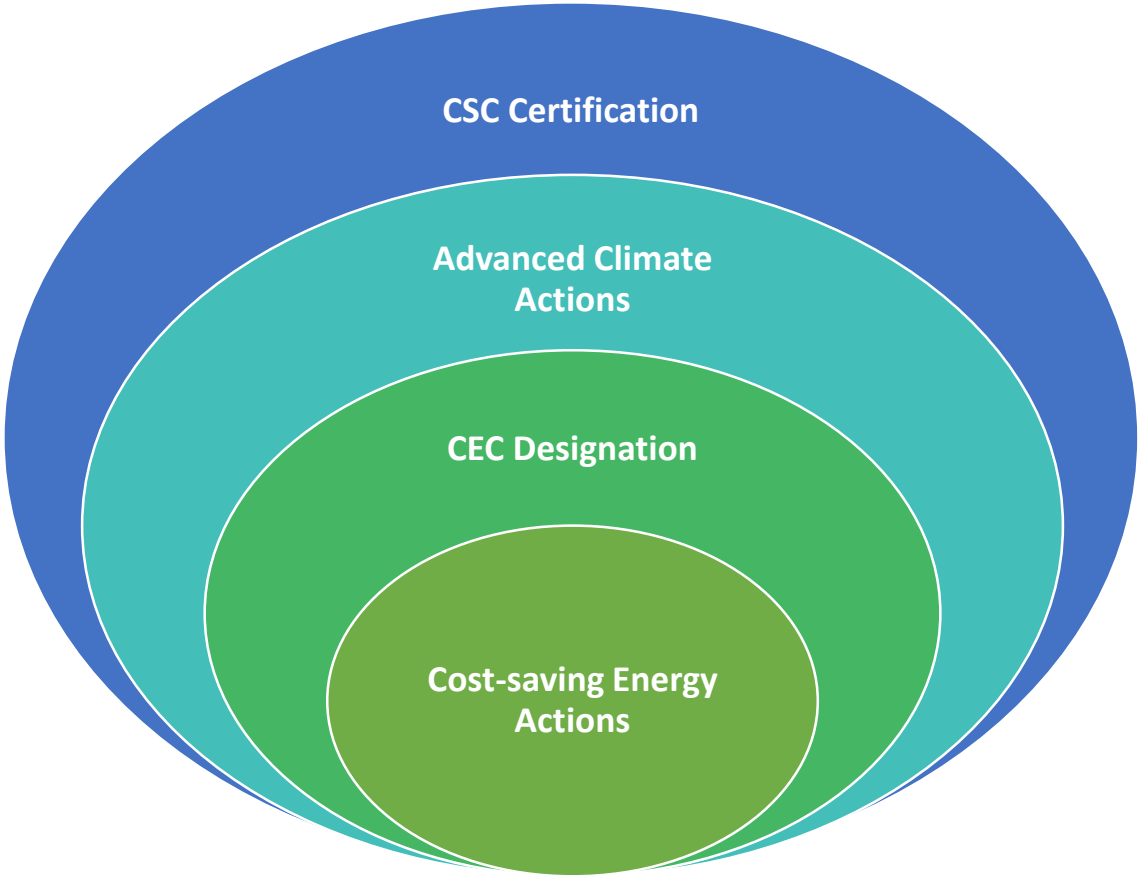
How are the two programs related?

Climate Smart Communities Certification

- Comprehensive climate program
- 138 unique actions
- Improve score on CSC grant applications

Clean Energy Communities

- Focused on clean energy
- 10 high-impact actions
  - 1 of 10 is becoming a Certified CSC
- Complete 4 actions to be designated a CEC and gain access grant funding



➢ **Earn points toward CSC Certification by doing CEC actions**

➢ **Do both!**

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Southampton is NY's Newest Certified CSC

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Climate Smart Communities Certified

BRONZE:

1) Ulster County
2) City of Kingston
3) Village of Dobbs Ferry

CERTIFIED:

1) Madison County
2) Orange County
3) Sullivan County
4) Schenectady County
5) Tompkins County
6) City of Albany
7) City of Rochester
8) City of Watervliet
9) Town of Mamaroneck
10) Town of Ithaca
11) Town of East Hampton
12) Town of Cortlandt
13) Town of Southampton

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CSC Certification

- **CSC Certification Workbook**
  - Excel tool for estimating pts for past actions, tracking progress & submitting documentation; email climatechange@dec.ny.gov for a copy
- Actions from the CSC Certification Program related to today's webinar:
  - **#6.7 –** Adopt land-use policies that support community gardens & urban & rural agriculture (4 pts.)
  - **#8.6** – Create & promote local farmers markets (3 pts.)

Cornell University

CSF Cornell Climate Smart Farming

Agriculture & Climate Change Adaptation: A Role for Municipalities & Farming Communities

•Allison M. Chatrchyan, Ph.D. Cornell Climate Smart Farming Program Cornell Institute for Climate Smart Solutions

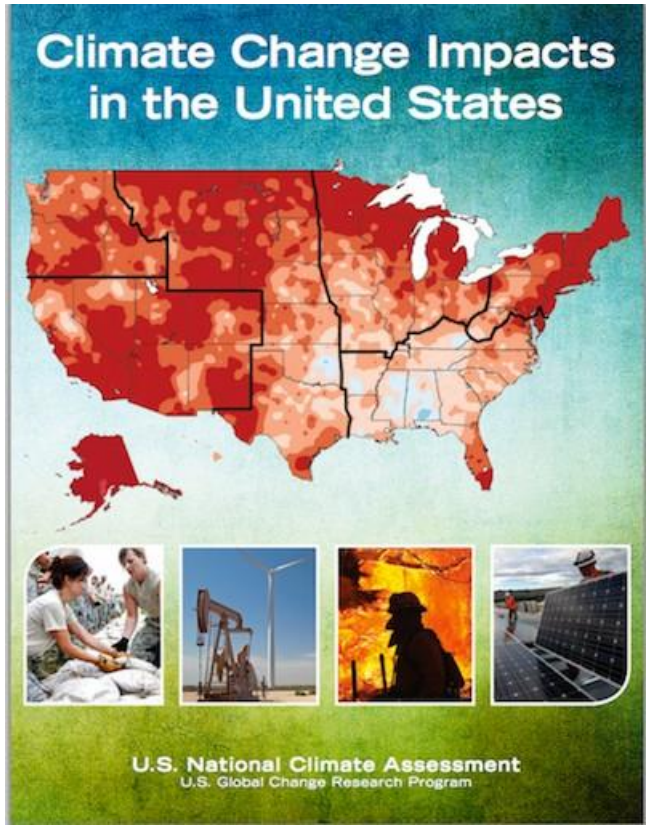
•Climate Smart Communities (CSC) Webinar Thursday, December 7, 2017, 9:00 - 10:30 AM

Think about it…

- How have extreme weather & climate change affected your community and farmers over the last decade??
- How can we bring about change as quickly as possible, to reduce our impact on the climate, and increase resiliency?
- What resources and tools are available to farmers and communities?

Today's Webinar

- Overview climate impacts in the NE and how they affect agriculture and communities
- Introduce Cornell Climate Smart Farming Program
- Introduce adaptation practices and tools
- Discuss how communities can help foster Climate Smart Farming
- Examples/Resources



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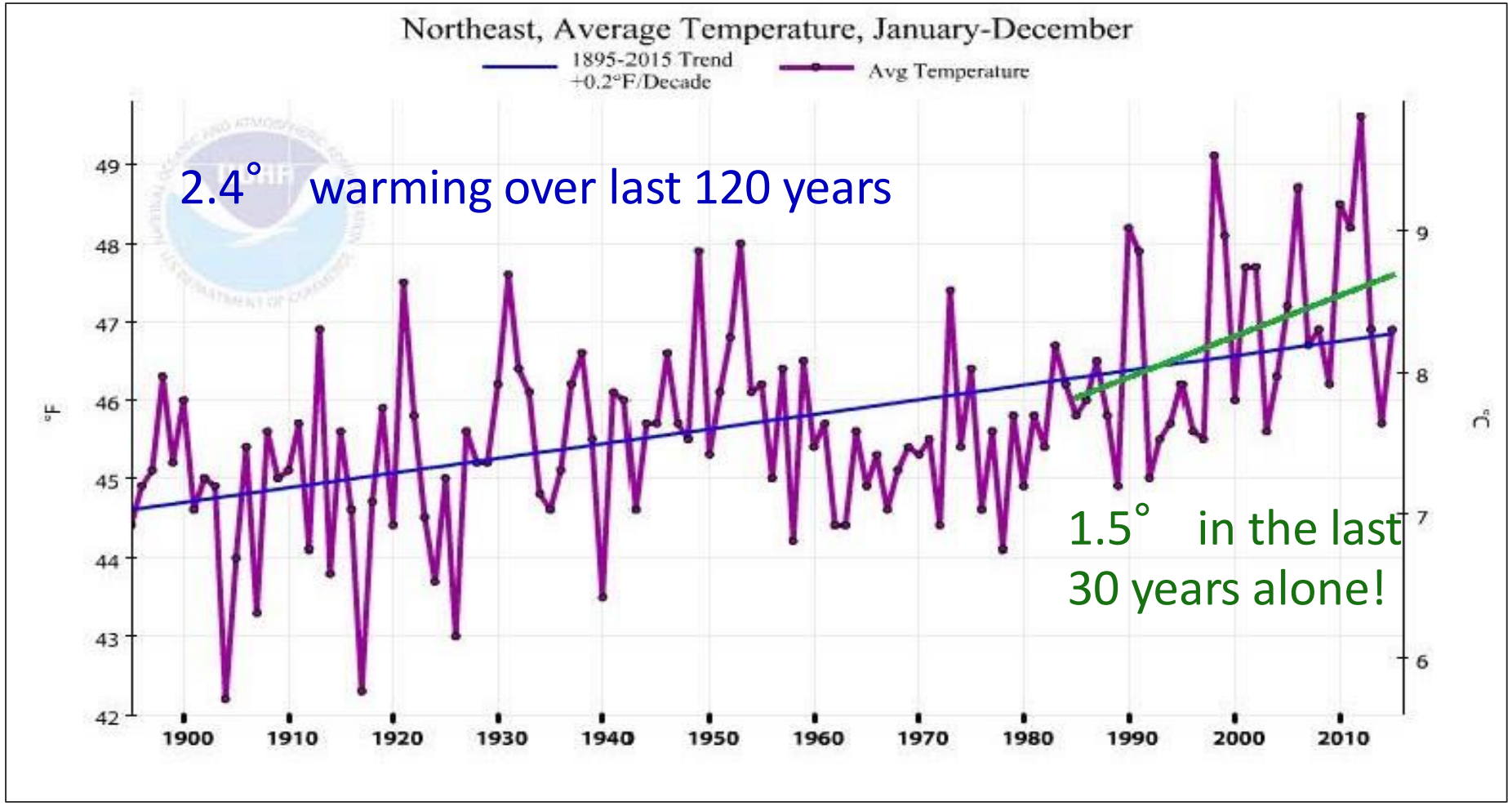
Climate Smart Farming

http://nca2014.globalchange.gov/

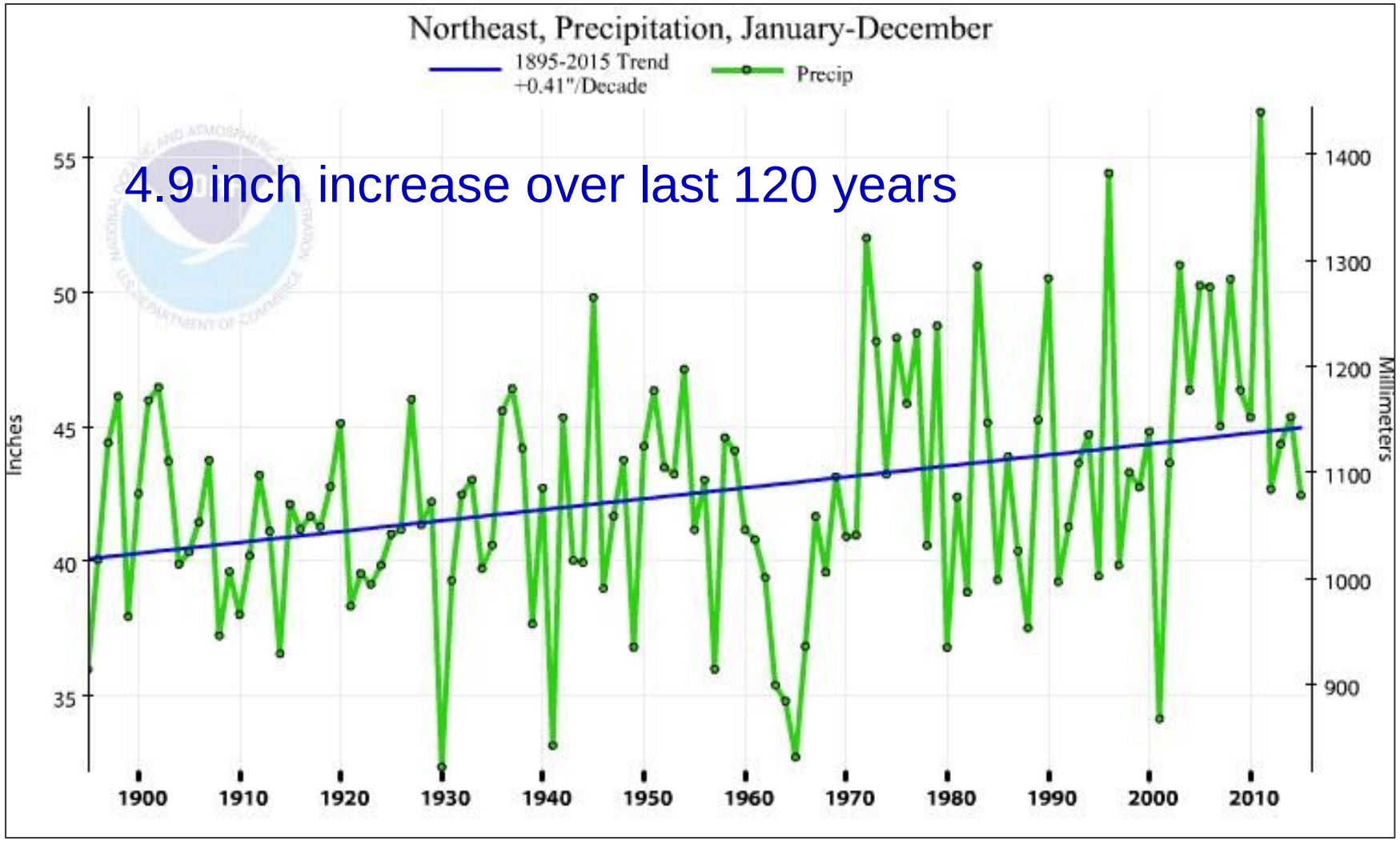
https://science2017.globalchange.gov/

NE Temperature Trend



Source: NOAA NCDC. Data 1895-2015.

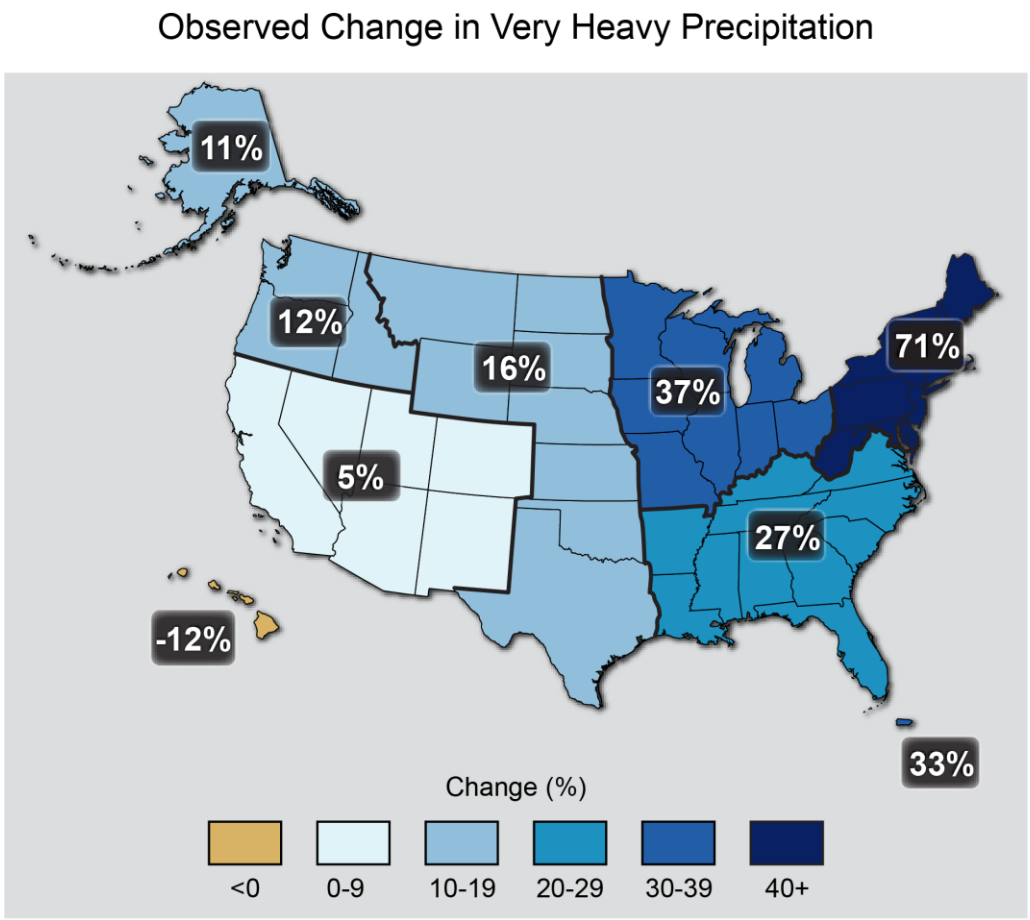
NE Precipitation Trend



Source: NOAA NCDC. Data 1895-2015.

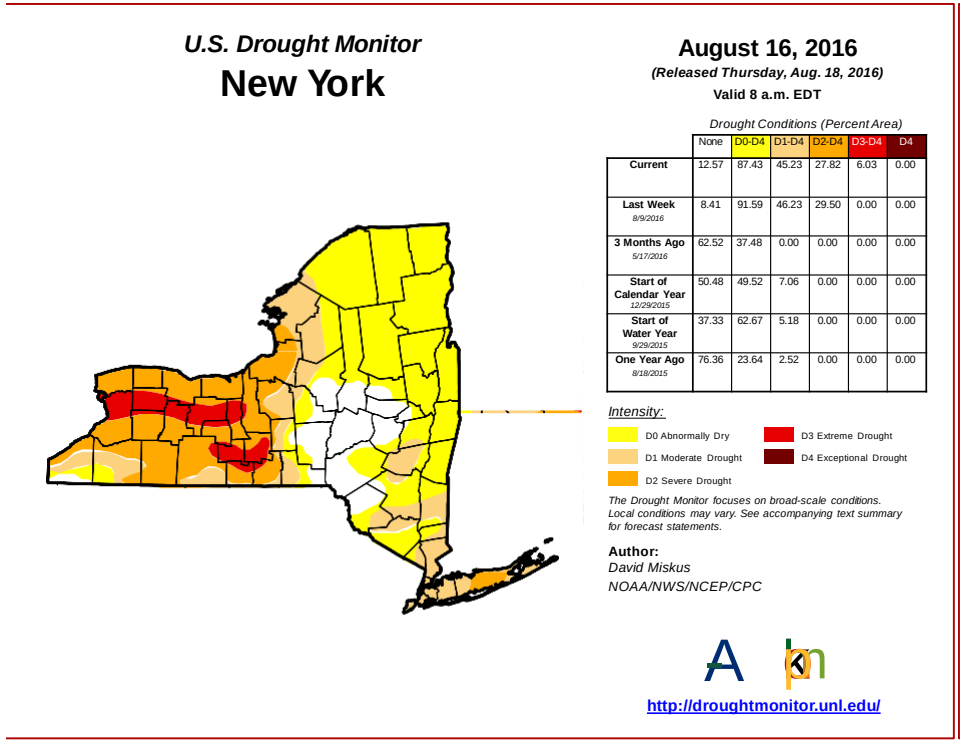
Observed Trends in 1-day Very Heavy Precipitation (1958 to 2012)

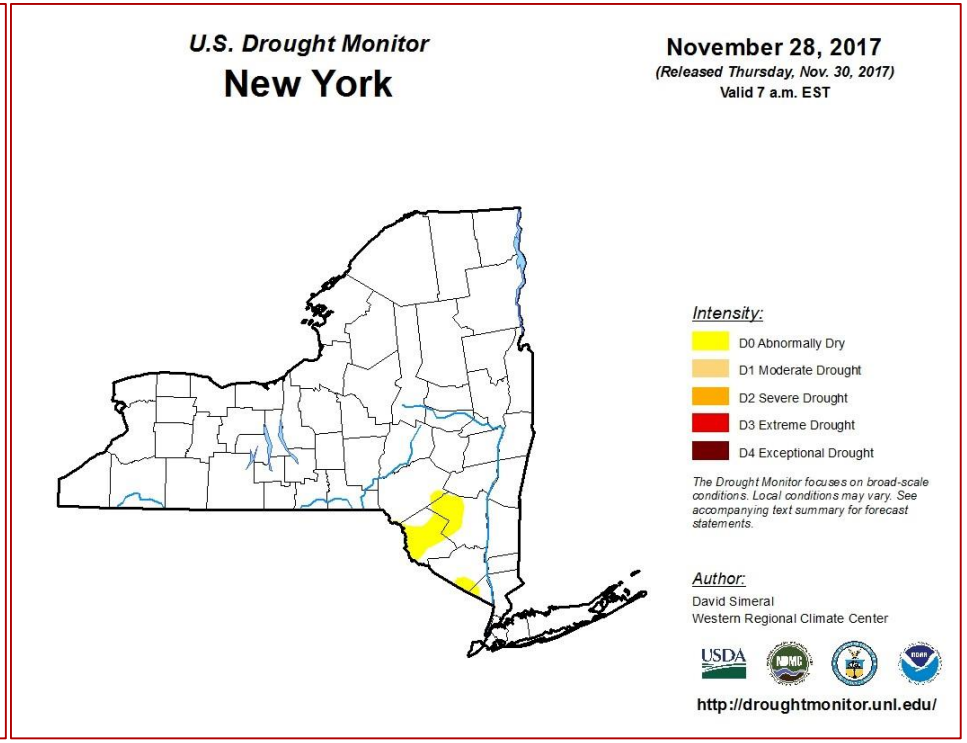
The Northeast has had the greatest increase in heavy precipitation in the United States.



Source: NOAA/NCDC

Short-Term Drought

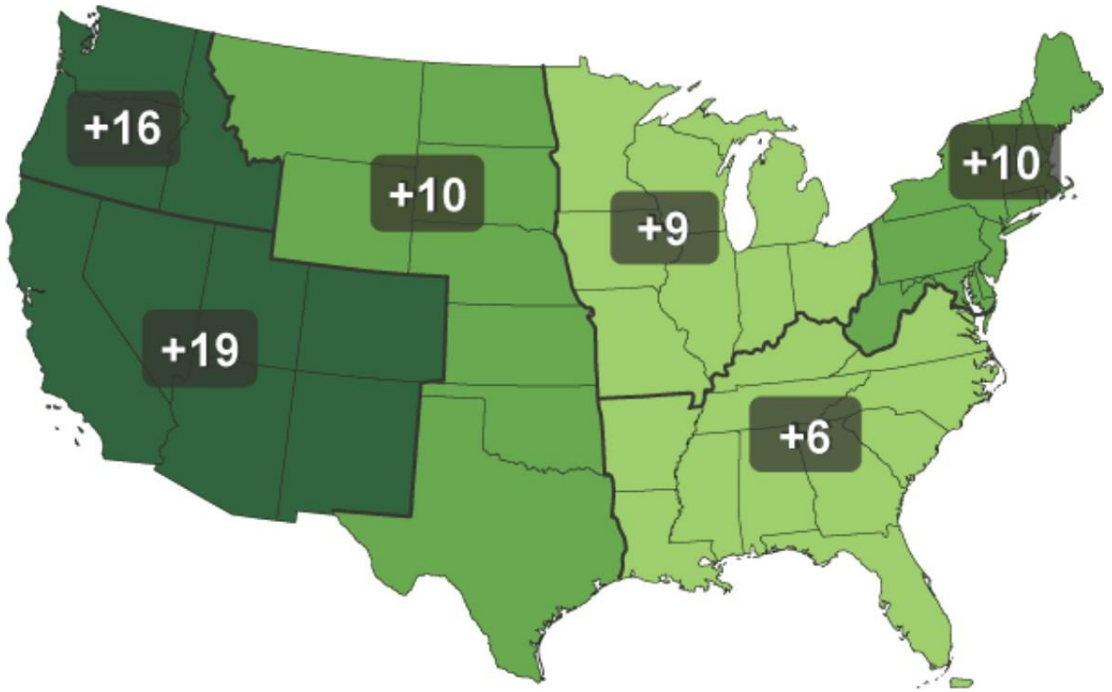




US Drought Monitor: http://droughtmonitor.unl.edu/

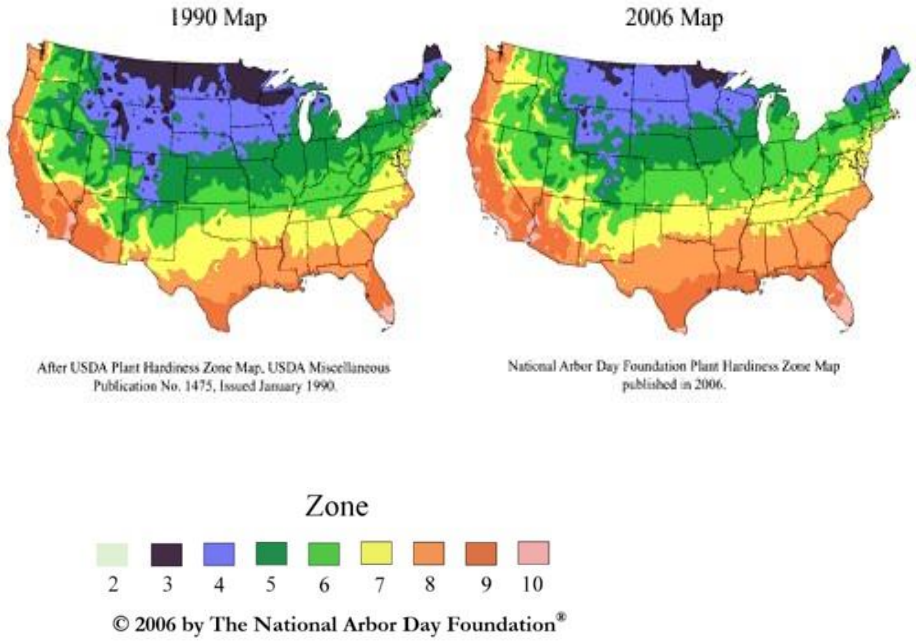
t9 CSF
Cornell Climate Smart Farming

Observed Increase in Frost-Free Season Length

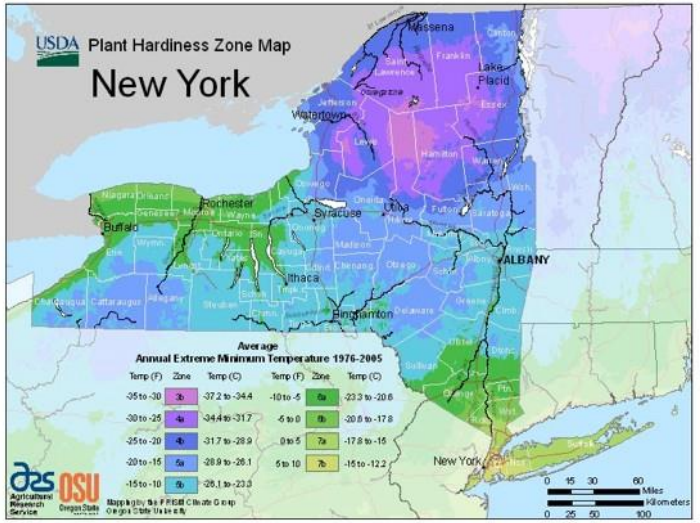


The period between the last occurrence of 32° F in the spring and the first occurrence of 32° F in the fall, has increased in each U.S. region during 1991-2012 relative to 1901-1960. NOAA/NCDC / CICS-NC.

Changes in Plant Hardiness Zones



Source: http://www.arborday.org/media/zones.cfm



New USDA Plant Hardiness Zone Map 2012

Phenological Responses:

Grapes are blooming 6 days earlier

Apples are blooming 8 days earlier than they were in the 1960s

Lilacs are blooming 4 days earlier

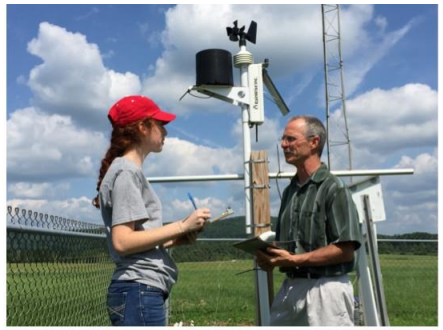
Spring arrival dates of 103 migrant birds in NY and MA arriving 4 to 13 days earlier 1951-1993 compared to 1903-1950 (Butler 2003)

[Source: Wolfe DW et al. 2005. Internat J Biometeor 49:303-309.]
National Phenology Network: http://www.usanpn.org

CICSS
Cornell Institute for Climate Smart Solutions

CSF
Climate Smart Farming

- Formed in 2013
- Working toward resilient and sustainable agricultural, ecological, and social systems in the face of a rapidly changing climate
- Launched Cornell Climate Smart Farming (CSF) Program and CSF Extension Team in 2015



Research

Education/Outreach

Partnerships

climateinstitute.cals.cornell.edu/

Cornell Climate Change Capacity

Research, Teaching and Extension:

- New/Adapted Crops
- Pests and IPM
- Animal Agriculture
- Climate Modeling/Extreme Weather
- Communicating Climate Change
- Crop Yield Risks
- Carbon Sequestration & Policy
- Northeast Regional Climate Center
- Water Management
- Renewable/Bioenergy
- Nutrient Management
- Stakeholder Risks & Needs
- Teaching: Climate Change Minor and Courses

And Many Partnerships: NYS Ag and Markets, DEC, NRCS, SWCC, USDA Climate Hubs, NGOs and Foundations.

Adaptation Defined

- Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which **reduces vulnerability**, **moderates harm, or exploits beneficial opportunities** (IPCC, 2007).

- **Adaptive management**: A decision process that promotes flexible decision-making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process (Walthall et al. 2012).

Identify Local Adaptation Practices based on Local Impacts to Key Production

- Agricultural production in the NE is characterized by a diversity of products and production systems, scales of operations (small to large), and landscapes.
- Farmers need a variety of specific practices and tools to help them with climate change adaptation and mitigation.

Agricultural Products	Climate Change Impacts	Toolkit of Adaptation & Mitigation Practices
Dairy and Livestock	Heat stress, water impacts from heavy precipitation	Increased cooling, energy efficiency and renewables, water management
Vegetables and Field Crops	Disease, weed and pest pressure, flooding and short-term drought, longer growing seasons, heat stress	Integrated pest management, drainage or irrigation, soil health, cropping systems, shifting dates and new varieties
Tree Fruit, Berries, and Grapes	Unexpected freeze, short-term drought, reduced winter chill	Monitoring weather and protecting crops, siting, soil health and cropping systems, new varieties
Maple Syrup	Changing seasons, variable weather, contamination, tree health	Earlier tapping, new technologies, shifting production

Climate Smart Farming Program Goals

- Increase farm resiliency to extreme weather events, climate variability and change, through assessing risk & adopting BMPs (**adaptation).**
- Increase energy efficiency and renewable energy capacity to reduce GHG emissions and operating costs, and utilize BMPs (**mitigation**).
- Sustainably **increase agricultural productivity** and farming incomes, to contribute to regional & global **food security**

- Based on FAO definition of CSA

CSF

Climate Smart Farming

A program of Cornall University

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Powerful and user-friendly climate tools for farmers in the Northeast

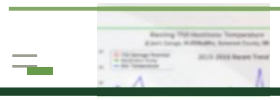
Climate Smart Farming Decision Tools

Cutting-edge tools to help farmers manage climate risk.

See more Tools

CSF Growing Degree Day Calculator

Grape Hardiness & Freeze Risk



CSF Irrigation Scheduler

Climate Normals - Northeast Regional Climate Center

www.climatesmartfarming.org

CSF Video: Oechsner Farm

"A normal season does not seem like it happens any more. It's either really dry, or really wet. It seems like when we get rain, it's apocalyptic…We got 5 inches of rain in about 1.5 hours, and I had a lot of soil loss…I see the impact for generations."

http://climatesmartfarming.org/videos/oechsner-farm/

Extension Team

Dr. Kitty O'Neil, Field Crops & Soil Health

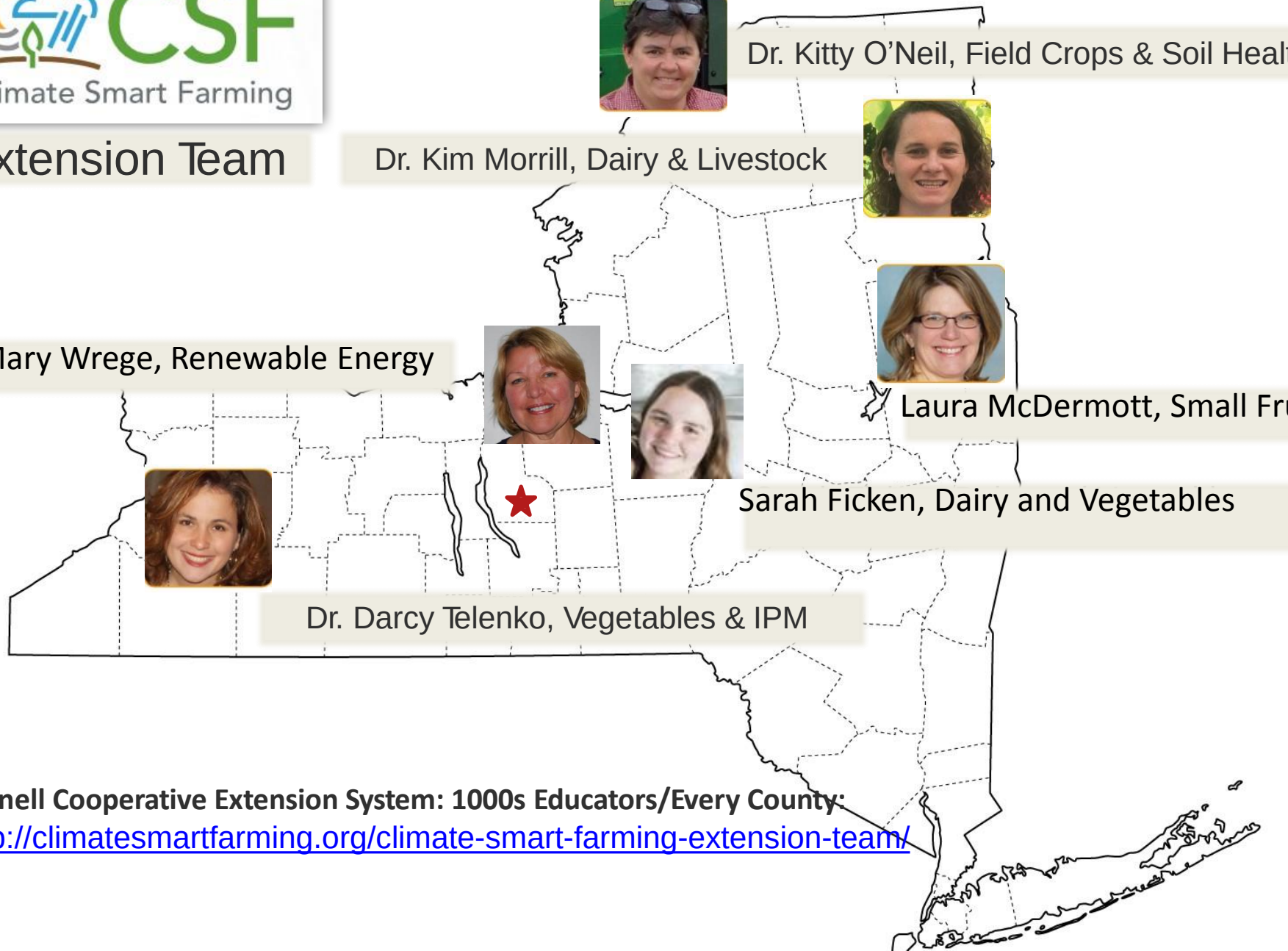
Dr. Kim Morrill, Dairy & Livestock

Laura McDermott, Small Fruit

Mary Wrege, Renewable Energy

Sarah Ficken, Dairy and Vegetables

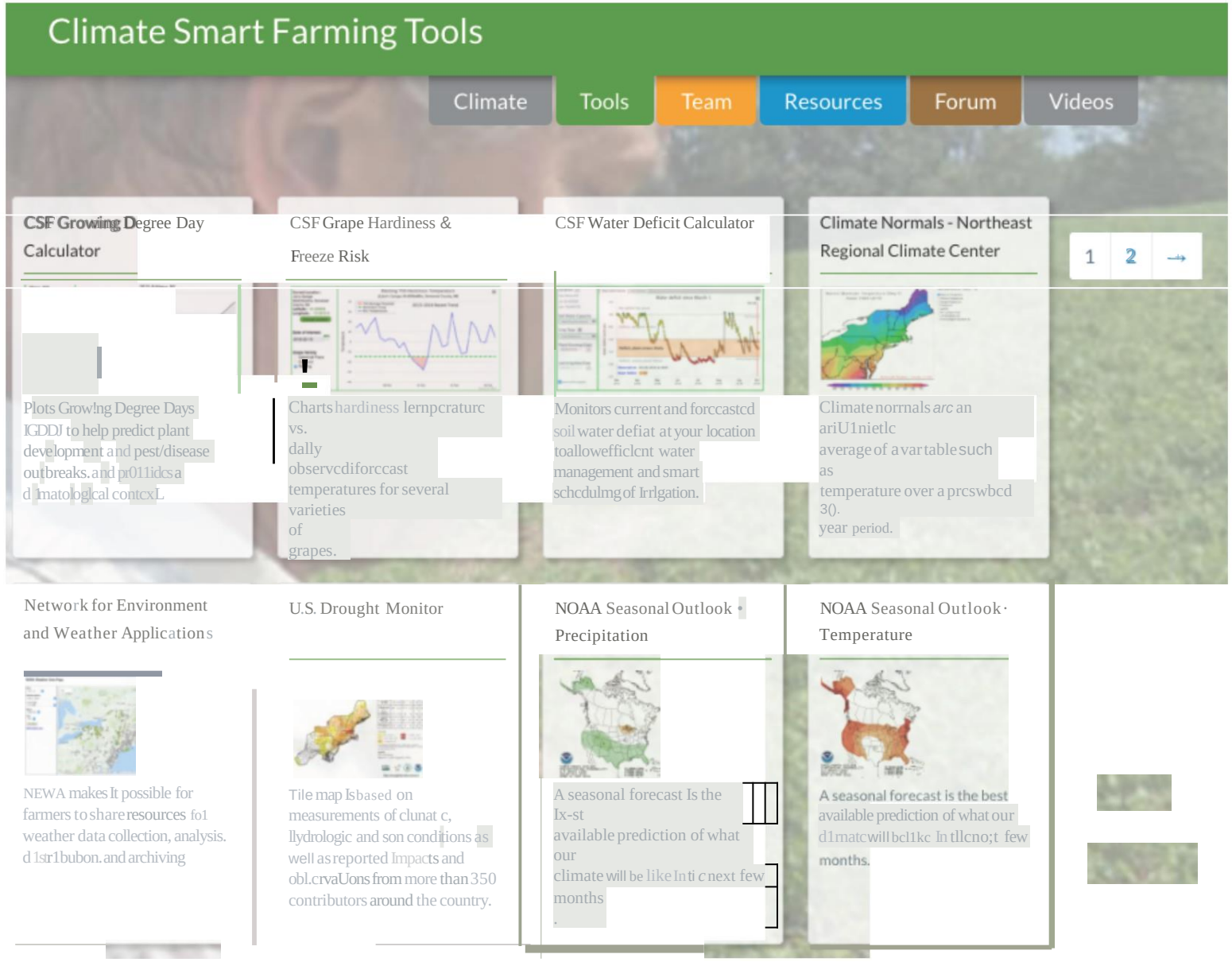
Dr. Darcy Telenko, Vegetables & IPM



Cornell Cooperative Extension System: 1000s Educators/Every County:
http://climatesmartfarming.org/climate-smart-farming-extension-team/

Outreach & Training Extension and Farmers

- Extension Agriculture In-Service Training
- NYS Ag Society Conference
- CSF 6-Week Online Course
- Fruit and Vegetable Producers Expo
- Northeast Organic Farmers Assoc.
- Regional & County Extension Events
- Empire Farm Days



http://climatesmartfarming.org/tools

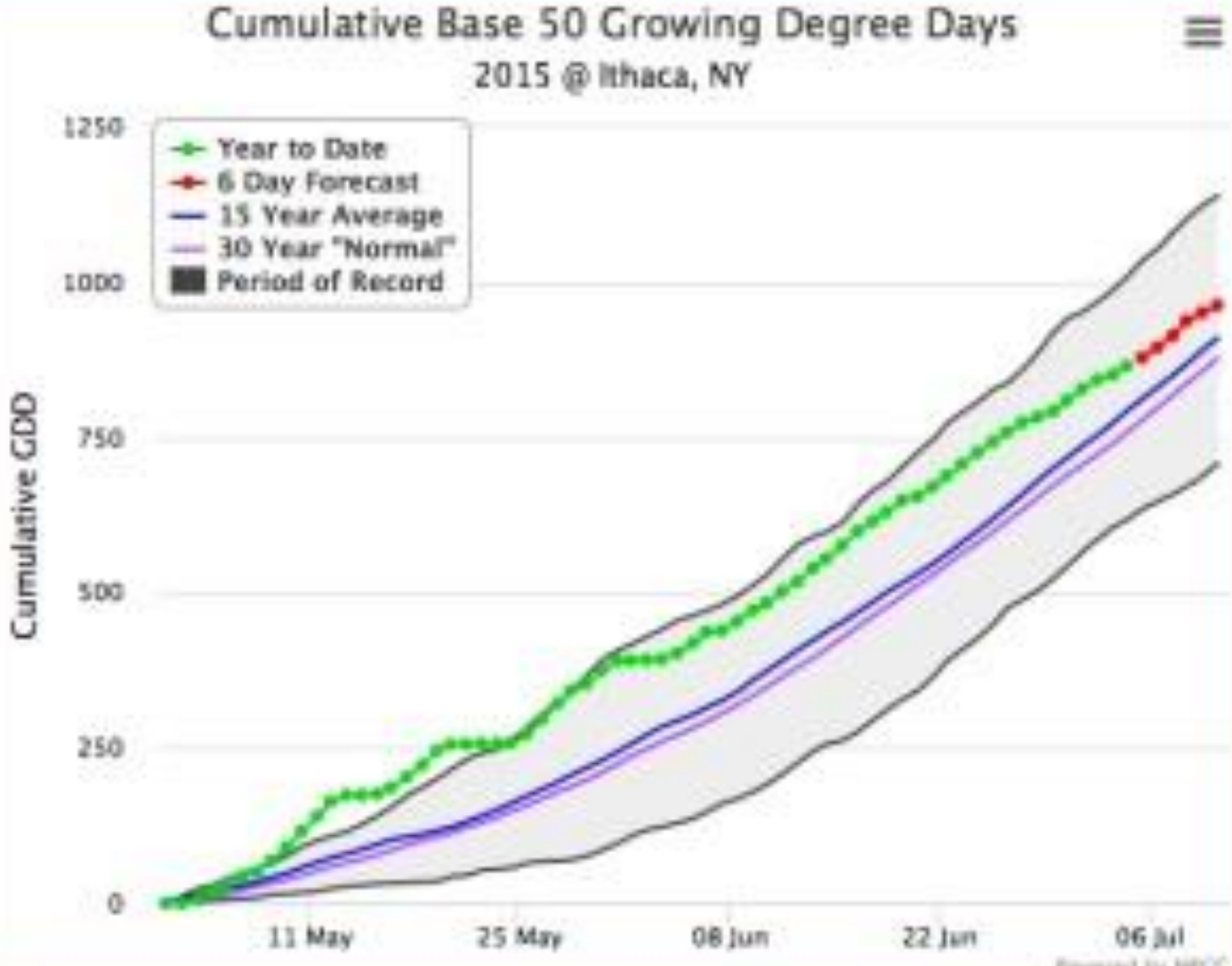
Growing Degree Day Tool

Current Location :
Ithaca, NY
Latitude : 42.4439614
Longitude : -76.5018807
Change Location

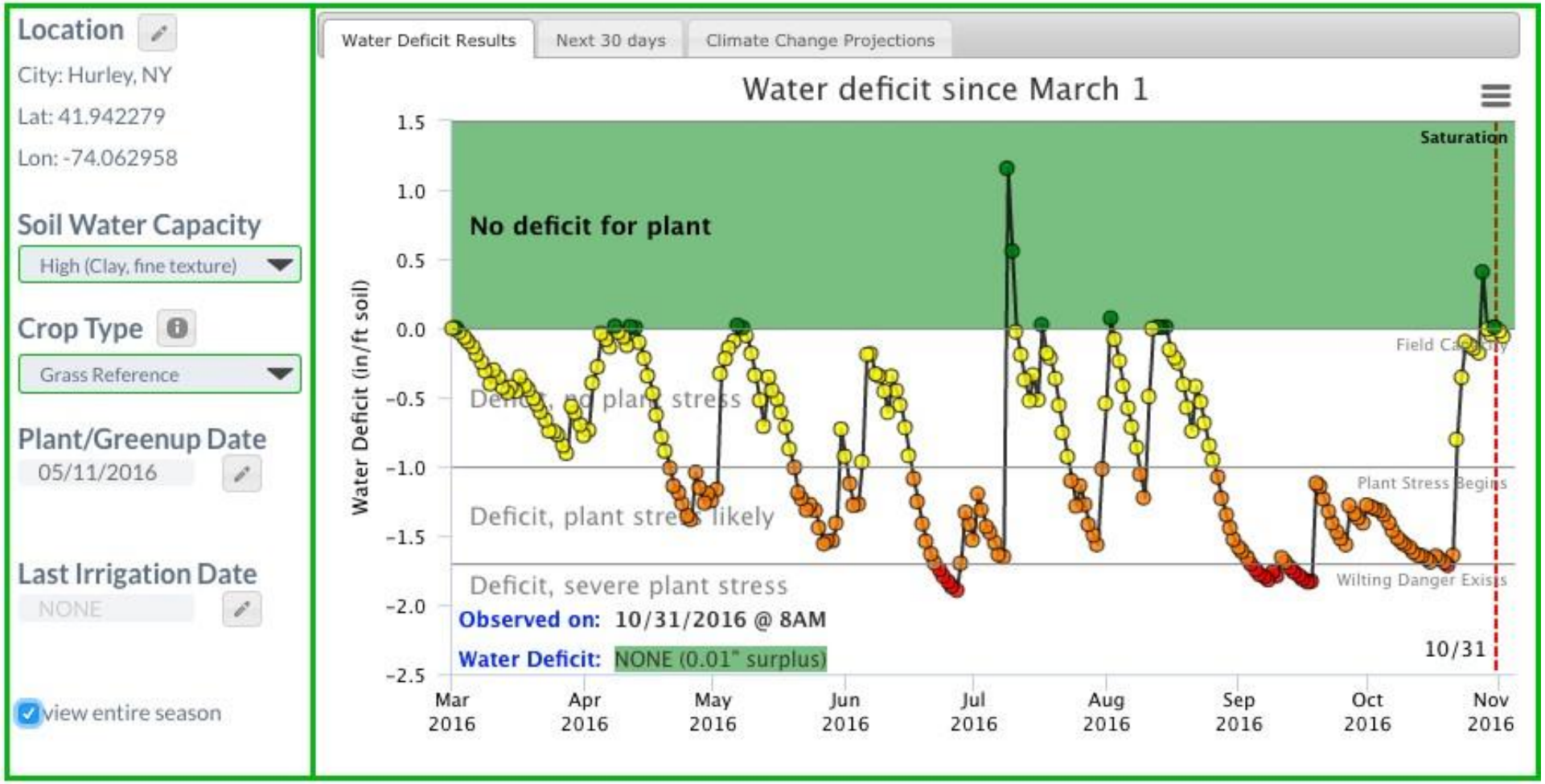
Planting Date:
2015-05-01

GDD Threshold
Base 50
Base 86-50

Show Season Outlook

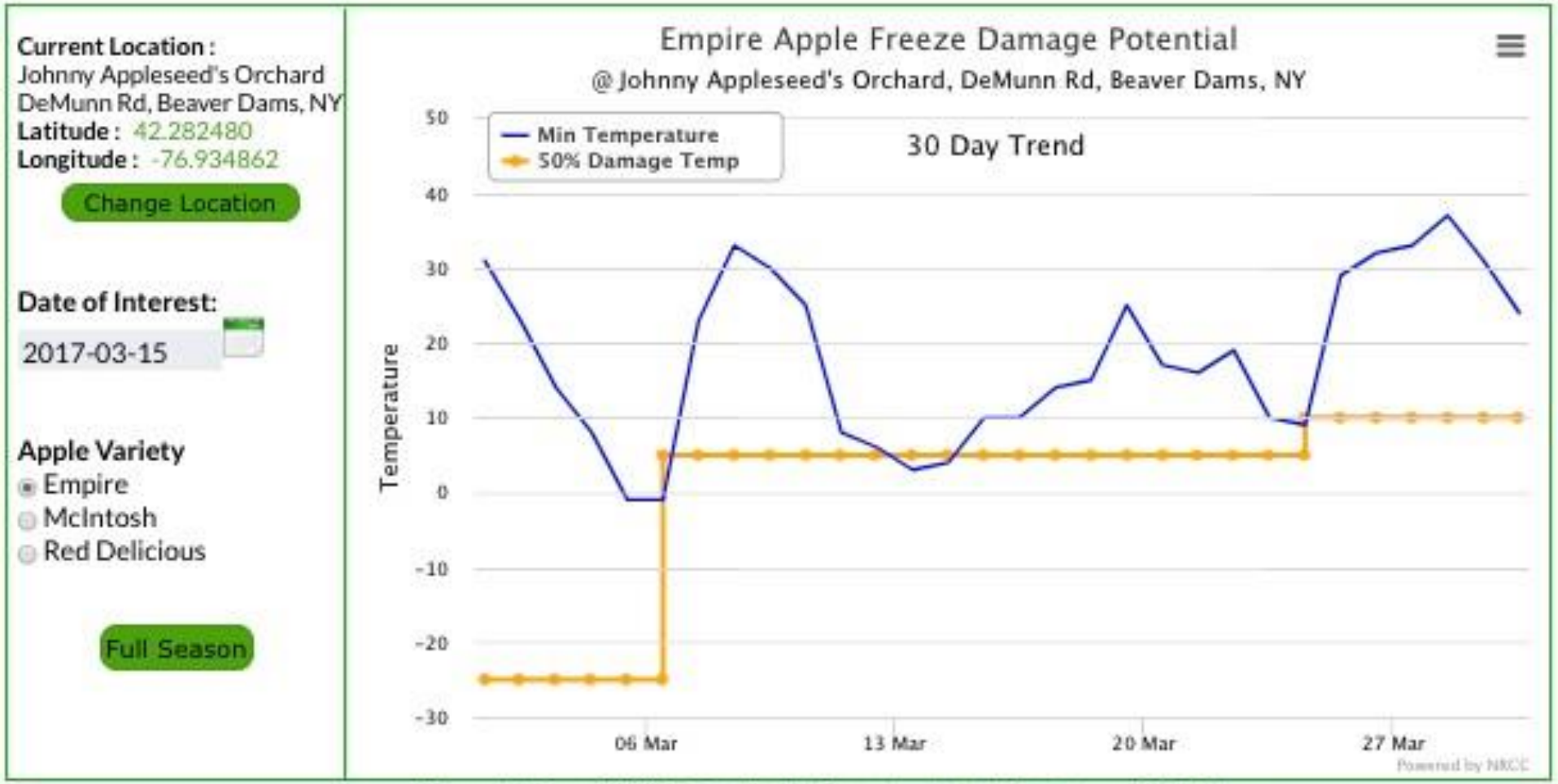


Water Deficit Calculator

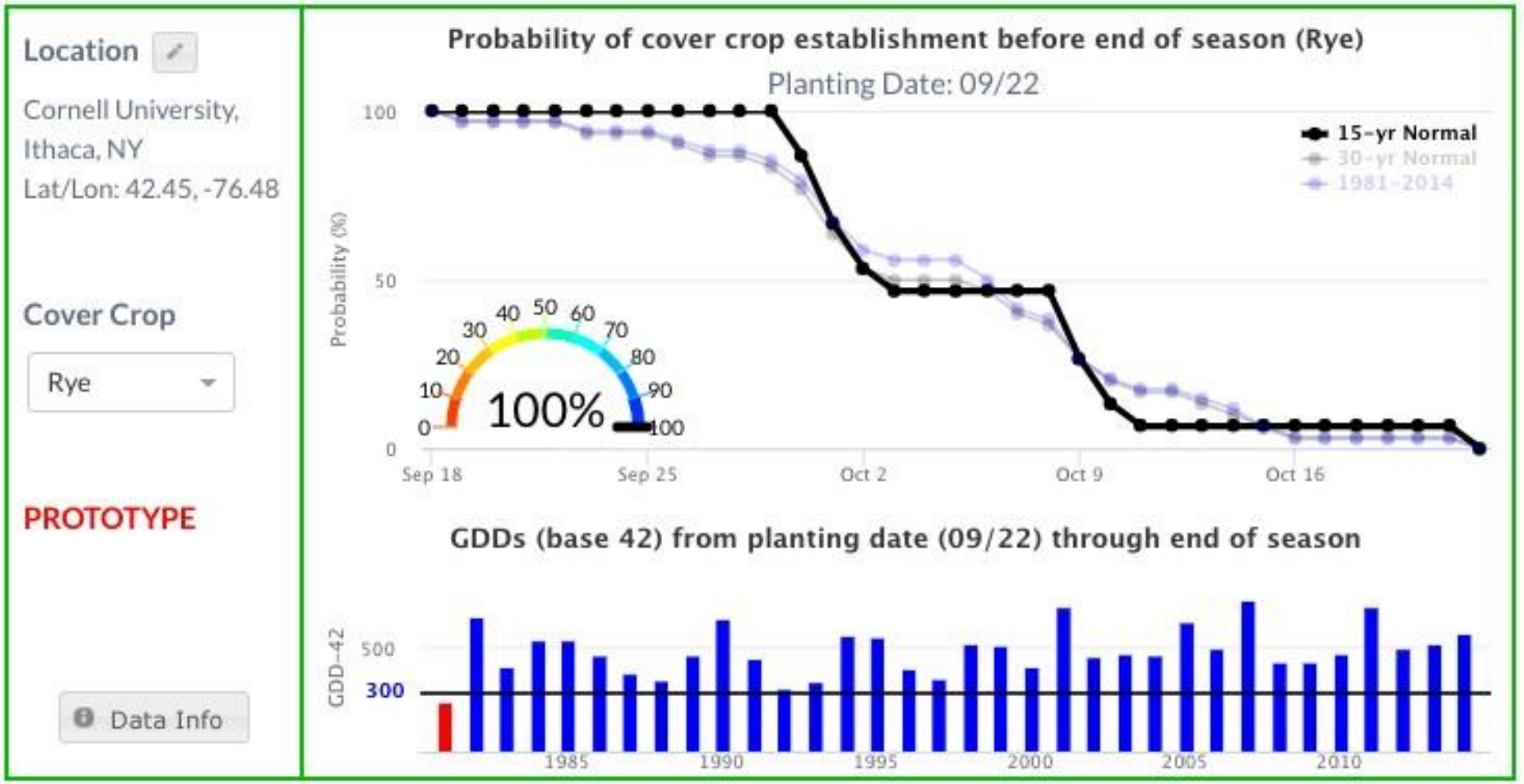


© Cornell University, 2016. Credits: Tool Developed by Art DeGaetano & Brian Belcher.

Apple Freeze Risk Tool



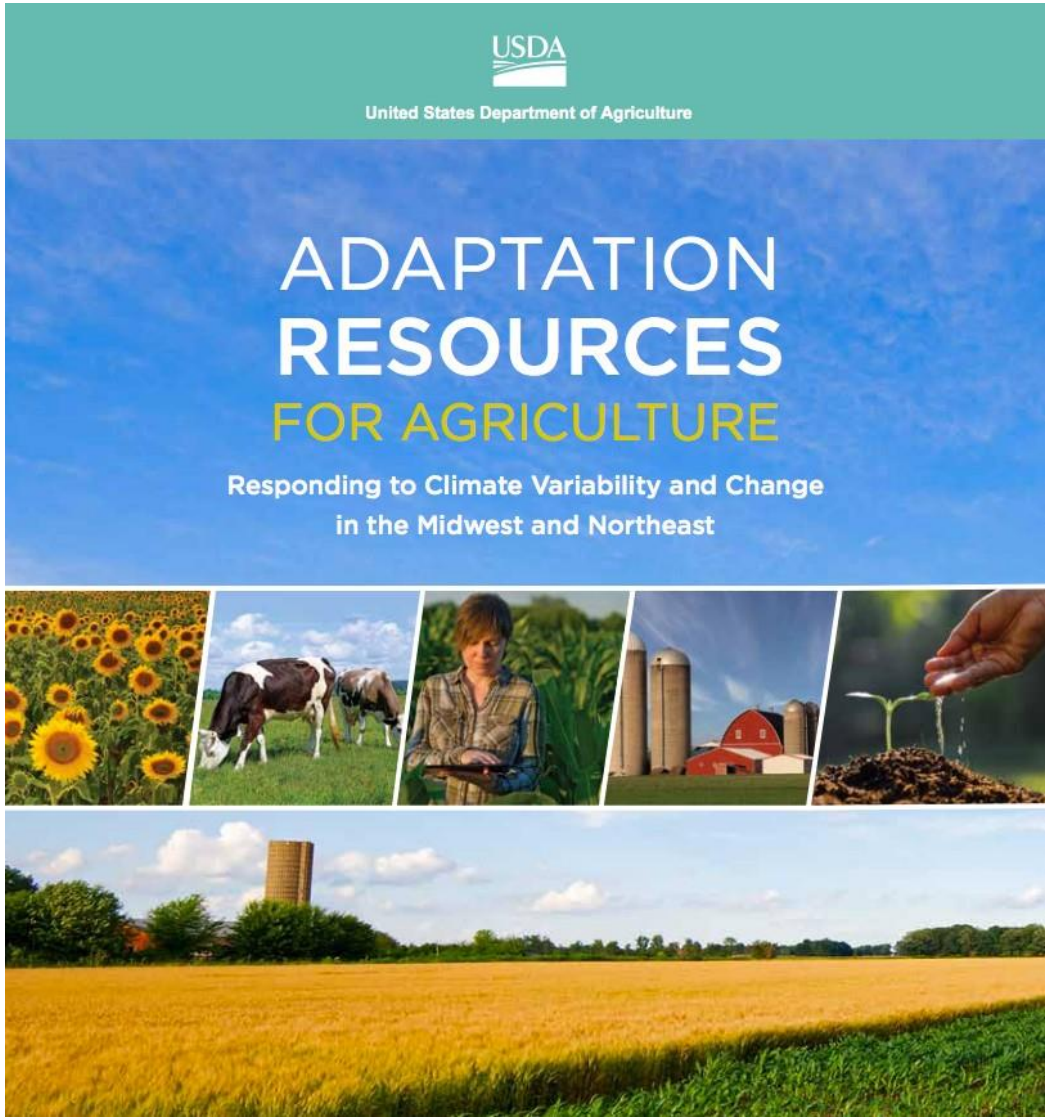
Cover Crop Scheduler



CSF Resources & BMPs

http://climatesmartfarming.org/resources/

USDA Adaptation Resources for Ag (2016)



http://www.climatehubs.oce.usda.gov/sites/default/files/adaptation_resources_workbook_ne_mw.pdf

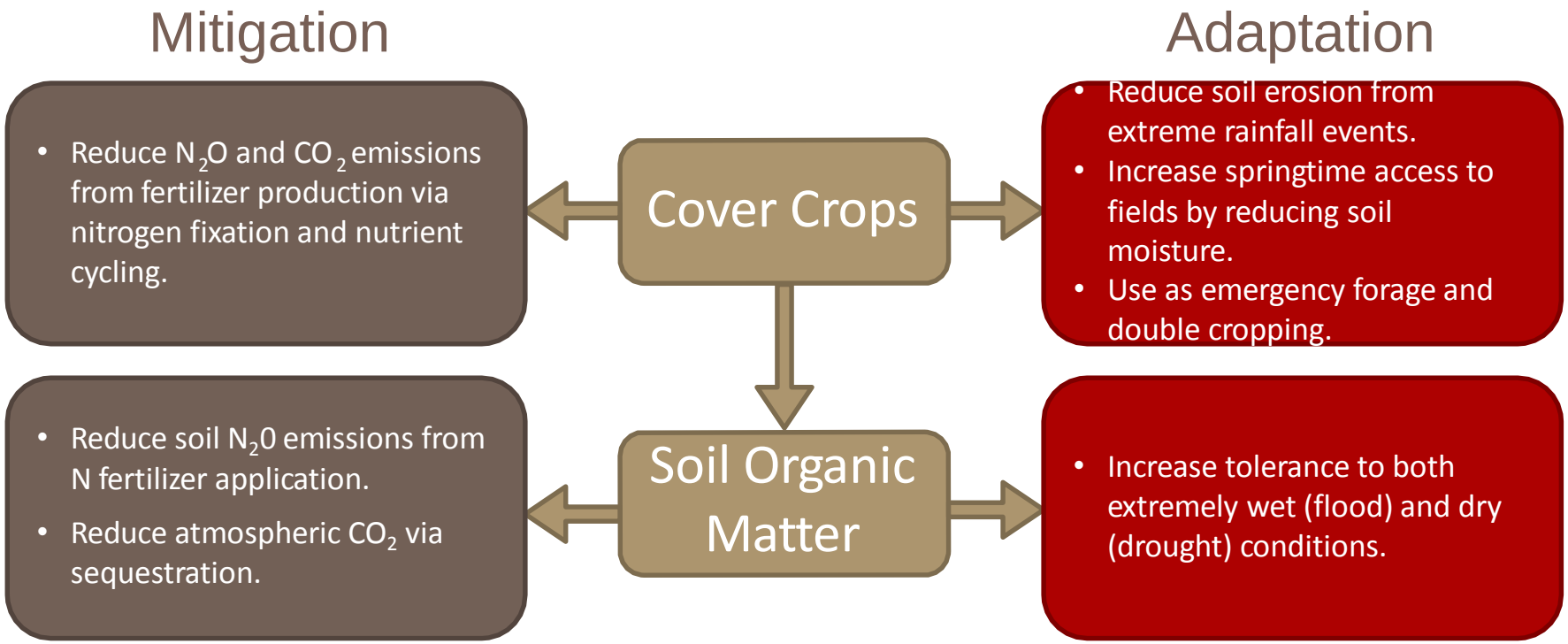
USDA Adaptation Strategies & Approaches

- **Strategy 1**: Sustain fundamental functions of soil and water
  - ➢ **Approach 1.1: Maintain and improve soil health**
  - ➢ **Approach 1.2: Protect water quality**
  - ➢ **Approach 1.3: Match practices to water supply and demand**
- **Strategy 2**: Reduce existing stressors of crops and livestock
- **Strategy 3**: Reduce risks from warmer and drier conditions
- **Strategy 4**: Reduce the risk and long-term impacts of extreme weather
- **Strategy 5**: **Manage farms and fields as part of a larger landscape**
- **Strategy 6**: Alter management to accommodate expected future conditions
- **Strategy 7**: Alter agricultural systems or lands to new climate conditions
- **Strategy 8**: Alter infrastructure to match and expected conditions

Adaptation: Too Much Water

- Climate Change: Increased Precipitation. But when in Rains it Pours, followed by short-term drought in between heavy rainfall events.
- Impacts: Heavy rainfall, flooding, erosion and runoff, soil loss, loss of crops, challenges accessing fields, damage to infrastructure and fields, deposition after runoff
- Adaptation Strategies: Improved Water Management!
  Improvements in soil health, low till, and use of cover crops, strip cropping, tiling, riparian buffer protection, retention ponds, green infrastructure, re-plumb ditches, watershed protection and storm water management.

Cover Crops for Climate Adaptation & Mitigation



Cover crops provide both direct and indirect benefits, especially with improved practices that overcome past challenges and increase biomass production and performance.

Matt Ryan, Cornell University.

Watershed Management Adaptations

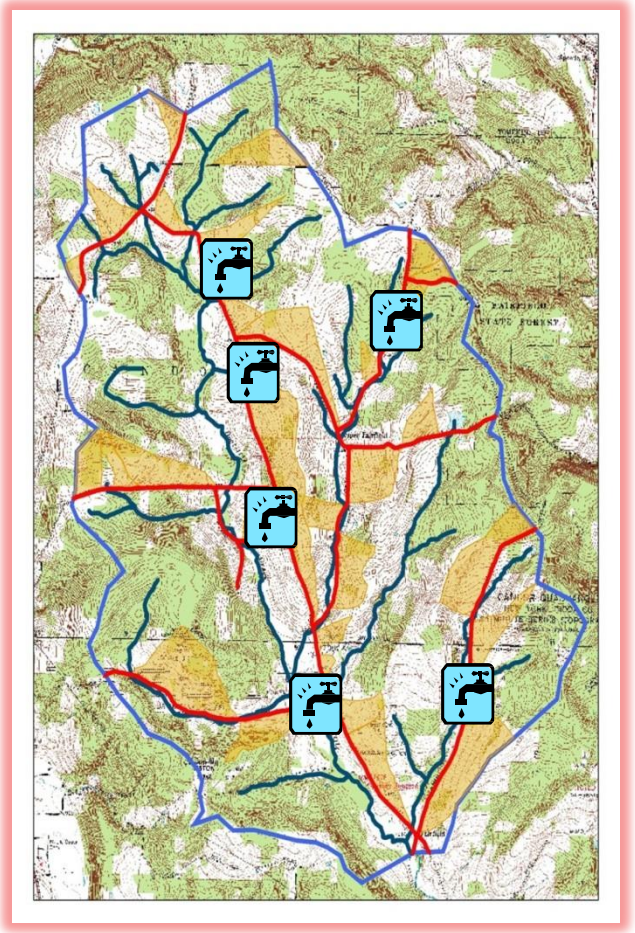
- Restore Buffers
- Protect Agricultural lands and open space
- Retention Ponds
- Streambank Management
- Re-Plumb Roadside Ditches
- Local ordinances: buffer protection, steep slope ordinances

Protect and Restore Riparian Buffers

- Prevent erosion
- Filter excess nutrients and pollutants
- Slow the movement of water

- Cooler water temp.
- Provide food and habitat
- Provide shade and aesthetic value

Landscape Scale Watershed Management: Rethink Roadside Ditches



Ditch drainage basins Capture and Shunt Stormwater to Streams. They intercept**~ 19 %** of the surface runoff and shallow groundwater from each watershed and rapidly shunt it to the nearest stream.

Ditch drainage basins
Stream
Road ditches
Ditch outflows

Rebecca Schneider, Cornell University.

Watershed Scale, Long-Term Adaptation Strategies

Dr. Rebecca Schneider, Cornell:

- Re-plumb our watersheds to reduce floods, pollution, droughts
- Disconnect ditches from streams to reduce flooding
- Recharge the groundwater
- Save the rain for a droughty day!

Adaptation: Too Little Water

- Climate Change: Decreased amounts and and seasonal variation in precipitation. Projections of Increased short-term drought and seasonal availability of water.
- Impacts: Damage to crops and crop loss, topsoil loss, drawing down of aquifers and wells, $$ spent on adaptation and infrastructure
- Adaptation Strategies: Improved Water Management, efficient irrigation, soil health, low-till and cover crops, water storage, utilize decision tools, drought resistant varieties

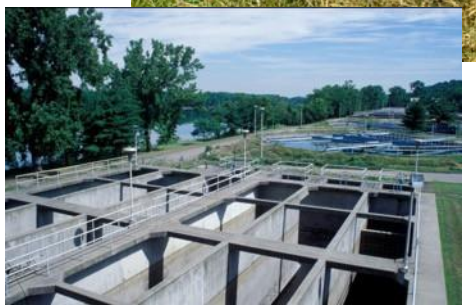
Think about Water Sources

- Surface water: ponds, rivers, and creeks
- Groundwater
- Potable water: municipality, county or utility
- Identify, use and protect sources that provide greatest quantity, least environmental impact and lowest cost

Local Governments in NY

Key Climate Actors:

- Consume energy in operations
- Manage solid waste
- Authority over local land use
- Invest in development
- **Involve & Educate local citizens & Farmers**



NYS Climate Smart Communities Pledge

Climate Smart Communities 10 Pledge Elements:

1. Designate Lead Agency, Create Task Force/Committee, join ICLEI or similar program
2. Set Goals, Inventory Emissions, Move to Action
3. Decrease Energy Demand for Local Government Operations
4. Encourage Renewable Energy for Local Government Operations
5. Realize Benefits of Recycling and Climate Smart Solid Waste Management
6. **Promote Climate Protection Through Community Land Use Tools**
7. **Plan for Adaptation to Unavoidable Climate Change**
8. **Support a Green Innovation Economy** – *Local Farms, Farmers' Markets!*
9. **Educate and Inform the Public** – *Including Farmers!*
10. **Evaluate & Commit to an Evolving Process**

http://www.dec.ny.gov/energy/50845.html

Example: Sullivan County, NY Land-Use Policies to Support Agriculture (Certified CSC)

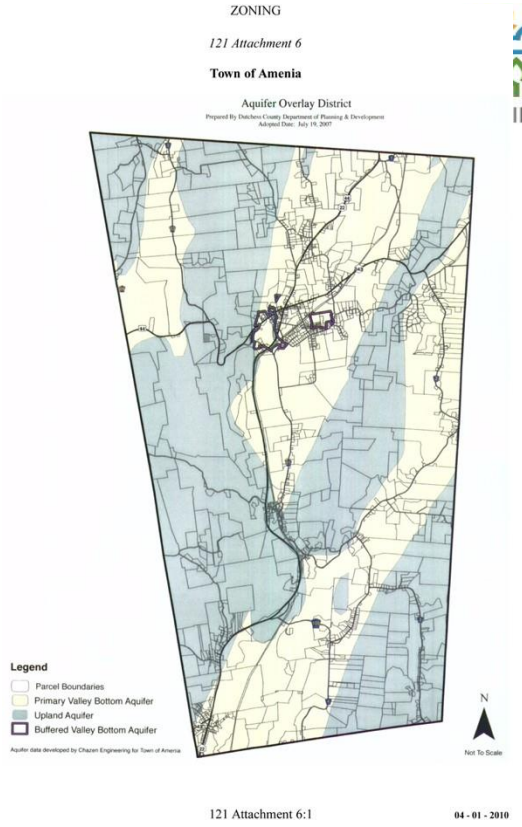
- Acquisition of development rights on Farm
- Creation of Agriculture and Sustainability Policy Committee
- Adoption of Updated Sullivan County Farmland Protection Plan,
- Contract with CCE for agriculture services
- Promotion of Farmer's Markets

Example: Dutchess County, NY Farmland Protection

- 2015 Updated Farmland Protection Plan
- Purchase of Development Rights on Farms: 1999-2008: +3,000 acres; 2016: additional $1 million included in budget for farmland protection
- Support of CCE Agricultural Programs
- Encourage local municipalities to consider adopting zoning and overlay measures that support local agri-businesses and the preservation of farmland.

Example: Town of Amenia Agriculture Overlay District

- Rural Agricultural District: maintain the Town's working landscape by promoting agriculture, forestry, recreation, land conservation, and low-density residential uses, as well as compatible open space and rural uses, by encouraging such activities and discouraging large-scale residential development.
- Floodplain Overlay District
- Stream Corridor Overlay District
- Mapping work done by Conservation Advisory Council (CAC) Volunteers!



CSF
ll Climate Smart Farming

CSC Benefits for Local Governments

- Save Taxpayer Dollars
- Emergency Planning: Reduce Risks & Prepare for Disasters
- Improve Operations & Upgrade Infrastructure
- Build the Local Economy and Create Green Jobs
- Improve Air Quality and Public Health
- Create Desirable, Sustainable Communities: Smart Growth & Low Impact Development, Farmland Protection and Markets, recreation opportunities increased
- Quality of life is maintained/Maintains Tax Base

CSF Benefits for Local Farmers & Farming Communities

- Reduce Risks & Prepare for Extreme weather
- Reduce losses, Increase yields and income
- Improve Operations & Upgrade Infrastructure
- Protect water resources
- Protect Soil Health, prevent soil loss
- Support the Local Farm Economy, high-tech jobs
- Save Money
- Support Desirable, Sustainable Communities: Farmland Protection and Markets, biodiversity benefits
- Maintain Rural/Agricultural quality of life

Resources

- Cornell Institute for Climate Smart Solutions: http://climateinstitute.cals.cornell.edu
- Climate Smart Farming Program: www.climatesmartfarming.org
- Cornell Climate Change Resources: www.climatechange.cornell.edu
- National Climate Assessment: Agriculture http://nca2014.globalchange.gov/ https://science2017.globalchange.gov/
- Climaid Report NYS: Ch. 7 Agriculture: https://www.nyserda.ny.gov/climaid

BF 107: Climate Smart Farming Online Course

Course Runs: January 16 – February 20, 2018

Register Now: http://smallfarms.cornell.edu/online-courses/course-descriptions/climate-smart-farming-bf-107/

Follow us on Social Media!

Cornell Institute for Climate Smart Solutions
http://climateinstitute.cals.cornell.edu/

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Climate Smart Farming Program: www.climatesmartfarming.org

Thank you!

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Questions?

- Office of Climate Change
- NYS Department of Environmental Conservation
- 625 Broadway

  Albany NY 12233-1030
- climatechange@dec.ny.gov
- 518-402-8448

Webinar slides & recordings available at
http://www.dec.ny.gov/energy/84359.html

CSC Funding Programs:
http://www.dec.ny.gov/energy/109181.html

NYS Climate Change Sci. Clearinghouse:
https://www.nyclimatescience.org/

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NEW YORK STATE OF OPPORTUNITY. Climate Smart Communities

NEW YORK STATE OF OPPORTUNITY Department of Environmental Conservation