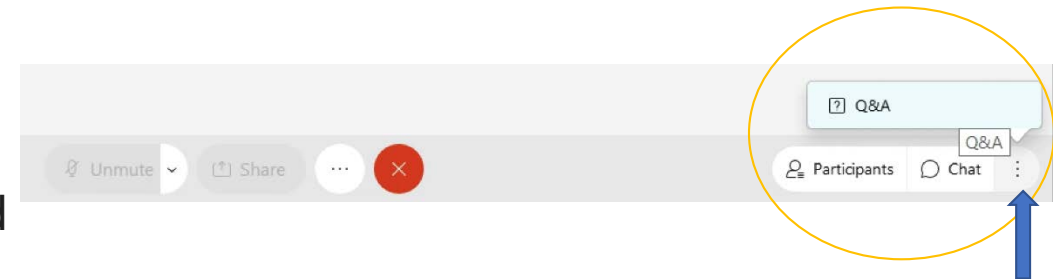# Procedure for Public Input

The Advisory Panel welcomes public comments and questions both during and in between its meetings

> To submit feedback to Panel Members and agency staff during the meeting, members of the public can use the WebEx Chat function located in the right bottom corner.

- Comments and questions submitted through WebEx will be aggregated and submitted to panel members to be included in deliberations.

> To submit feedback between Advisory Panel meetings, please email agriculture.forestry@agriculture.ny.gov

Agenda

> Welcome

> Roll Call

> Recap of Climate Action Council's 11/24/20 meeting

> Forestry related recommendations – Peter Innes, DEC

> Initial analysis of carbon storage in harvested wood products/developing NY's Wood-based Bioeconomy – Bob Malmsheimer, SUNY ESF

> Bioeconomy subgroup report and recommendations – Maureen Leddy, DEC

> Adaptation and resiliency in the agriculture and forestry sectors – Mark Lowery, DEC

> Recap and next steps

> Set next meeting

Recap of Climate Action Council's 11/24/20 meeting

Forestry related recommendations

Forestry and Forest Management Subpanel Comment

> Increase Forest Sequestration
  - "No harvest" on equal footing as timber harvesting with regards to incentives and professional forestry services
  - Income tax credits for forest carbon
  - Forest carbon is number one priority
  - Forest markets provide a financial incentive to landowners to hold and manage forestland
  - Increase in forests under management should not incentivize increased harvesting
  - Working forests help keep forest as forests
  - Partnering to efficiently deliver professional forestry services (stewardship program) to more landowners
  - Develop a program for monetizing forest carbon that can cover a range of forest owner class sizes
  - Carbon programs that are practice based and performance based
  - Protect forests from invasive species at source as well as in the woods.
  - Workforce development will need to be addressed.
  - Efforts by the Wood Products Development Council to address forest sector issues, such as workforce development and research.
  - Deer management using scientific approach, Regenerate NY, etc
  - Keep programs as simple and direct as possible for landowners (Jason)

Forestry and Forest Management Subpanel Comment

> Afforestation/Reforestation
- Native species
- Protect trees from deer
- Include option in 480a
- Identify acres

> Forest Tax Law (480a) Reform
- Lower Acres
- Broaden appeal by adjusting penalties and requirements
- Amend language to include carbon as a product or create two management tracts (480c)
- Local Reimbursement
- Change the name! (Jeff)

> Wood Products
- Review agency building codes to find opportunities to use wood (substitution)
- Need to show a clear carbon benefit to increase use of NYS wood
- Support research efforts
- Wood Products Development Council
- Remove barriers and create incentives that recognize the benefits of using carbon storing materials, like wood, for infrastructure.
- Affordable Housing: Strengthen affordable housing construction to help reduce the housing shortage and promote the value of building with wood in affordable housing
- Communication is important
- Price is the main barrier

> Urban Forestry
- The urban forestry strategy should include expansion of urban garden pocket park programs
- Urban forestry should be included in the improved forest management strategy for carbon benefits and co benefits.

Initial analysis of carbon storage in harvested wood products/developing NY's Wood-based Bioeconomy – Bob Malmsheimer, SUNY ESF

Estimates of Carbon Stored in NYS Harvested Wood Products 1990-2018

Robert Malmsheimer, HakSoo Ha, Timothy Volk, and Obste Therasme

The Department of Sustainable Resources Management

State University of New York College of Environmental Science and Forestry

December 9, 2020

State University of New York
College of Environmental Science and Forestry

Overview of Analysis

➢ Using DEC Timber Products Output (TPO) data, we estimated metric tonnes of CO_2 stored in harvested wood products (HWPs) from 1999 to 2018:

  ➢ Grown in NYS and milled in NYS,

  ➢ Grown out-of-state and milled in NYS, and

  ➢ Grown in NYS and milled out-of-state

➢ Using trend lines from this data, we then extrapolated back to provide an estimate of the carbon stored in HWPs from 1990 to 1998.

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Analysis Limitations

➤ Our analysis is a rough estimate of the metric tonnes of CO_2 stored in HWPs based on DEC's Timber Product Output (TPO) surveys, which will:

  ➤ **Overestimate** stored carbon.

    ➤ Some lumber does not end up stored in wood products (i.e., some of this material ends up as mill residuals that is burned to produce energy and/or other products).

  ➤ **Underestimate** stored carbon.

    ➤ Not all lumber is accounted for in TPO surveys (e.g., some HWP manufacturers did not respond to DEC surveys).

    ➤ Some HWP carbon is stored in non-lumber products (e.g., paper, cardboard) that are produced by pulpwood and wood chips.

➤ *It is likely that CO_2 stored in HWPs are 1.5 to 2 times greater than our estimates.*

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Three Categories of HWPs from the NY Data

➤ **NY/NY**: Sawtimber produced from NYS forests and milled in NYS-based sawmills.

  ➤ Hardwood and softwood data

➤ **NY/OUT**: Sawtimber produced from NYS forests and exported to Vermont, Pennsylvania, and Canada.

  ➤ Hardwood and softwood data

➤ **OUT/NY**: Sawtimber imported into NYS from VT, PA, and Canada, and milled in NYS sawmills.

  ➤ Hardwood and softwood data

Conversion of Raw Data to Metric Tonnes of CO_2

▶ **Board Feet of Wood to Cubic Meters of Wood.**

  ▶ Converted board foot volume of sawtimber into cubic meters (m^3)

  ▶ Used 424 board feet per m^3

▶ **Cubic Meters of Wood to Tonnes of Wood.**

  ▶ Multiplied the obtained volume of hardwood and softwood sawtimber in cubic meters by density of sawtimber (oven dry mass over air day volume, Mg/m^3)

  ▶ Used 0.56 Mg/m^3 for hardwood and 0.49 Mg/m^3 for softwood (IPCC 2019)

▶ **Tonnes of Wood to Tonnes of Carbon.**

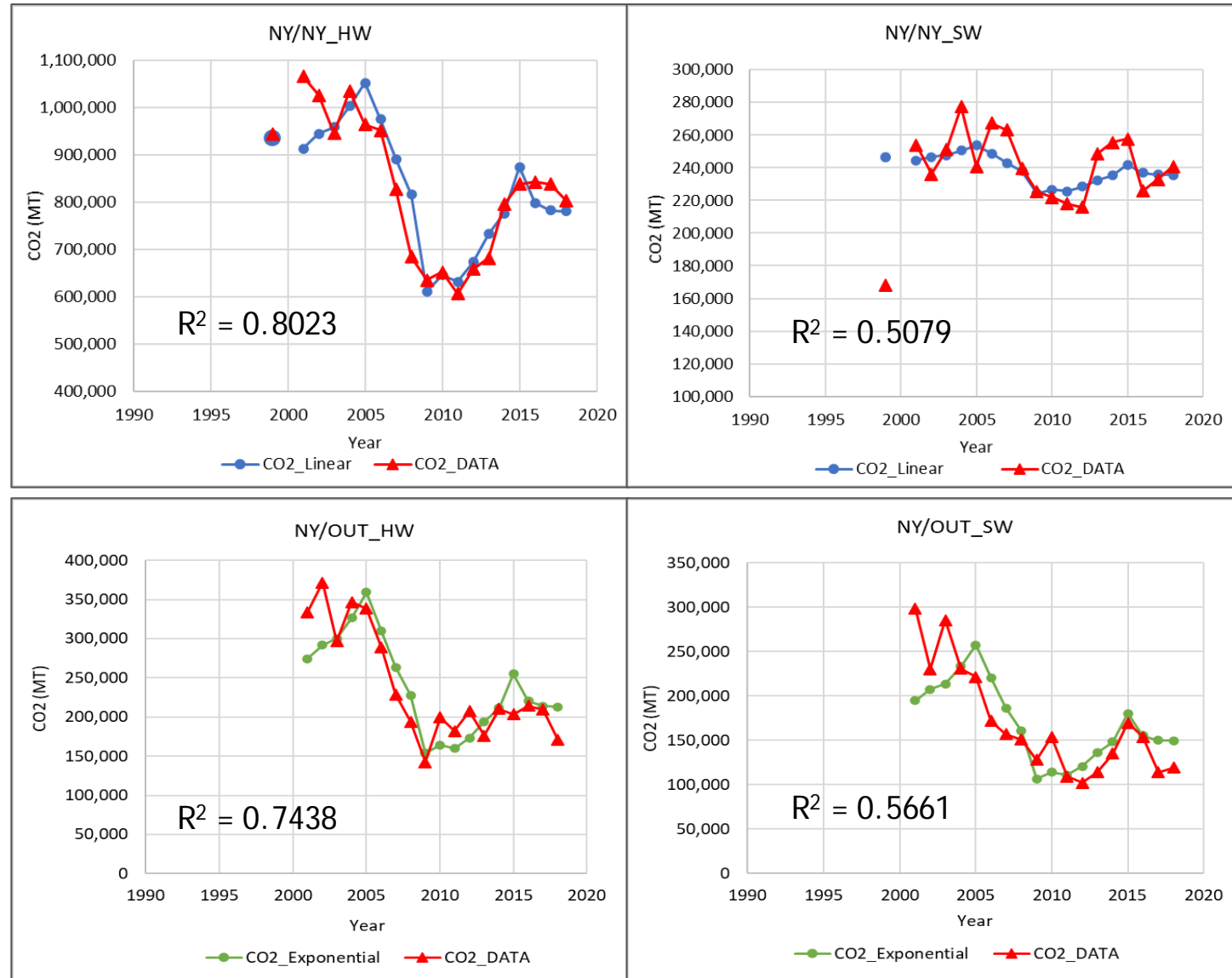 ▶ Multiplied the obtained mass from the second step by 0.5 to estimate the carbon amounts in HWPs

▶ **Tonnes of Carbon to Tonnes of CO_2.**

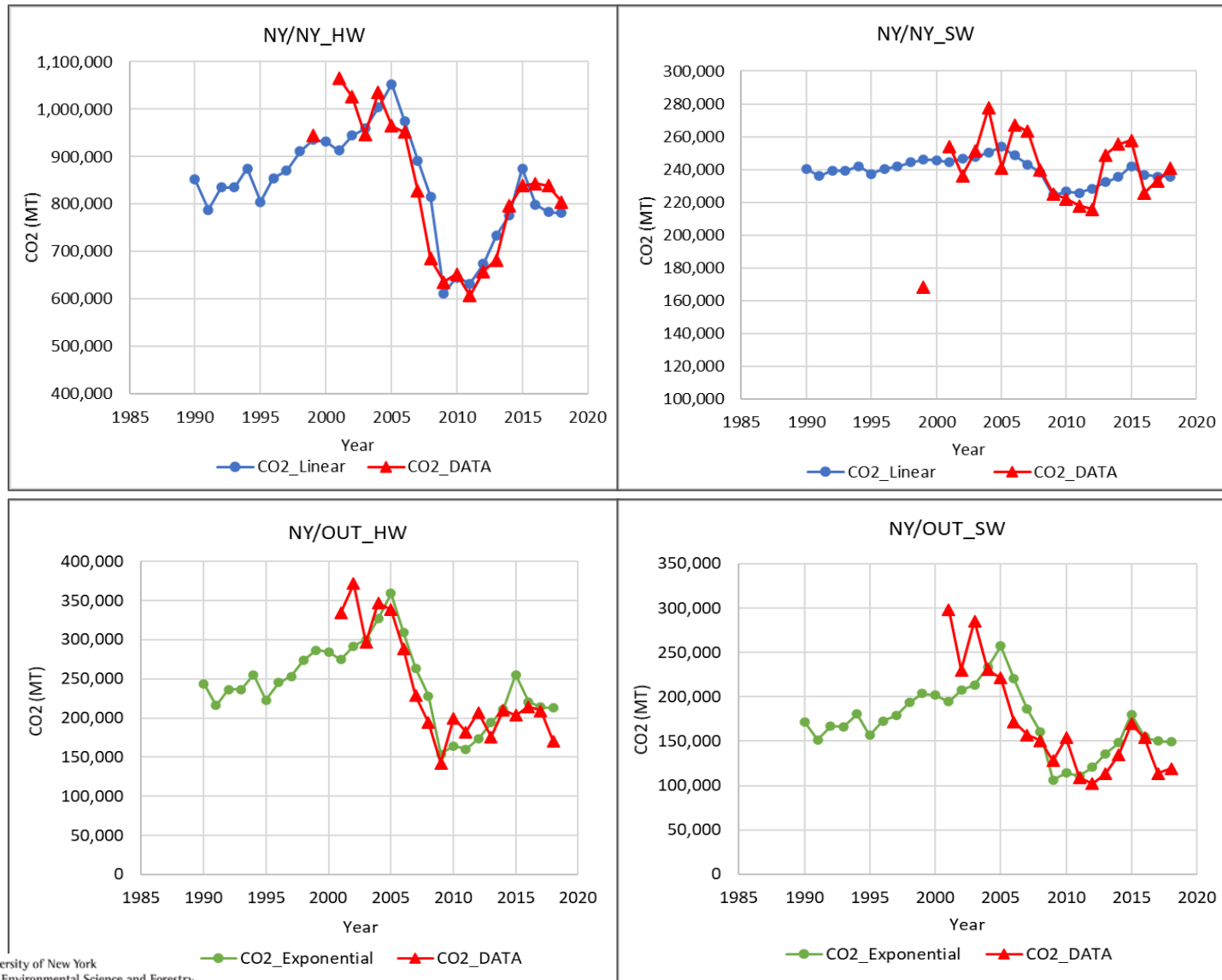 ▶ Used the ratio of CO_2 to carbon (C) (3.667) to find CO_2 amounts stored in HWPs.

Predicting Pre-2000 Values

▶ Explored the literature to find previously identified relationships between wood products production data and other available parameters.

  ▶ Items included: housing starts, total housing units, housing permits, commercial buildings, and valuation of construction.

▶ Tested relationships between these variables and the three categories (NY/NY, NY/OUT, OUT/NY) for both hardwoods and softwood in each of these categories.

  ▶ Used scatter plots of variables and correlation analysis to identify best parameters.

▶ Determined the best relationships were for annual housing starts for the NE region (Mid Atlantic and New England, Census Bureau 2019) and hardwood (HW) and softwood (SW) separately for NY/NY and NY/OUT.

  ▶ Used regression to develop relationships.

  ▶ No solid relationships for OUT/NY, but this is a minor component in total HWP.

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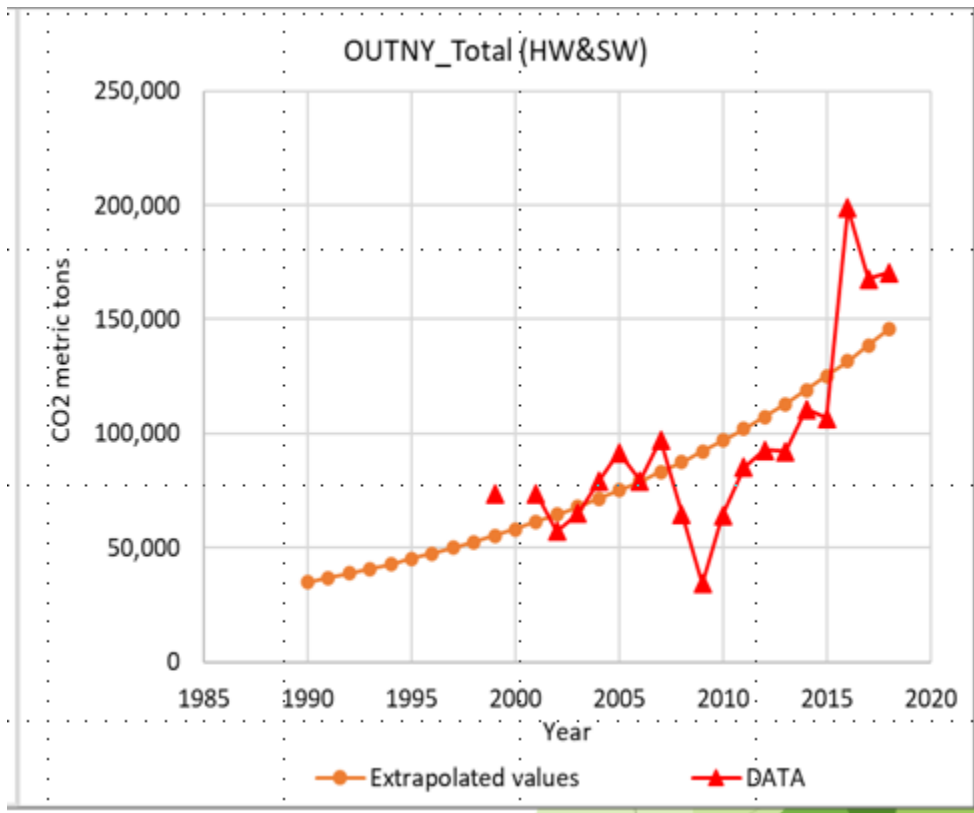# Modeled and Actual CO₂ in HWPs
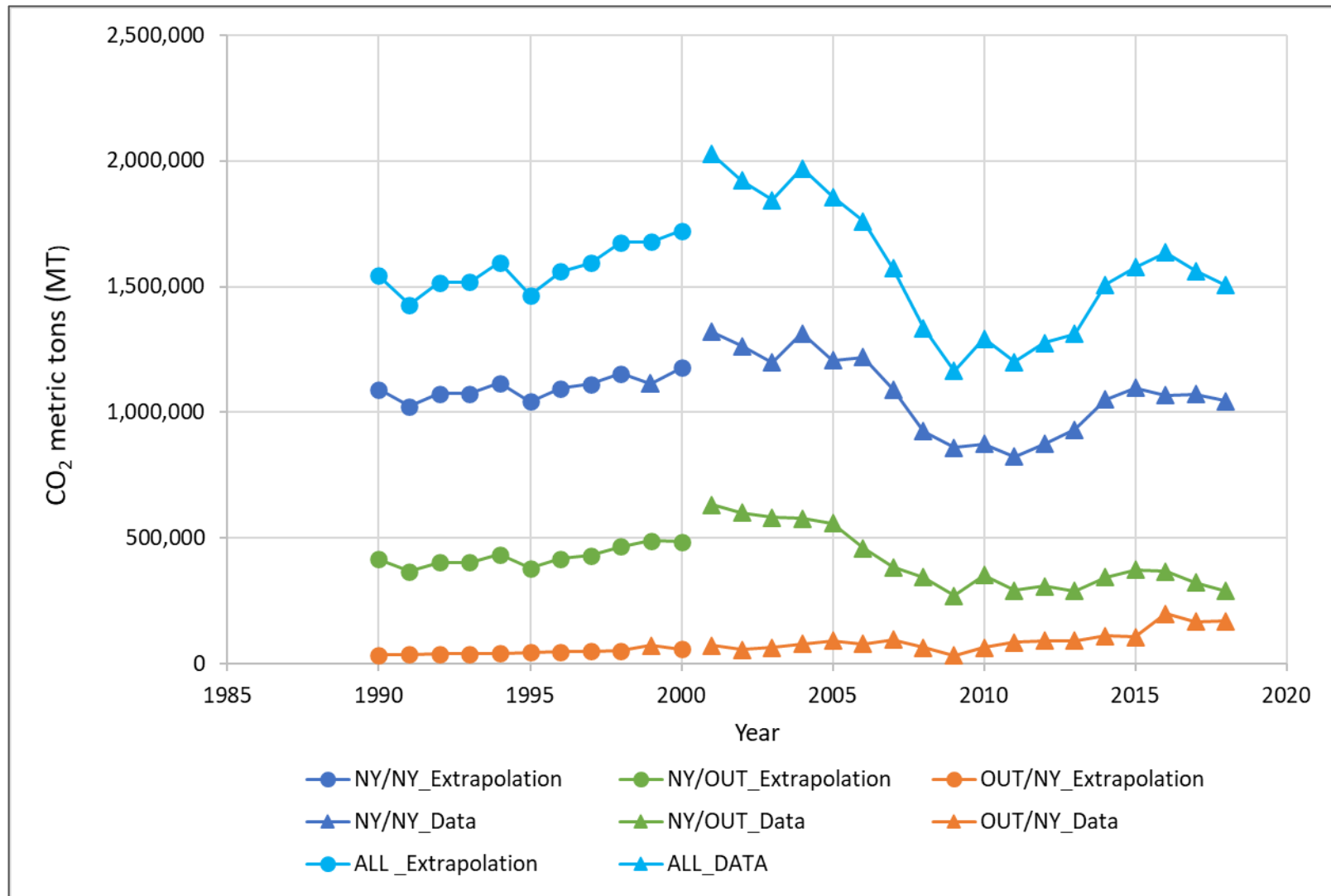
Predicted (pre-2000) and Actual CO$_2$ in HWPs

Prediction for OUT/NY Data

- None of the parameters examined provide a good fit.

- But total amount of C stored in HWP from this component is small.

- Used a quadratic equation as reasonable estimation.

- Requires some additional work, but this component is relatively small.

Annual Amounts of CO₂ Stored in HWPs in NY

Future Research Refinements

- We will be working with DEC to:

  - Refine our estimates to better address the limitations stated earlier in the presentation, and/or

  - Provide estimates based on IPCC HWP protocols (e.g., tonnes of carbon stored in HWPs 20 years or 100 years after the harvesting of logs).

- Citations

  - IPCC. (2019). 2019 Refinement to the 2006 IPCC guidelines for national greenhouse gas inventories: Volume 4 agriculture, forestry, and other land use. https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.htm

  - US Census Bureau. (2019). New residential construction historical data: Annual and monthly data--housing units started. https://www.census.gov/construction/nrc/historical_data/index.html

Questions?

Developing a Wood-based Bioeconomy Plan for New York State

Robert Malmsheimer, Timothy Volk, Colin Beier, Tristan Brown, Danielle Kloster, Deepak Kumar, Paul Crovella, and René Germain.

State University of New York College of Environmental Science and Forestry

December 9, 2020

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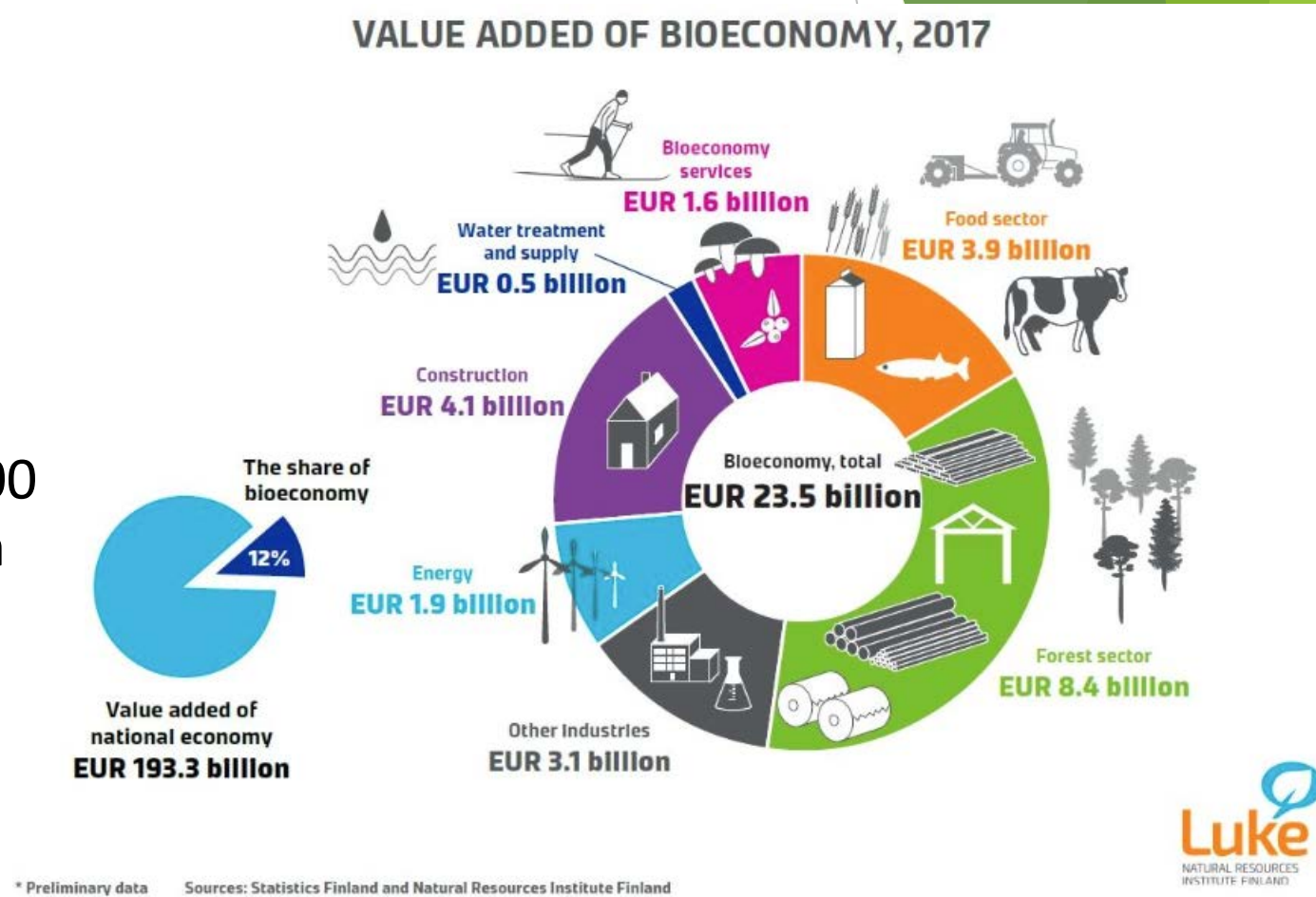# Overview of Presentation

- What is the Bioeconomy?
  - The Value of the Bioeconomy
  - Other Economies Bioeconomy Development Efforts
- Developing a Wood-based Roadmap for NYS's Bioeconomy
- An Example of the Benefits of the Wood-based Bioeconomy
- An Example of a Potential Opportunity to Develop NYS's Bioeconomy

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What is the Bioeconomy?

➤ The bioeconomy describes the portion of an economy that uses renewable bio-based feedstocks, rather than fossil fuel-based feedstocks, to produce bio-based products (e.g., chemicals, pharmaceuticals, biodegradable plastics), bioenergy, food, and feed.

➤ It uses forestry-, agriculture-, and aquaculture-based feedstocks, as well as biological raw materials produced by industry or through waste management.

➤ Utilizing bio-based feedstocks creates locally-based jobs and economic development while providing climate change benefits and other environmental services, such as clean water, wildlife habitat, and recreation opportunities.

The Value of the Bioeconomy

➢ US Bioeconomy.
  ➢ In 2014, US bio-based products industry supported 4.22 million jobs and added $393 billion in value.
  ➢ Bio-based products in the US marketplace increased from 17,000 in 2008 to 40,000 in 2014 (Golden et al., 2019).

➢ Finland Bioeconomy.
  ➢ Adds EUR 193 billion of value to Finnish economy (represents 12% of the economy).

VALUE ADDED OF BIOECONOMY, 2017

Bioeconomy services
EUR 1.6 billion

Water treatment and supply
EUR 0.5 billion

Food sector
EUR 3.9 billion

Construction
EUR 4.1 billion

Bioeconomy, total
EUR 23.5 billion

The share of bioeconomy
12%

Energy
EUR 1.9 billion

Forest sector
EUR 8.4 billion

Value added of national economy
EUR 193.3 billion

Other Industries
EUR 3.1 billion

* Preliminary data   Sources: Statistics Finland and Natural Resources Institute Finland

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Luke
NATURAL RESOURCES INSTITUTE FINLAND

Other Economies are Developing their Bioeconomies

➢ Other states and countries already recognize the importance of the bioeconomy in a future sustainability-focused world, and the benefits it can provide to their citizens.

➢ **Minnesota.** In 2015, the Minnesota legislature created a new incentive program to attract commercial-scale production of advanced biofuels, renewable chemicals, and biomass thermal energy. The Bioeconomy Coalition of Minnesota is positioning the state as a global bioeconomy leader.

➢ **Finland.** Finland's national bioeconomy strategy is designed to grow their bioeconomy output by EUR 100 billion and create 100,000 new jobs by increasing bioeconomy businesses and adding new high value products and services.

Sustainable growth from bioeconomy
THE FINNISH BIOECONOMY STRATEGY

bioeconomy⁺

Developing a Roadmap for NYS's Wood-based Bioeconomy

➤ Analyze and summarize other economies' bioeconomy strategies.

➤ Assess existing wood-based feedstocks (e.g., sustainably-sourced forest residues, mill residuals) and opportunities for increasing feedstocks.

➤ Examine existing wood-based uses, and understand opportunities for new uses (e.g., biochemicals, biochar, nanocellulose materials).

> ➤ Outreach with state agencies, stakeholders, and the public.

➤ Develop a plan for coordinating R&D to spur the creation of new technologies and companies that can make use of NYS's woody resources to spur the growth of the wood-based bioeconomy.

> ➤ Establish a network across different sectors to facilitate information sharing and collaboration that are essential for growth in this sector.

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An Example of the Benefits of the Wood-based Bioeconomy

➢ The bioeconomy (1) capitalizes on the "Carbon **Substitution** Benefits" (i.e., substituting a bio-based low carbon feedstock for a fossil fuel-based feedstock) and (2) enhances the "Carbon **Sequestration** Benefits" (i.e., stores additional carbon) of using bio-based feedstocks, rather than using fossil fuels and fossil fuel-based feedstocks.

➢ Utilizing bio-based feedstocks creates jobs and economic development while providing *real and permanent* climate change benefits and other environmental services such as clean water, wildlife habitat, and recreation opportunities.

An Example of the Benefits of the Wood-based Bioeconomy

Sequestration Benefit: The carbon stored in the building below will offset (be equal to) the carbon released by the building's operations during the it's first 11 years.

Substitution Benefit: About 15% of carbon released by humans comes from the production of steel and cement – timber has much lower embodied fossil fuel-based energy.

An Example of the Benefits of the Wood-based Bioeconomy

Univ. of Washington's West Campus Student Housing

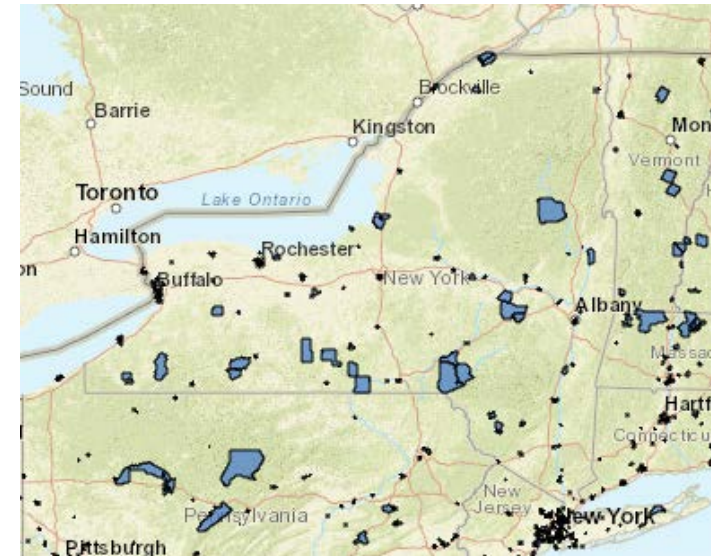Five-story 668,000 ft^2 mixed-use building

Sequestration Benefit: Stored Carbon (CO_2e)	4,466 metric tons
Substitution Benefit: Avoided GHGs (CO_2e)	9,492 metric tons
Total Carbon Benefit (CO_2e)	13,958 metric tons

An Example of a Potential Opportunity to Develop NYS's Bioeconomy

► Biomass Development Opportunity Zones.

  ► Creative approach to combine the job creation potential of federal opportunity zones and innovative biomass analysis tool to identify areas with low biomass supply risk.

    ► Tool development included key capital markets representing $65 billion

  ► Non-traditional biomass supply and systems are not well understood in financial circles which increases project risk

Investment and Development Community
Promotional Network
Local Stakeholder Groups

BDO Zone
'AA' Feedstock Risk Rating
+
OZ tax incentives

Local Chambers of Commerce
Equipment suppliers
Trucking / logistics
Local bio-based organizations

Regional Economic Development
OZ communities
Anchor biomass suppliers
State Bio-Associations

State Economic Development
National Bio-Associations

Federal Economic Development EDA

Bio-project Development Companies
Other Development Incentive Programs

60 major capital market bio-investors
>$50B of investment capital designated for bio-projects

FRAMEWORK FOR BIOMASS SUPPLY CHAIN RISK STANDARDS

J. Solomon, Ecostrat

https://opportunitydb.com/tools/map/

Questions?

Bioeconomy subgroup report and recommendations

Agriculture and Forestry Advisory Panel Bioeconomy Subgroup

> **Climate-focused Bioeconomy definition** - the portion of an economy that produces sustainable, renewable bio-based feedstocks, rather than fossil fuel-based feedstocks, to produce products that achieve the climate and social justice goals of the CLCPA.

- Focused on building a long-term bioeconomy supply chain in NYS that can serve multiple future markets
- Assessing potential policies that achieve CLCPA requirements as a foundation for building out this market sector
- Start with an assessment of existing policies and programs that support the bioeconomy of today
- Consult with EJ groups throughout
- Enhance the public's understanding of the Bioeconomy and its role in implementing the CLCPA
- Three main categories of focus for the bioeconomy of the future: Substitution, Bioenergy, Biorefining

Agriculture and Forestry Advisory Panel Bioeconomy Subgroup

> Substitution of bio-based products for fossil based, strategies under consideration:
  - Increase use of wood products in buildings
  - Increase use of bio-plastics
  - A low-carbon building standard
  - Spur innovation by educating local banks on emerging bio-technologies
  - Create a low-carbon marketplace for NYS products

> Issues to explore:
  - Need to do more work to structure these ideas so they serve to achieve CLCPA emission limits
  - End-of-life issues with bioplastics
  - Leverage state procurement and lead by example

Agriculture and Forestry Advisory Panel Bioeconomy Subgroup

> Bioenergy

- 12/16 meeting on feedstock potential and associated emissions, manure management subgroup, Waste panel and outside experts invited
- Early January meeting on end-use application with EITE, EE and Housing, Transportation, Power Generation and outside experts invited
  - Discussion informed by estimates of available fuel volumes and associated GHGs from 12/16 meeting
- Some early policy ideas include:
  - Low carbon fuel standard for all sectors
  - Income tax credit for residential wood pellet fuel
  - Locate production next to source
- Issues to explore:
  - Co-pollutant issues from bioenergy use
  - Identification of highest and best use of the limited resource
  - Role of Bioenergy in economically meeting the final 10% challenge of decarbonization

Agriculture and Forestry Advisory Panel Bioeconomy Subgroup

> Biorefining
- Discussion in late January/early February
- Future-looking to use bio feedstocks to replace petrochemicals, pharmaceuticals, etc
- R&D investment to advance cellulosic nanotechnology

Adaptation and Resilience in the Agriculture and Forestry Sectors

Increasing Temperatures

> Impacts

- Heat stress in livestock, reduced yields
- Reduced crop yields

> Adaptations

- Increase cooling in barns and shading
- Research and trial new varieties

Capital Region
More extreme heat days (> 90°F)
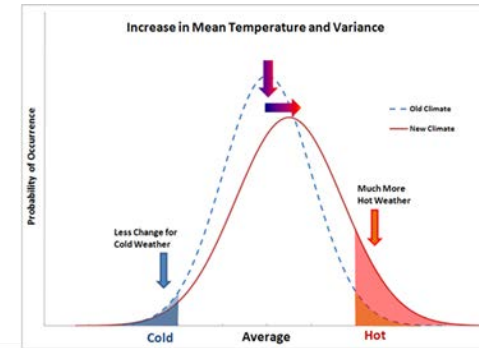   14 to 23 days by 2020s (instead of 10!)
     27 to 82 days by 2080s
More heat waves
     2 to 4 by 2020s (instead of 1!)
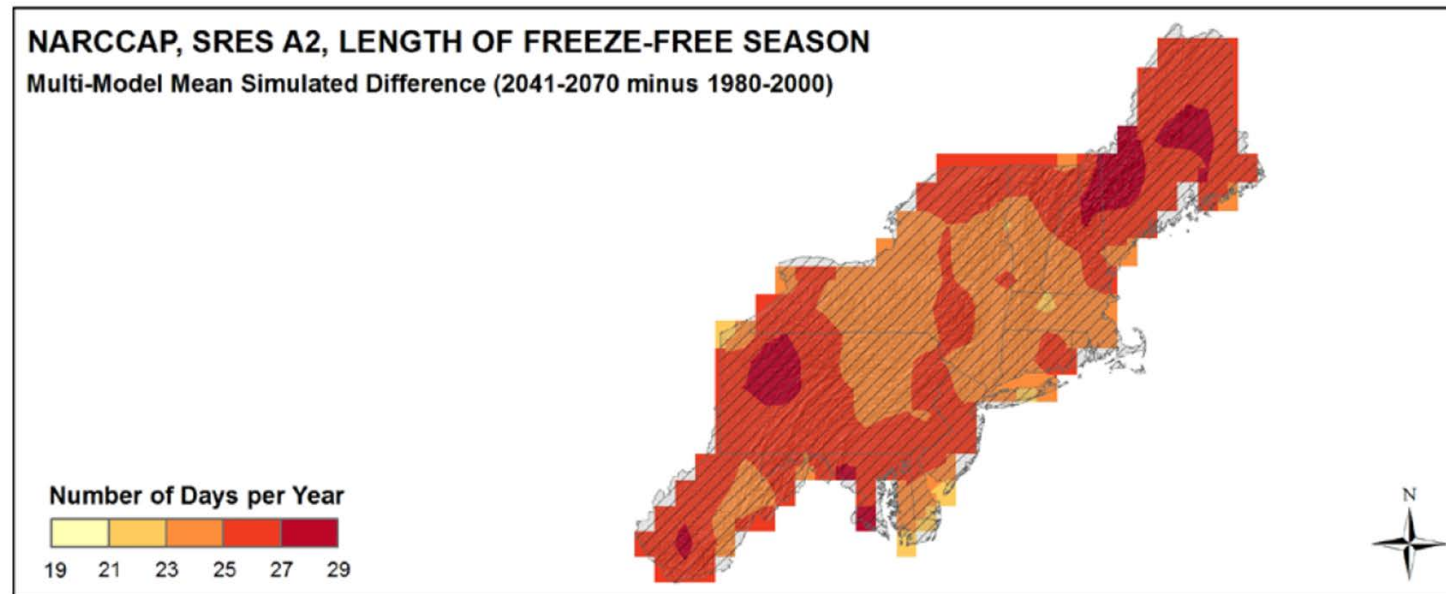   4 to 9 by 2080s

Longer Growing Seasons

> Effects

- Greater market opportunities for warm-season crops
- Reduced production of cool-season crops, niche products
- Freeze/thaw damage
- Late frost risk

> Adaptation

- Crop diversification
- Research and trial new crops and varieties
- New crop rotations, double cropping
- Frost warning improvements

NARCCAP, SRES A2, LENGTH OF FREEZE-FREE SEASON
Multi-Model Mean Simulated Difference (2041-2070 minus 1980-2000)

Number of Days per Year
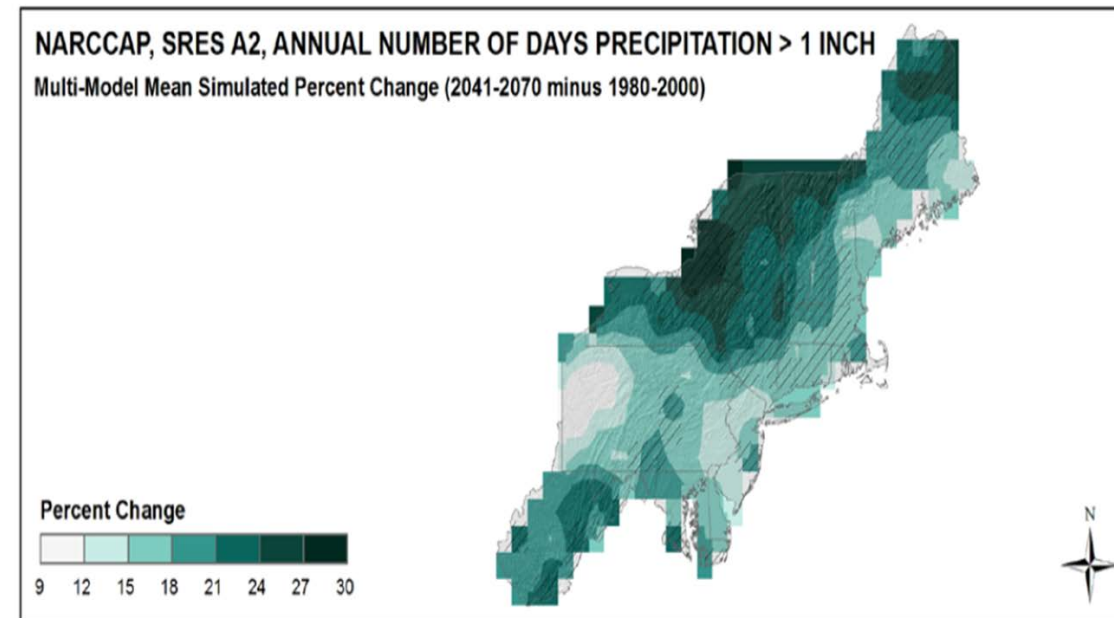19 21 23 25 27 29

Changes in Precipitation

> Effects
- Direct crop damage
- Disease
- Delayed planting
- Contamination from flood water
- Flood damage to farms
- Liability, e.g., manure storage failure

> Adaptation
- Soil improvements
- Tile and drainage systems
- Riparian buffer protections
- Retention ponds

NARCCAP, SRES A2, ANNUAL NUMBER OF DAYS PRECIPITATION > 1 INCH
Multi-Model Mean Simulated Percent Change (2041-2070 minus 1980-2000)

Percent Change
9   12   15   18   21   24   27   30

- Capital Region Projected Annual Precipitation:
  - up to15% increase by 2050s
  - up to 26% increase by 2100

Drought

> Effects
- Reduced crop yields
- Potential competition for water
- Wildfire risk
- Forest mortality due to fire, insects, disease
- Disrupted regeneration, succession

> Adaptation
- Soil improvements
- Drought-tolerant species
- Improved water storage
- Riparian buffer protections
- Improved irrigation capacity
- Improved outreach re drought

> Drought risk not yet quantified

> More frequent short-term, summer droughts likely
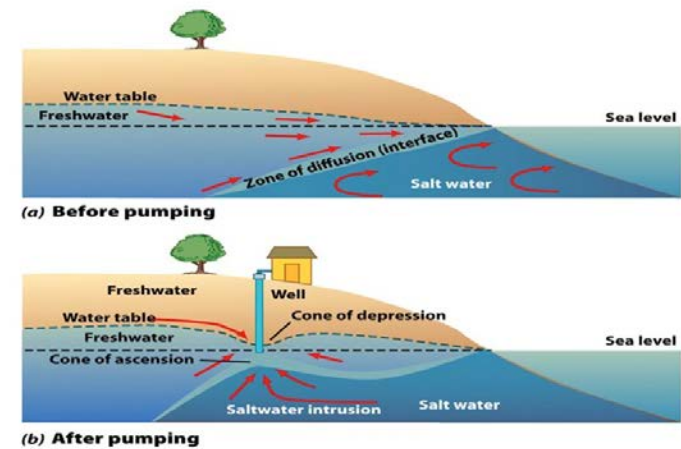
> Exacerbated by higher temperatures
- Increased evapotranspiration

NEW HAMPSHIRE DROUGHT
Drought Hurting
Pumpkin Crop
WMUR9

Sea-level Rise

Groundwater on Long Island: saltwater intrusion

> Effects
  - Salt-water intrusion
  - Inundation

> Adaptation
  - Water conservation
  - Reduced irrigation
  - Green infrastructure

Projected Sea-level Rise, Mid-Hudson
(inches of rise relative to 2000-2004 baseline)

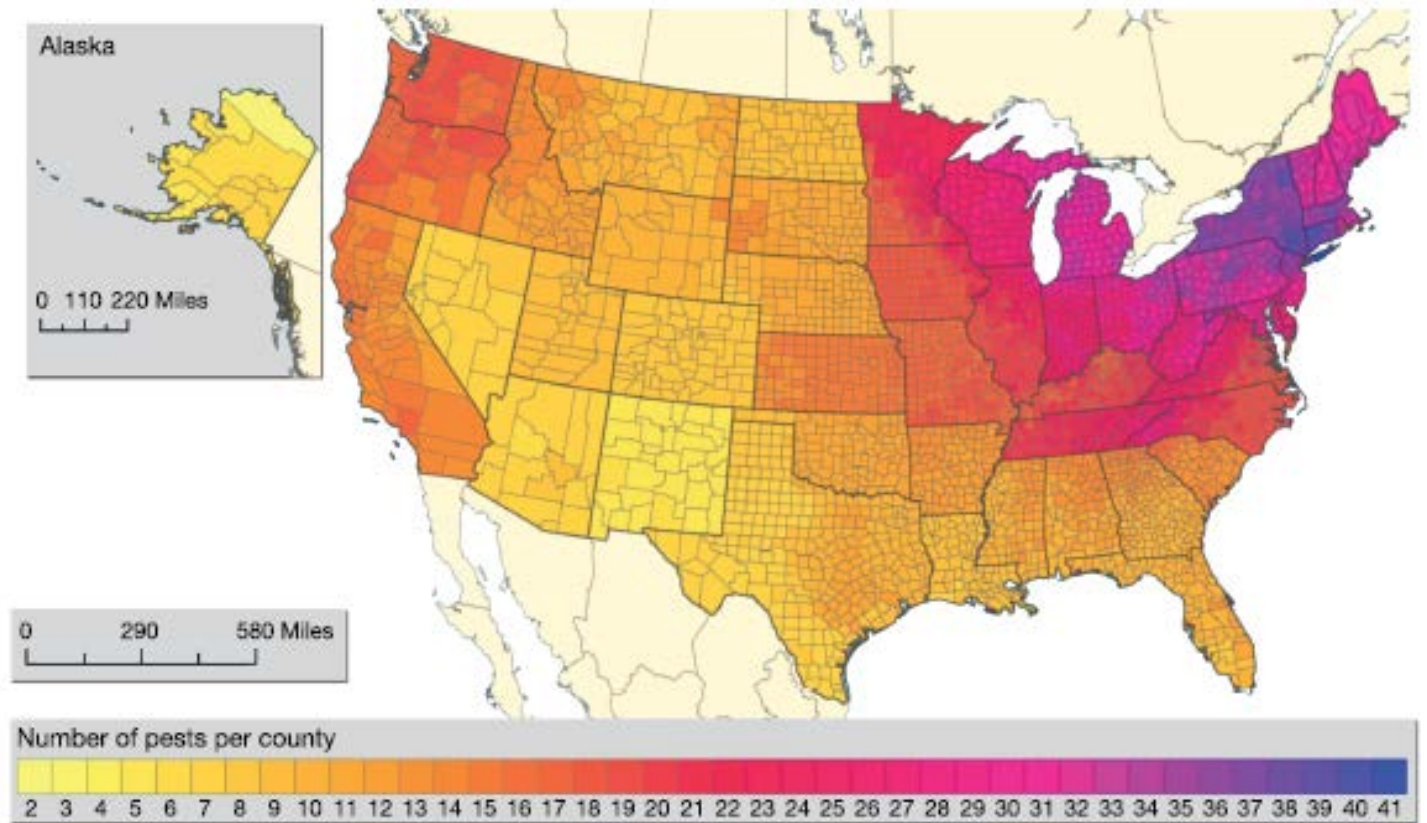|	Low	Low-medium	Medium	High-medium	High
2020s	1	3	5	7	9
2050s	5	9	14	19	27
2080s	10	14	25	36	54
2100	11	18	32	46	71

Pests and Weeds

> Effects
- Northward expansion
- Increased overwintering
- Earlier emergence
- Crop damage
- Disease
- Forest species composition changes
- Increased herbivory
- Increased pesticide use
  - Reduced effectiveness
  - Environmental effects

> Adaptation
- Integrated pest management
- Herbivore control
- Monitoring and rapid response
- Education

Number of invasive forest pest and pathogen species established per county

Number of pests per county

2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41

Source: Alien Forest Pest Explorer, USDA Forest Service
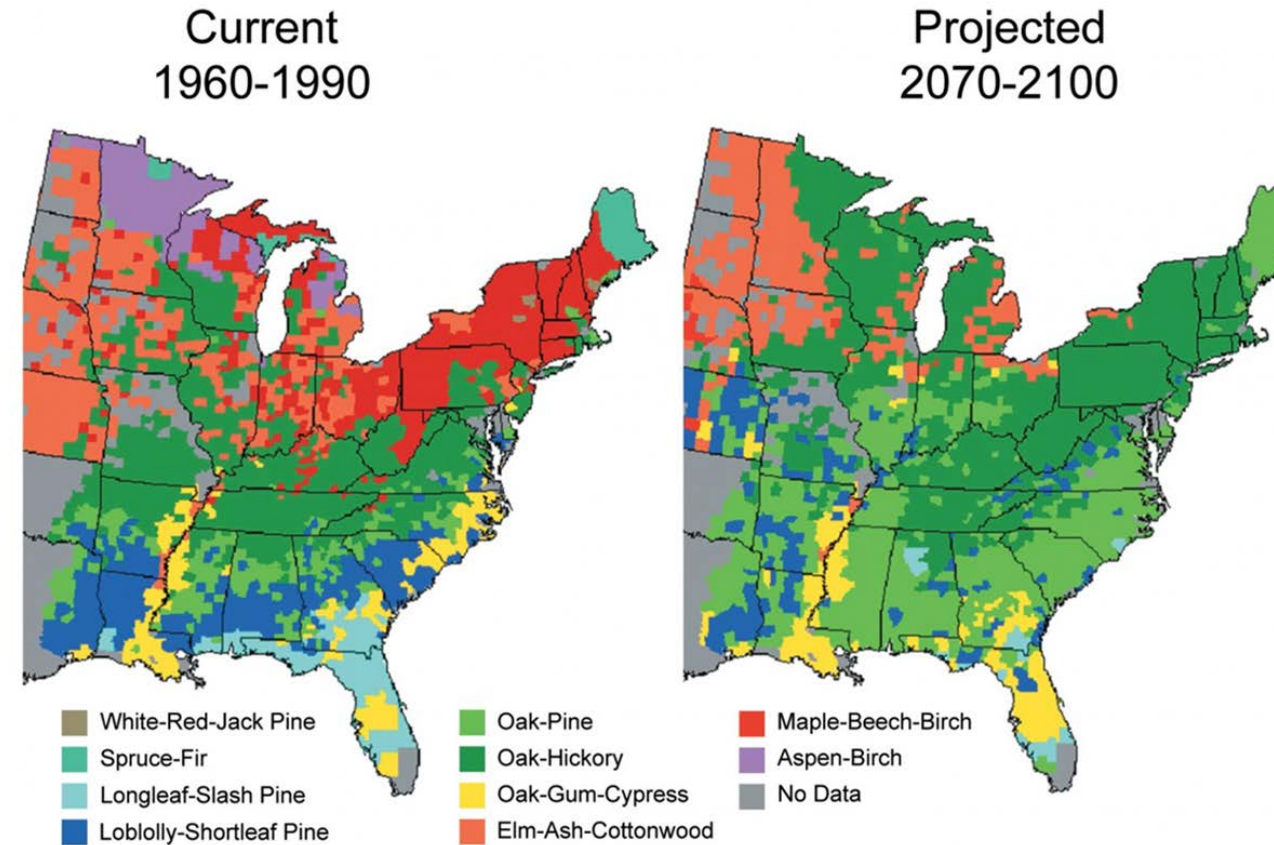
Forest Community Changes

> Influenced by changes in
- Temperature
- Drought
- Snowpack
- Insects
- Biogeochemistry
- Fire
- Synchrony

> Climate envelope studies:
- Current boreal and spruce-fir forests highly vulnerable
- Maple-beech-birch dominated forest replaced by oak-hickory replaced by 2100

Current
1960-1990

Projected
2070-2100

White-Red-Jack Pine
Spruce-Fir
Longleaf-Slash Pine
Loblolly-Shortleaf Pine
Oak-Pine
Oak-Hickory
Oak-Gum-Cypress
Elm-Ash-Cottonwood
Maple-Beech-Birch
Aspen-Birch
No Data

Land Use and Local Government Adaptation and Resilience Strategies

> Develop policies, programs and resources to reduce risks associated with acute climate hazards

- Will include recommendations to reduce climate risks associated with selected mitigation strategies from all advisory panels

> Develop a comprehensive state climate change adaptation and resilience plan

- If adopted, would include sectoral risk assessment and adaptation recommendations

> Ensure consideration of climate change in planning of state investments and environmental reviews

- If adopted, would include development of review guidance, decision-support tools, public investment guidelines, etc.

Mitigation Strategies: Adaptation and Resilience Considerations

> Climate or weather hazards relevant to the selected mitigation strategy
> Aspects of the mitigation strategy that are vulnerable to climate/weather hazards; and any human or natural population or community, natural resource, public or private asset, etc. potentially affected by the mitigation strategy under current or future climate conditions
> Risk: the probability of the hazard affecting the population, asset, etc., and the potential consequences
> Proposed actions to reduce risk
> Challenges to implementation of actions proposed to reduce risks
> Equity considerations associated with the vulnerabilities or proposed actions to reduce risk
> Resources required for further analysis of proposed risk-reduction actions

Next Meeting Hold:

January 14th, 1:00 – 4:00

and

January 22nd, 1:00 – 4:00