

Perceptions of maple producers towards climate change

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Project Summary

- The Northern Forest (NF) region of Vermont and New York is home to over 1,000 commercial maple producers who rely on maple production as a source of income and as the basis for longstanding family and community traditions. Changes in maple production are projected in some studies due to climate change and its potential impacts on forest type (i.e., from maple to oak-hickory-pine; Perkins, 2007), tree health and vigor (Wilmot, 2012), and timing of sap flow (Skinner et al., 2010), although predictions vary. Because maple producers depend on the health of sugar maples for their livelihood and cultural traditions, adapting to changes in maple production will likely be necessary in the future and will require planning. The goal of this study is to engage maple producers in the development of strategies that help them plan for and adapt to the potential impacts of climate change. The research approach for this study includes interviews and a survey of maple producers in the Northern Forest region of NY and VT. Interviews were used to obtain information about producers' knowledge and perceptions of climate change. A mail survey of producers was then used to assess their ability to adapt to change and to identify the factors that influence this adaptability. Results indicate that more than half of the maple producers who responded to the survey expressed concerns about climate change, and more than two-thirds had already made or were planning to make modifications to their business. The two factors that were identified as most important to respondents when assessing adaptability to climate change are resiliency of the maple producers' sugar bush and the producers' ability to adopt new technologies. Despite the uncertainty with the climate, maple producers are highly optimistic about the future, with 90% planning to continue or expand their business within the next five years.

About the maple production industry...

- In 2015:
 - 1,390,000 gallons in VT
 - 601,000 gallons in NY
- In 2014:
 - Nearly \$44.6 million in sales in VT
 - Nearly \$21.7 million in NY (NASS, 2015)
- Important part of agritourism in NY & VT
- Provides a secondary income source for many maple producers



Photo courtesy of the NYSMPA

Purposes of the study

- To identify producers' perceptions of climate change.
- To identify strategies for dealing with the potential impacts of climate change.



Photo courtesy of Liberty Hill Farm, VT

What are the potential impacts?

- Different researchers have different outlooks...
 - Shift in forests from maple-beech-birch to oak-hickory (Perkins, 2007)
 - As trees become stressed, they may be more susceptible to pests and disease (Wilmot, 2012)
 - No change in number of sap flow days through 2100, but earlier start to season (Skinner, DeGaetano, & Chabot, 2010)

Methods

- Maple producers from the Northern Forest Region of NY and VT were included:
 - 14 producers interviewed
 - 1,011 producers surveyed (269 responses)
 - Two focus groups sessions held in NY & VT



Based on a Northern Forest and Counties map by Conservation Advisory Services, 1994

About the questionnaire...

- Business & demographic characteristics
- Open-ended questions about climate change
- Five-point scaled questions on perceptions:
 - Knowledge about forests & climate change
 - Beliefs about impacts of climate change on production
 - Economic, recreational, and social dependence on their business
 - Connections of business to family, community, & industry
 - Perceptions of current business adaptability in general
 - Perceptions of adaptability to climate change

Respondent characteristics

- Ages: 18 to 88; average of 61
- Education: 14.5 years on average
- Gender: 94% male, 6% female
- Households: 87% had two or more adults
19% had at least one child

Business size

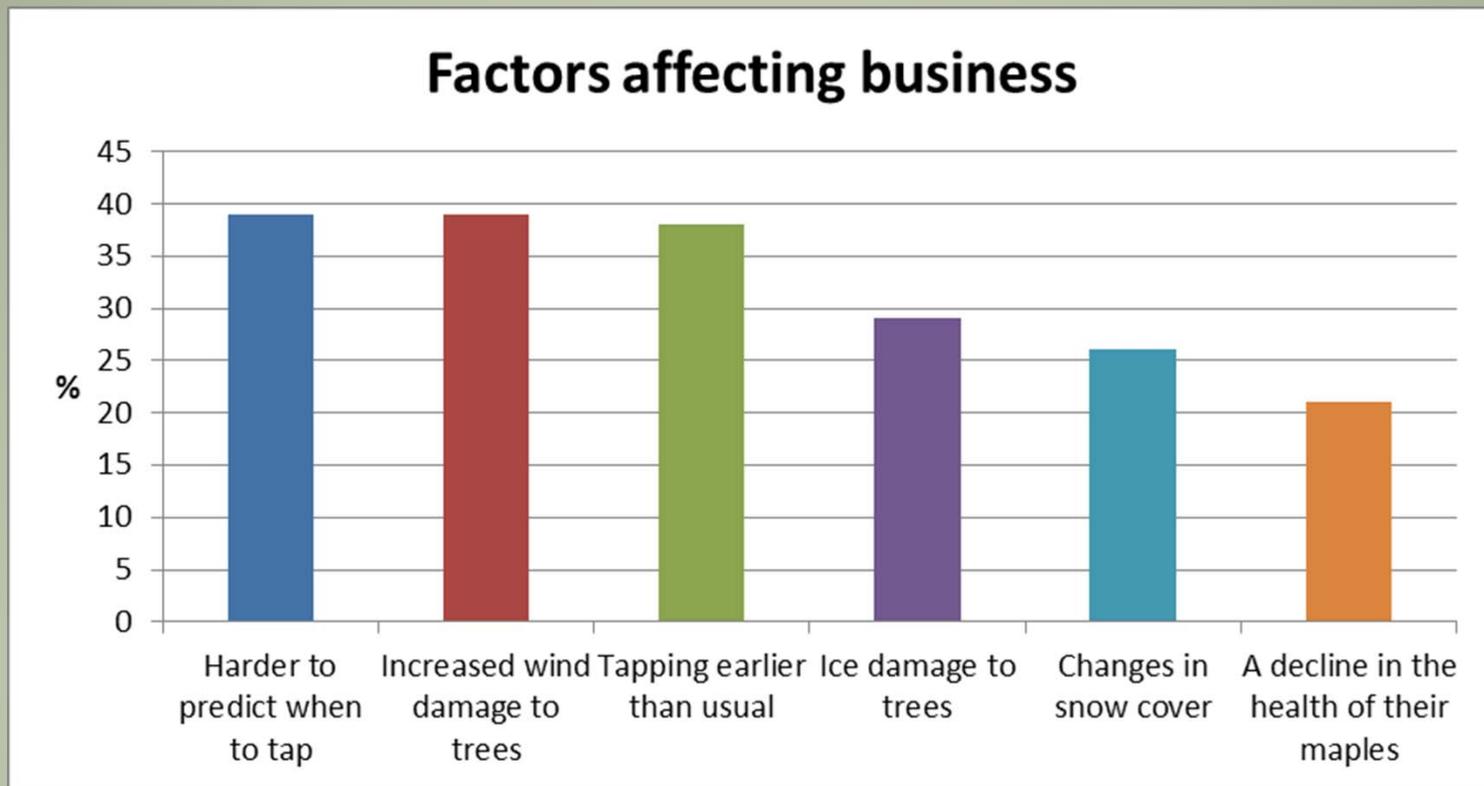
Number of taps	Percent of producers
< 500 taps	20%
501-1,000	17%
1,001-2,000	14%
2,001-3,000	14%
3,001-5,000	13%
5,001-10,000	14%
10,001 or more	8%

Tapping methods

Method used	Percent of producers
Tubing, mechanical vacuum	62%
Tubing, no vacuum	21%
Buckets	16%
Bags	1%

62% used only one method

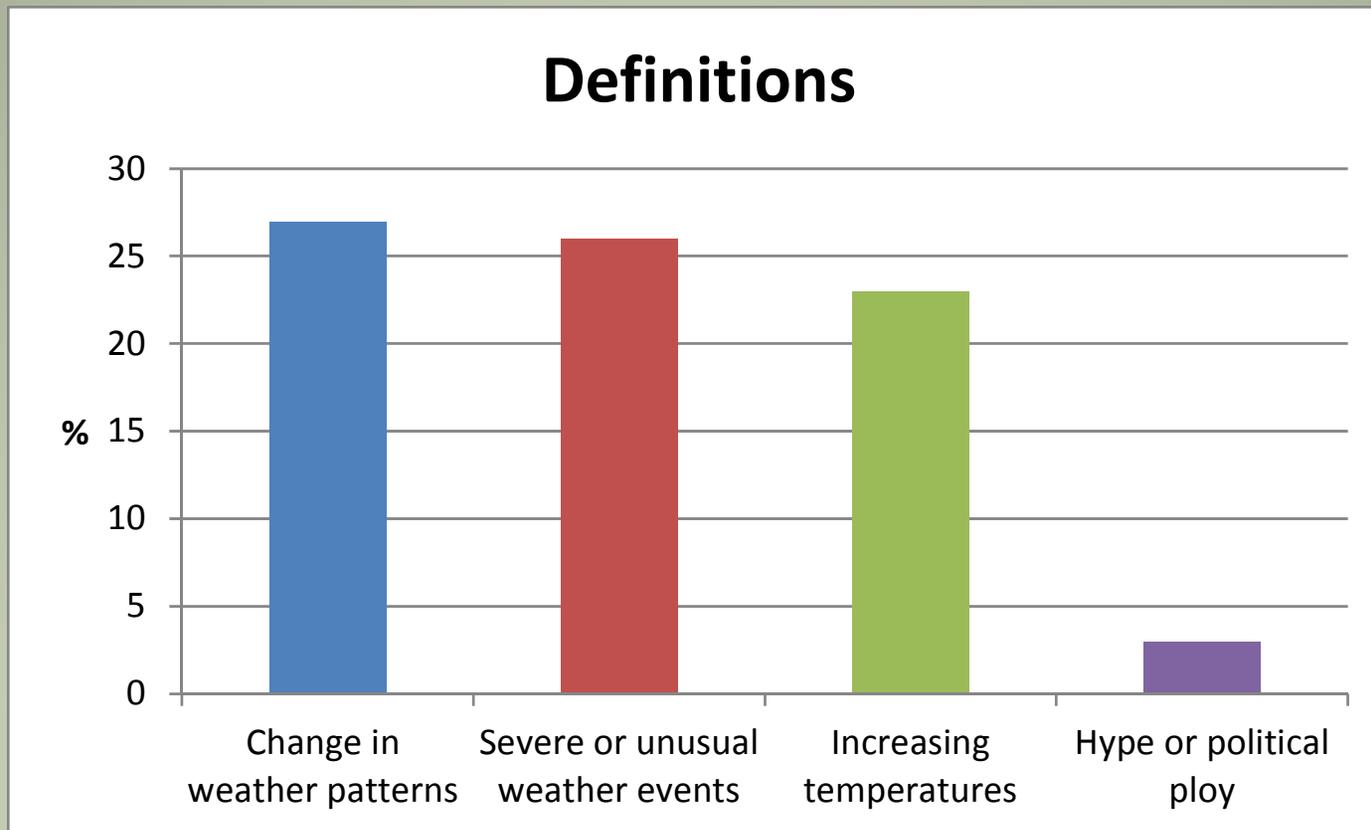
Current issues for respondents



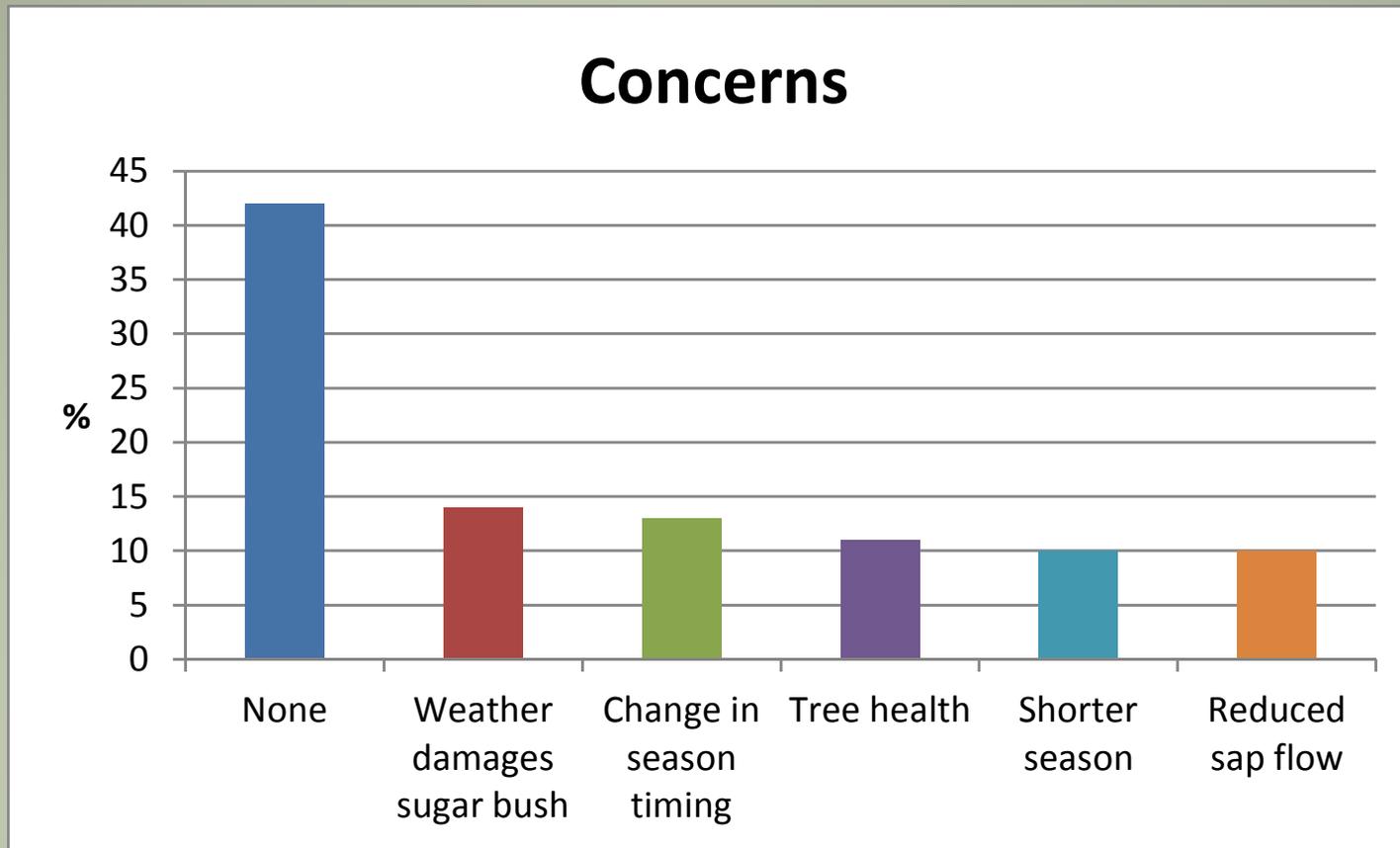
Future plans of respondents



Respondents' definitions of climate change



Concerns related to climate change



Perceptions of producers

How much do you know about climate change in general?

- I know a great deal about climate change in general.
- I know a great deal about the potential impacts of climate change on forests in the northeast.
- I know a great deal about the potential impacts of climate change on the health and vigor of sugar maple trees.
- I know a great deal about the potential impacts of climate change on maple production.

Scale used: -2 = strongly disagree, -1 = disagree,
0 = neither agree nor disagree, 1 = agree, 2 = strongly agree

Knowledge

Concept	Average	Percent D-N-A
Knowledge of northeast forests	0.43	18% - 19% - 63%
Knowledge of climate change	0.30	18% - 26% - 56%

Scale used: -2 = strongly disagree, -1 = disagree, 0 = neither agree nor disagree, 1 = agree, 2 = strongly agree

Beliefs

Concept	Average	Percent D-N-A
Beliefs concerning impacts on production	-0.62	66% - 17% - 17%
Beliefs concerning impacts on business operations	-0.70	71% - 17% - 12%
Beliefs concerning impacts on maple health	-0.90	88% - 8% - 4%

Scale used: -2 = strongly disagree, -1 = disagree, 0 = neither agree nor disagree, 1 = agree, 2 = strongly agree

Dependence on business

Concept	Average	Percent D-N-A
Income dependence	-0.46	66% - 5% - 29%
Recreational dependence	1.00	5% - 10% - 85%
Social dependence	0.46	18% - 13% - 69%

Scale used: -2 = strongly disagree, -1 = disagree,
0 = neither agree nor disagree, 1 = agree, 2 = strongly agree

Business connections

Concept	Average	Percent D-N-A
Connections with family	0.40	28% - 8% - 64%
Connections with association	0.41	22% - 11% - 67%
Connections with community	-0.60	63% - 14% - 23%

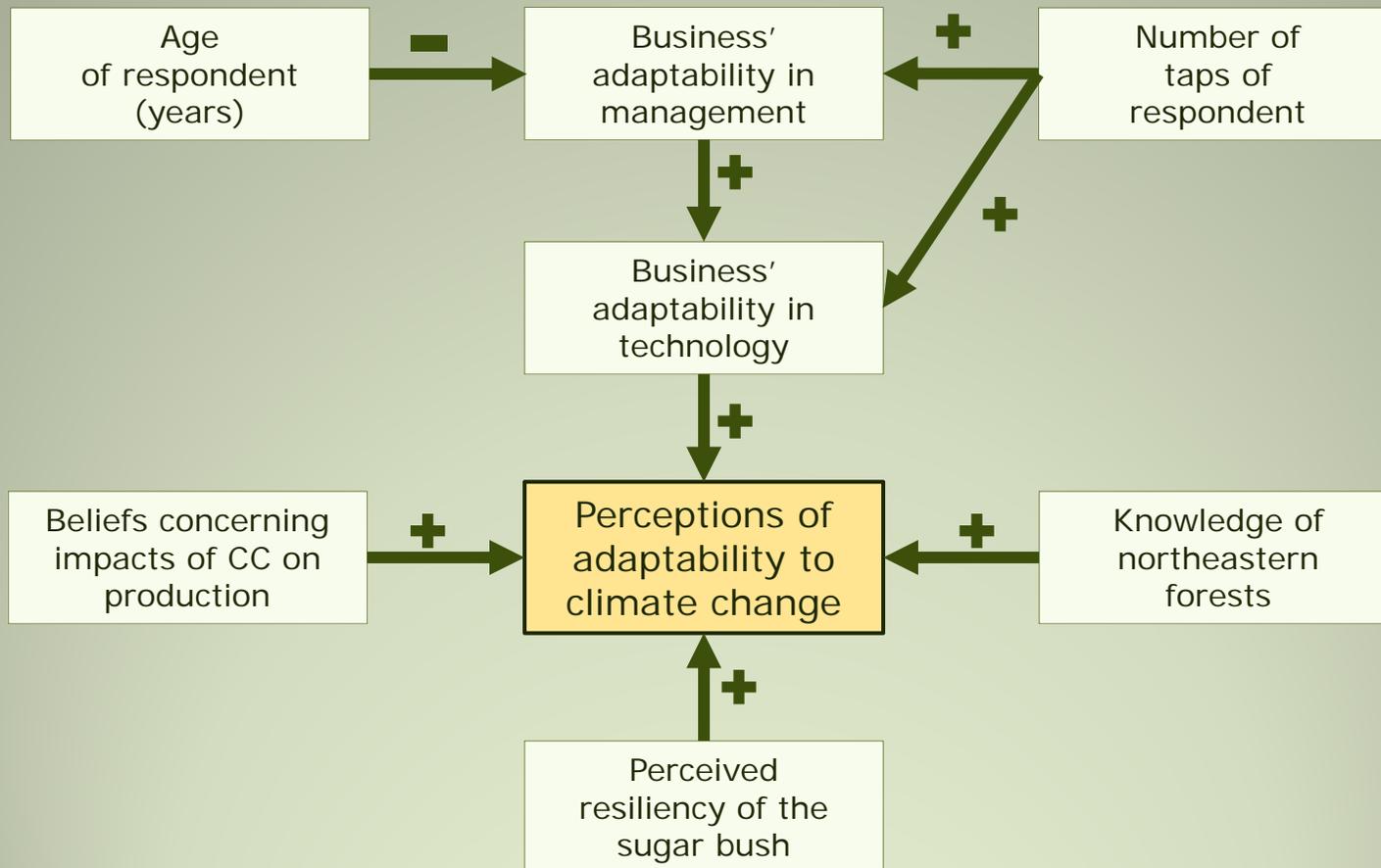
Scale used: -2 = strongly disagree, -1 = disagree,
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Business adaptability

Concept	Average	Percent D-N-A
Adaptability in management	0.81	6% - 5% - 89%
Adaptability in technology	0.23	32% - 13% - 55%
Adaptability in customer base	0.40	21% - 14% - 65%
Adaptability (resiliency) of sugar bush	-0.56	66% - 11% - 23%
Potential adaptability of business to climate change	-0.22	50% - 18% - 32%

Scale used: -2 = strongly disagree, -1 = disagree, 0 = neither agree nor disagree, 1 = agree, 2 = strongly agree

Path Analysis



Implications for the Industry

- Potential changes in the structure of the industry in the future
 - Costs associated with adopting new technologies
 - Size of maple bush and resiliency
- Education about new technologies
 - Cooperative Extension, Producers' Associations, Farm Bureau

Management Implications

- Tapping earlier
- Utilize technology when possible
 - Vacuum systems
 - Check valve spout adapters
- Improve resiliency of sugar bush & tree health
 - Conservative tapping
 - Thinning as needed
 - Plant saplings
 - Utilize windbreaks

Future Directions

- Maple producers are very positive about the future of the industry
 - Over the next five years...
 - 48% of respondents want to increase number of taps
 - 42% to stay "as is"
 - 18% to expand products and services
 - 10% to retire, sell, or close

List of Reports

- Kuehn, D., L. Chase, T. Sharkey, & S. Powers. (2016). Perceptions of maple producers towards climate change. SUNY ESF: Syracuse, NY. 38 pp. Available online at <http://www.esf.edu/for/kuehn/reports.htm>
- Kuehn, D., L. Chase, & T. Sharkey. (2016). Survey of Sugar Makers about climate change - 2014. SUNY ESF and University of Vermont. 2 pp. Available online at <http://www.esf.edu/for/kuehn/reports.htm>
- Sharkey, T., D. Kuehn, and L. Chase. (2016). Perceptions of maple producers towards climate change. *Proceedings of the 2015 Northeast Recreation Research Symposium*, Annapolis, MD. (in press).
- Kuehn, D., L. Chase, T. Sharkey, & S. Powers. Adapting to climate change in the maple production industry. (Journal article in progress).

List of Presentations

- Kuehn, D., & L. Chase. Perceptions of maple producers towards climate change. NSRC Research webinar. April 20, 2016.
- Powers, S., D. Kuehn, L. Chase. Adapting to climate change in the maple production industry (poster presentation). 2016 Northeast Recreation Research Symposium, Annapolis, MD. April 3, 2016.
- Kuehn, D., T. Sharkey, and L. Chase. Perceptions of maple producers towards climate change. 2015 Northeast Recreation Research Symposium, Annapolis, MD. April 12, 2015.
- Two focus group sessions were presented at statewide maple producers conferences in NY and VT in January, 2016.

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Citations

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- Skinner, C. B., DeGaetano, A.T., & Chabot, B.F. (2010). Implications of 21st century climate change on Northeastern United States maple syrup production: Impacts and adaptations. *Climatic Change*, 100(3):685-702.
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