



What Farmers Think (and Do) for Climate Change

Factors affecting climate mitigation and adaptation practices and future opportunities

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Major Topics



Outline of Discussion

What do farmers think about
climate change?

Factors affecting adoption

What practices have they
adopted (or want to?)

Policy design and opportunities



California agriculture weathers drought — at a cost
...ring relief, but longer and deeper dry spells are predicted.
...yden
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Rights & Permissions



...fires have proliferated during California's ongoing drought.

RESEARCH
California agriculture

California farmers enlist drones
battle against drought
ENERGY/ENVIRONMENT
Farmers in the drought-riddled West, farmers are hoping new technology
them get the most out of every last drop of water.
By Scott Smith, Associated Press | AUGUST 29, 2016



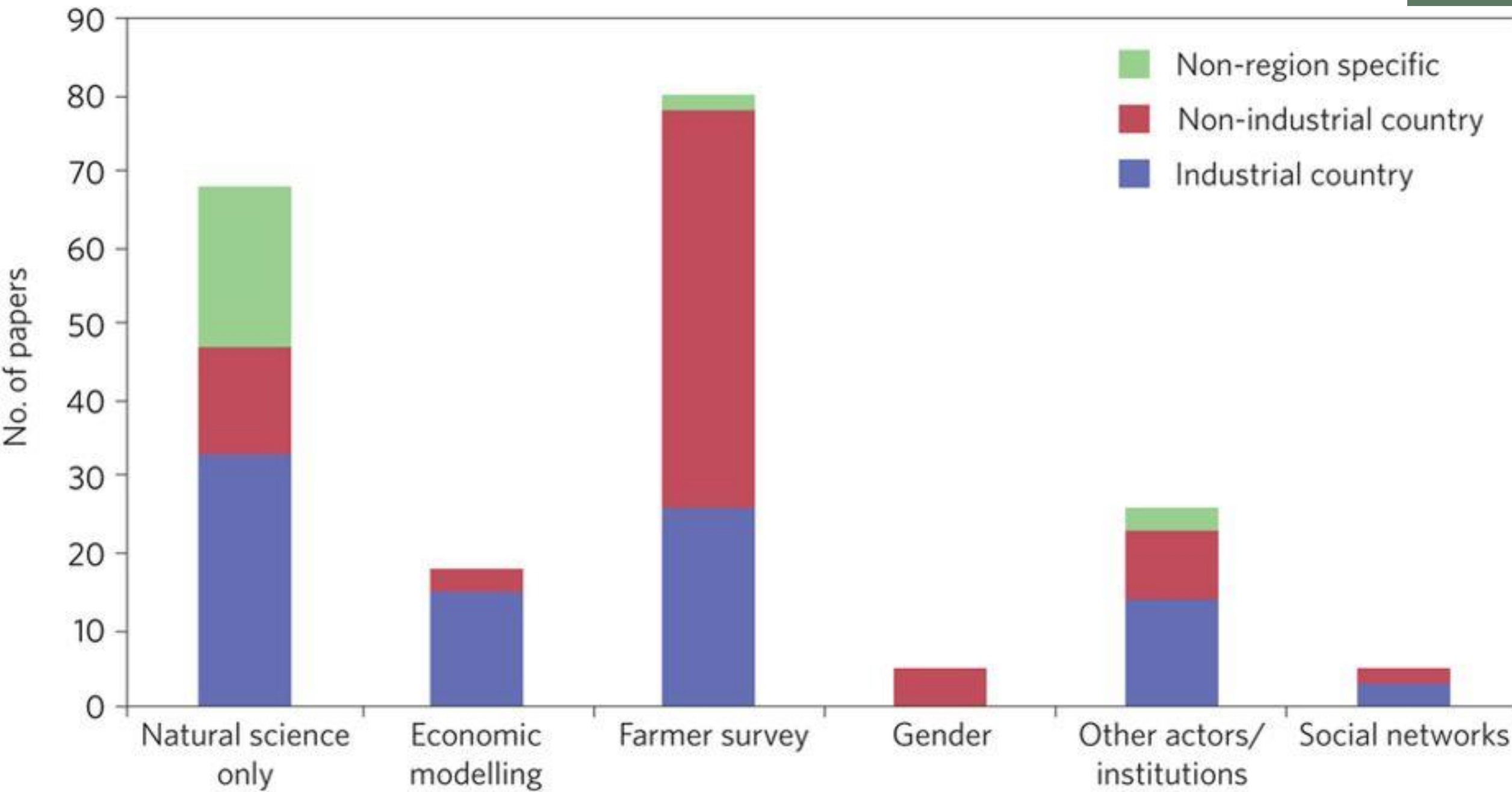
Agriculture and Climate Change

Agriculture is both a contributor to climate change and a potential victim of its impacts

Farmers are critical for adaptation and mitigation



Agricultural Adaptation Research



Large body of research with farmer surveys, especially in low-income countries



U.S. Farmers and Climate Change

Research across the U.S.

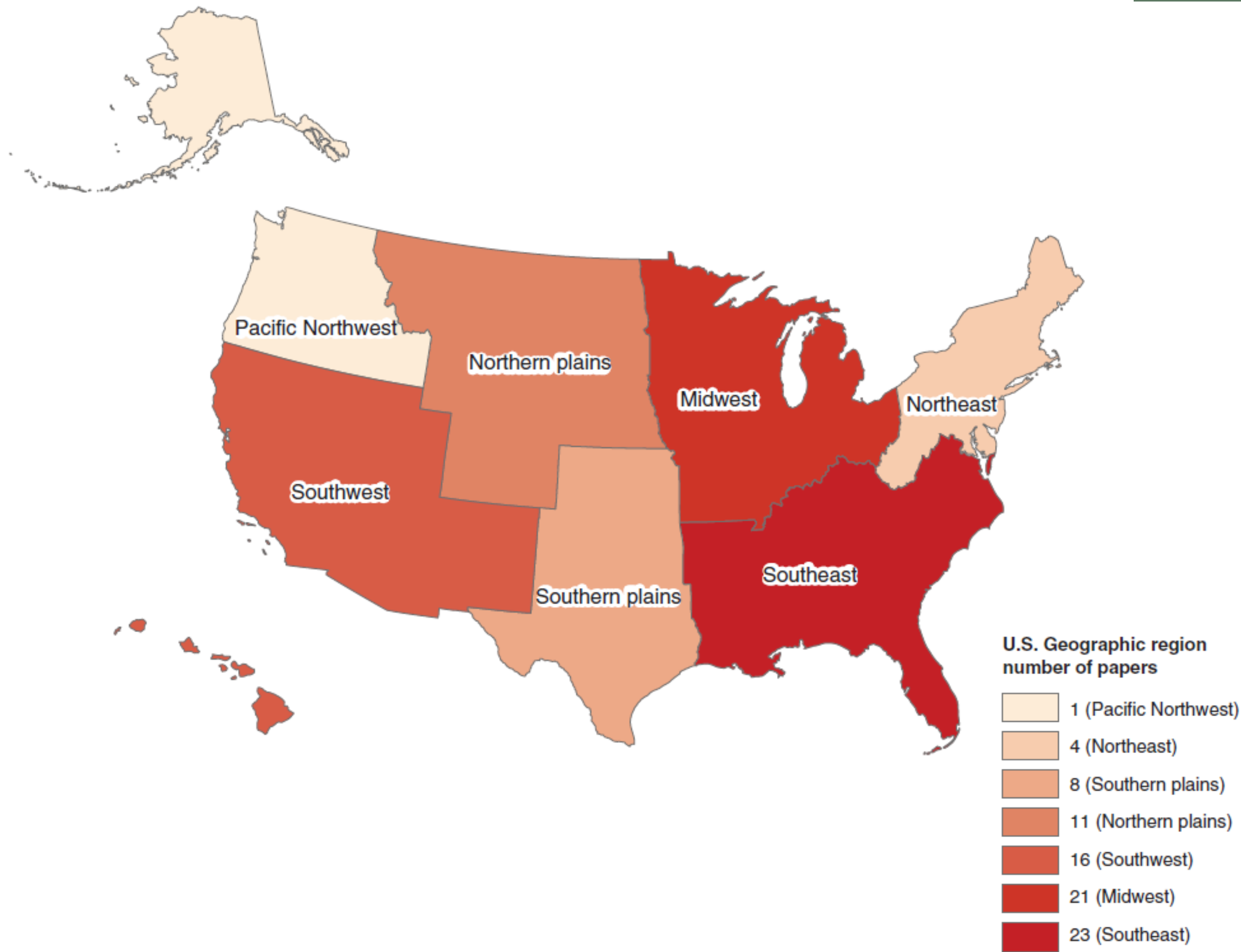


FIGURE 2 | Map of studies conducted between 1997 and 2015 on U.S. agriculture stakeholder views and decisions on climate change and extreme weather, by USDA Climate Hub region ($n = 84$, as some studies spanned multiple regions).



FACTORS AFFECTING CLIMATE BEHAVIORS

Belief/perceptions
Knowledge
Capacity
Social networks
Environmental factors
Political/economic

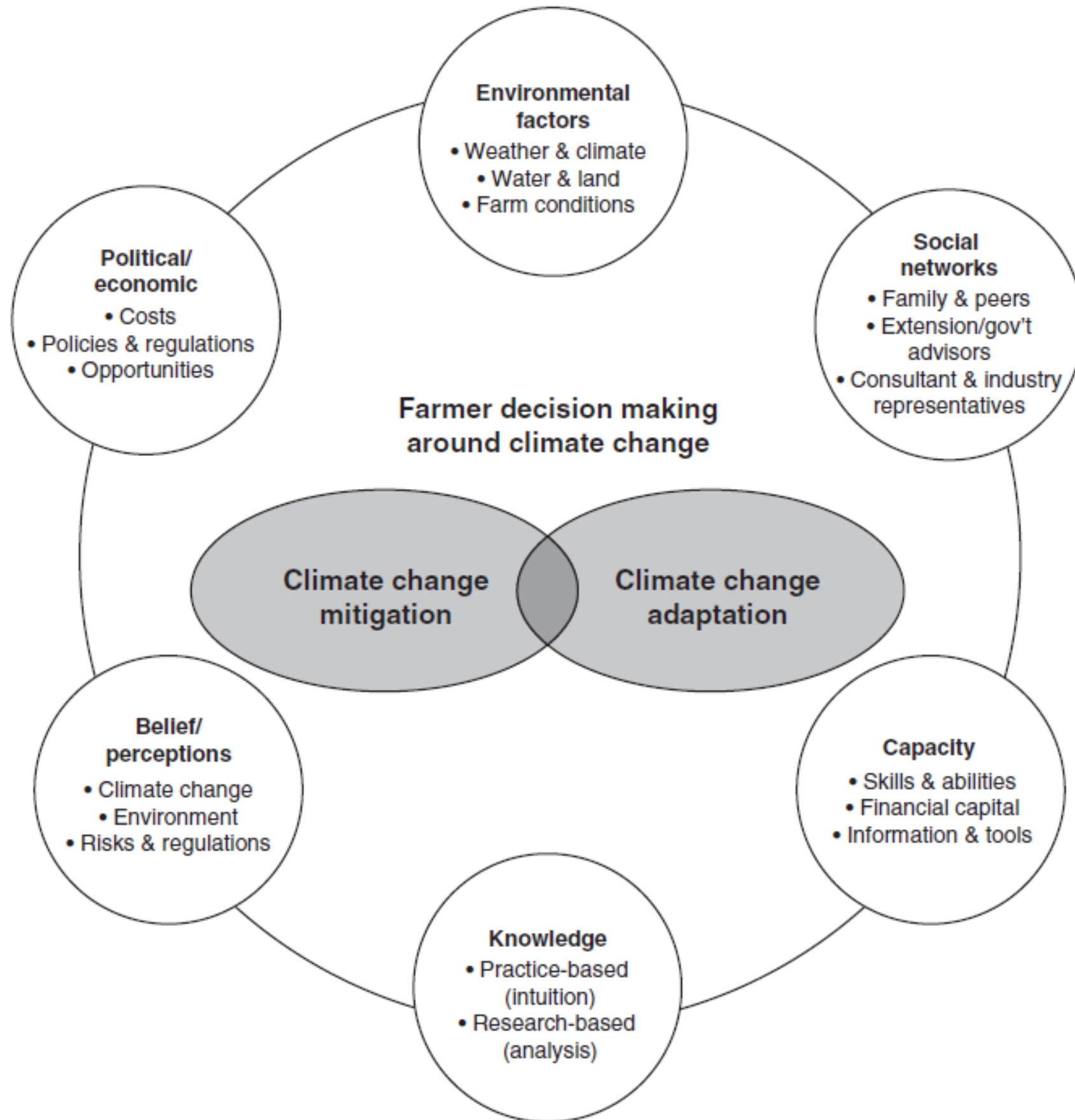


FIGURE 1 | Conceptual framework of the factors that affect U.S. farmers' decision making around climate change, based in part on Fishbein and Ajzen, White and Selfa, Park, and White.^{18,32-34}



Belief and Perceptions

The majority of US studies show farmers believe climate change is happening

- On average, 65% of farmers believe the climate is changing (Chatrchyan 2017)
- Fewer believe in the anthropogenic nature of climate change (40%)
- These may be changing

The screenshot shows the top portion of a web page. At the top left is a 'Latest Issues' button. The main header features the 'SCIENTIFIC AMERICAN' logo with a '175' anniversary badge, and navigation links for 'Cart', 'Sign In', and 'Stay Informed'. Below this is a horizontal menu with categories: 'THE SCIENCES', 'MIND', 'HEALTH', 'TECH', 'SUSTAINABILITY', 'VIDEO', 'PODCASTS', 'OPINION', and 'PUBLICATIONS'. A dark banner below the menu contains the text 'Celebrating 175 Years of Discovery' and a red 'Learn More' button. The main content area is headed by 'E&E NEWS' and 'SUSTAINABILITY'. The article title is 'What Do Farmers Think about Climate Change?'. Below the title is a sub-headline: 'Most farmers believe climate change is occurring but do not trust those who clamor for action'. The author information reads 'By Niina Heikkinen, ClimateWire on January 28, 2015'. On the left side of the article, there are social media sharing icons for Facebook and Email. On the right side, there is a 'READ THIS NEXT' section with a link to 'SUSTAINABILITY U.S. Farmers View Climate Change as Just Another Weather Challenge' by David Biello, dated July 16, 2013. At the bottom of the article, a quote begins: '"Our research so far has shown pretty clearly that although most farmers'.



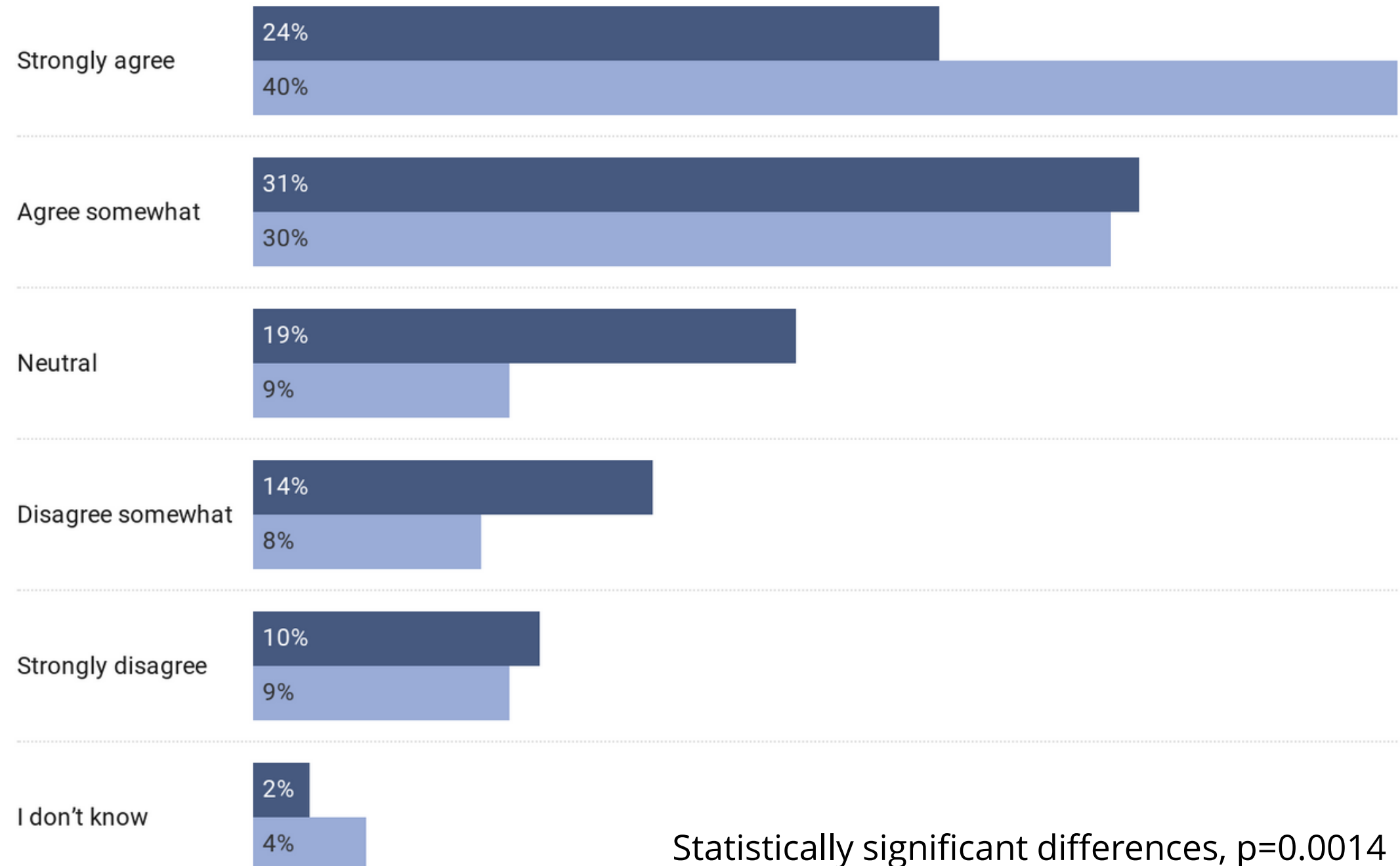
Belief and Perceptions

California shift in climate perspectives

- 55% climate change belief in 2011, 70% climate belief in 2017
- Human attribution belief 35% to 45%

The Global Climate is Changing

■ 2011 ■ 2017



Statistically significant differences, $p=0.0014$



Belief Threshold?

94% of Puerto Rican farmers believed the global climate is changing in 2018

Survey of 405 farmers following Hurricane Maria in 2018

90%

Agreed that climate risks were both LOCAL and GLOBAL

95%

The effects of climate change are being felt today



Capacity

Actual and Perceived

- Financial, technical, human, psychological capacities
- Perceived capacity was the only predictor of both farmer's actual and intended adoption (Niles et al. 2016)
- Perceived capacity positively associated with cover crop use (Gardezi and Arbuckle 2019)

"Fostering a sense of capacity and confidence for people to be able to change their behavior is crucial for both intention and actual adoption. This can help people overcome a sense of powerlessness that may be particularly acute for a collective action problem like climate change".

Niles et al. 2016 Climatic Change.



Social Networks

Trust and information sources affect climate beliefs and behaviors

- Agricultural industry and farm groups are most trusted by farmers (Arbuckle 2013)
- Farmer group participation positively associated with no-till adoption on New England vegetable farms (White et al. 2020)

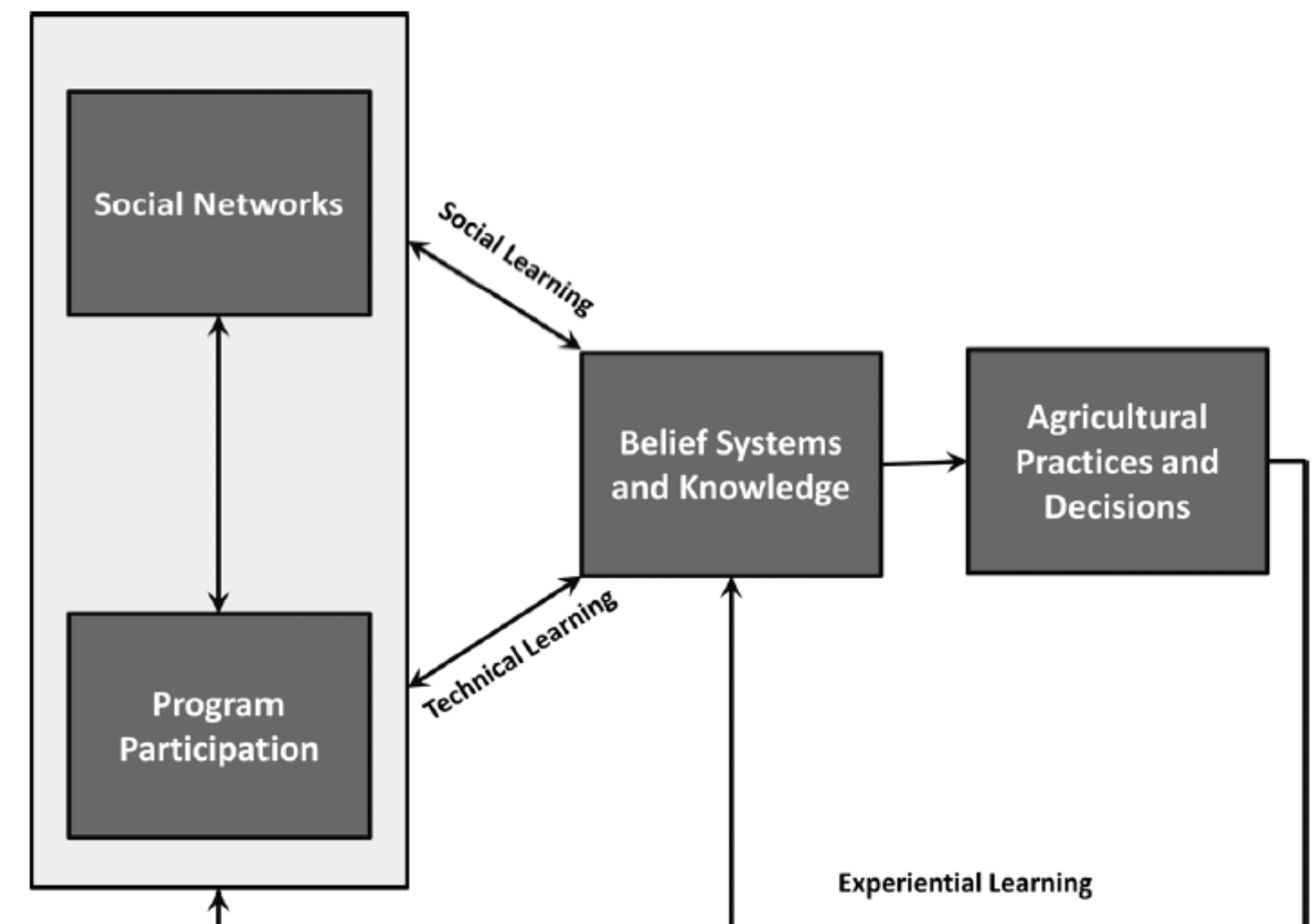


Figure 1. Theoretical framework for agricultural knowledge systems.

Agricultural knowledge networks are increasingly complex. Lubell et al. 2014



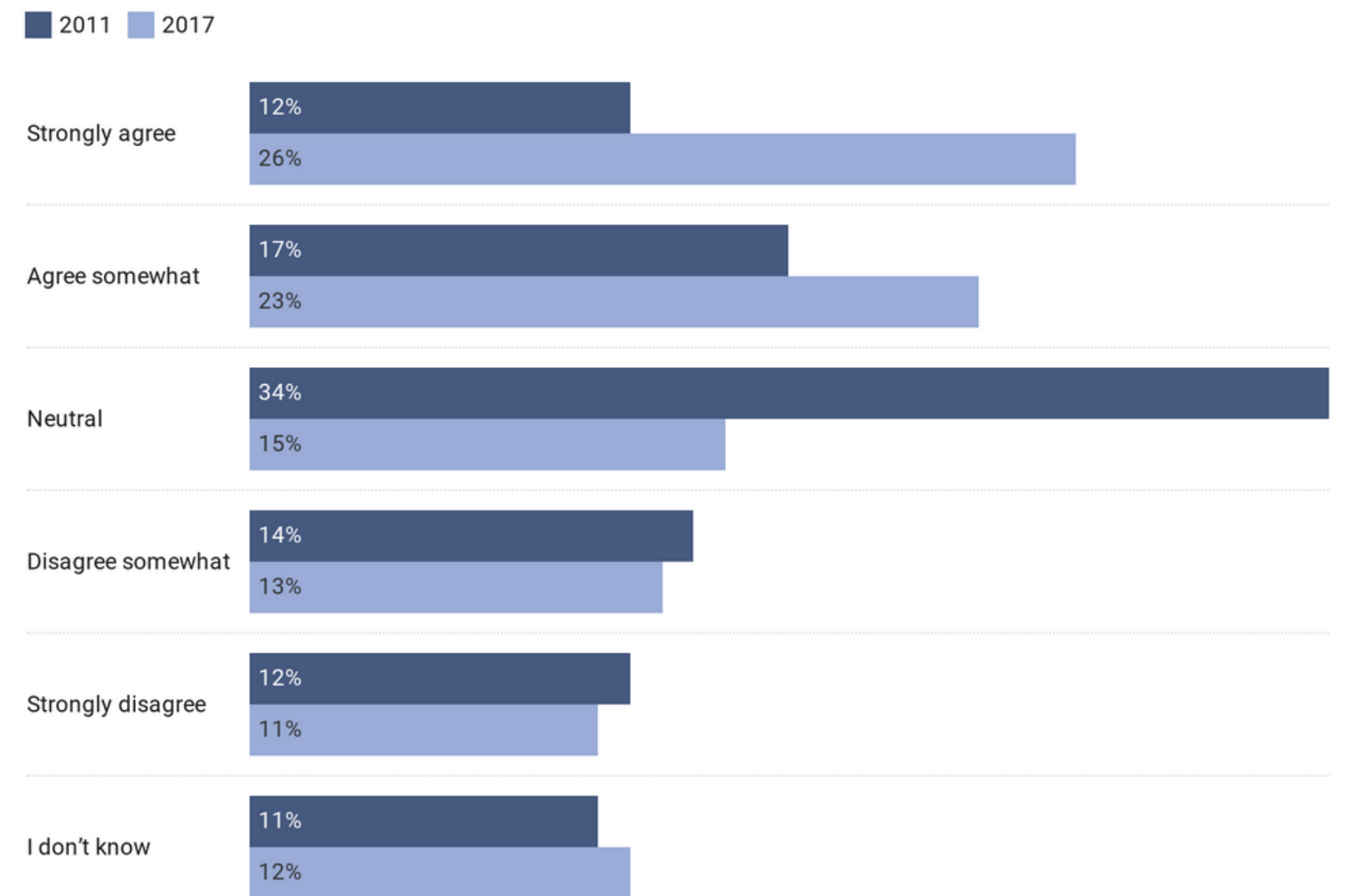
Environmental Factors

Farmer perceptions of risk were most important for adaptation practice adoption (Mase et al. 2017)

- These perceived risks appear to be increasing in some places like California (Niles et al. 2019)

Statistically significant differences, $p=0.005$

Climate Change Presents More Risks Than Benefits for Agriculture in Yolo County



Created with Datawrapper

Change in risk perceptions for Yolo County farmers between 2011 and 2017. Niles et al. 2019. 

“

**WE CAN ADAPT TO
CLIMATE CHANGE. I'M NOT
SURE WE CAN ADAPT TO
THE LEGISLATURE.**

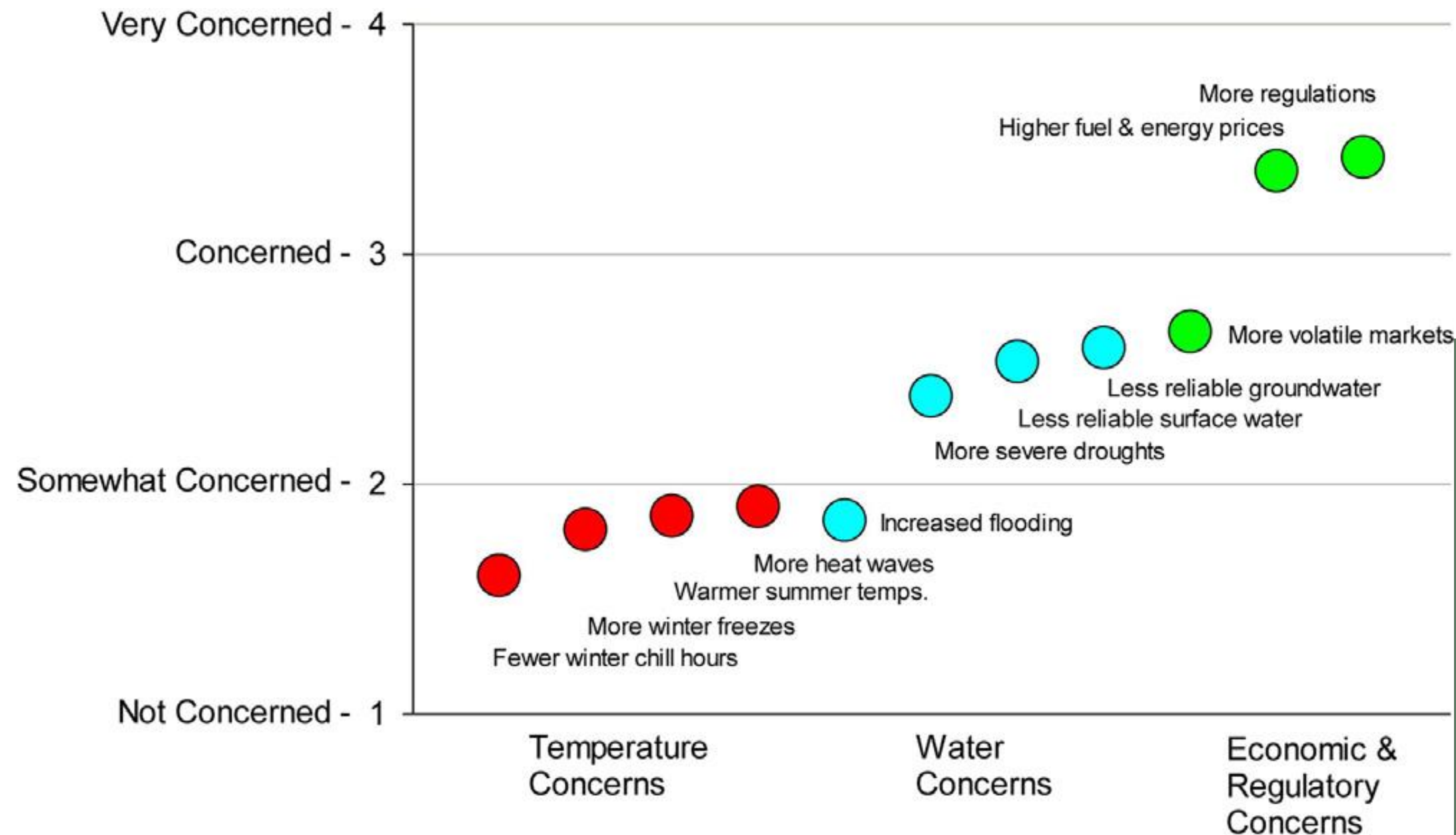
YOLO COUNTY FARMER - 2012



Political and Economic

Concern for Regulation and Economics

- Farmers were more concerned about climate policy than climate impacts (Niles et al. 2013)
- 48% indicated any interest in a government program for climate mitigation/adaptation



Farmer concern for varying climate related impacts among Yolo County farmers, 2012. Niles et al. 2013



Political and Economic

Simplicity?

- Over 80% of farmers in California and Vermont think government regulations and paperwork have increased in the last 5 years (Niles and Hammond-Wagner 2020, Niles et al. 2018)

Farmer Perceptions of Changes in Regulations

Significantly decreased Decreased Stayed the Same Increased Significantly increased Not sure

The number of government regulations in the past five years has...



The level of complexity of government regulation in the past five years has...



The number of farm visits/audits from government regulators in the past five years has...



Created with Datawrapper

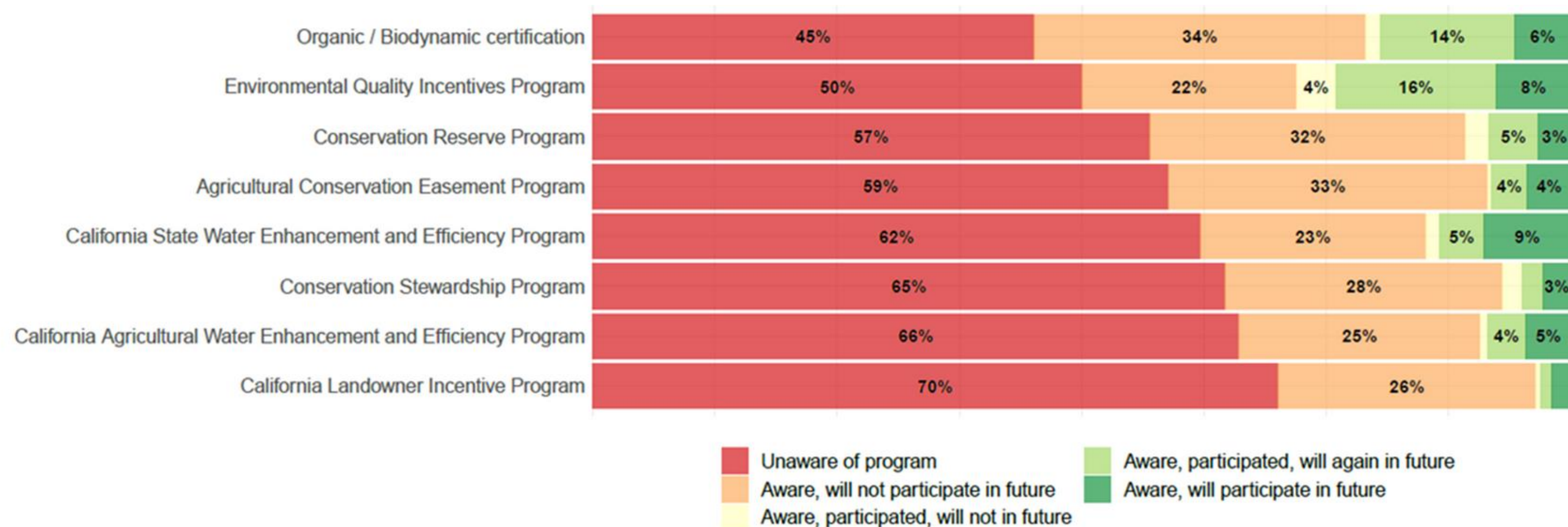
Vermont farmer perceptions of government regulations. Niles 2018.



Political and Economic

Do farmers know what exists?

- And even if they do, why don't they want to participate?



California farmer familiarity and interest in participating in a range of government conservation programs (Niles and Hammond-Wagner 2020)



Do We Need the Government?

Many new programs,
mostly not the government

- Indigo Ag
- Industry efforts
- Carbon markets



FOOD + POLICY

FARMING

HEALTH

ENVIRONMENT

DONATE



Will Indigo Ag's New Private Carbon Market Pay Off for Farmers?

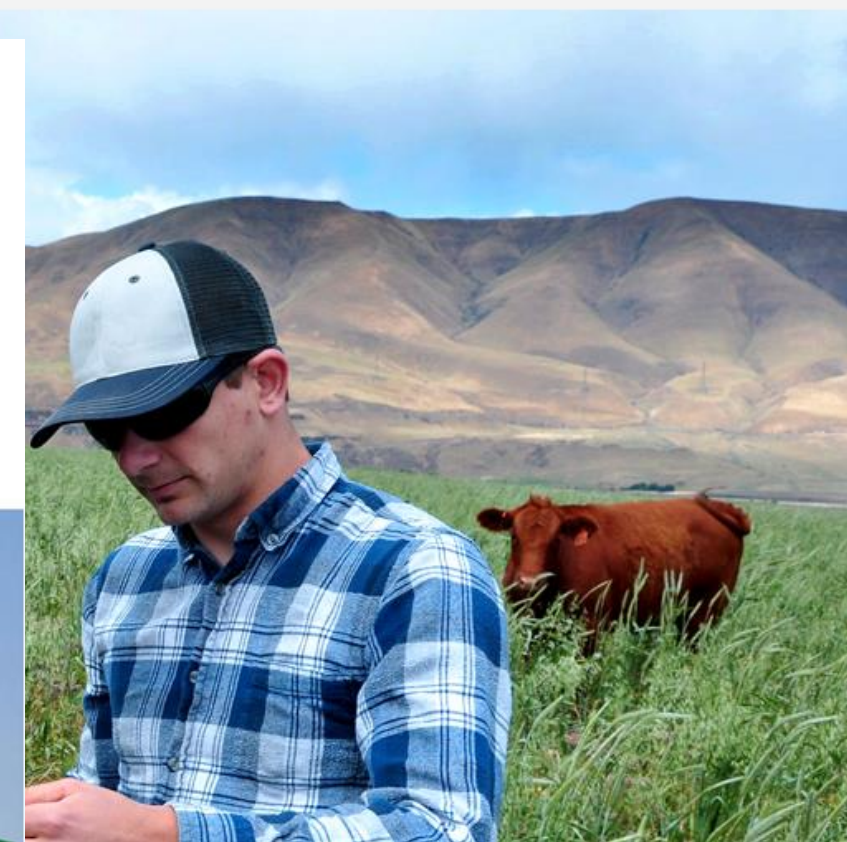
The company has raised millions to help farmers sequester a trillion tons of carbon in the soil.
A California carbon farming advocate weighs in.

New initiatives will pay farmers to keep carbon in the ground

07/22/20 6:30 AM By Steve Davies

KEYWORDS BAYER CARBON INITIATIVE CLIMATE CHANGE COVER CROPS GREENHOUSE GASES JOE BIDEN LISA SAFARIAN

NO-TILL

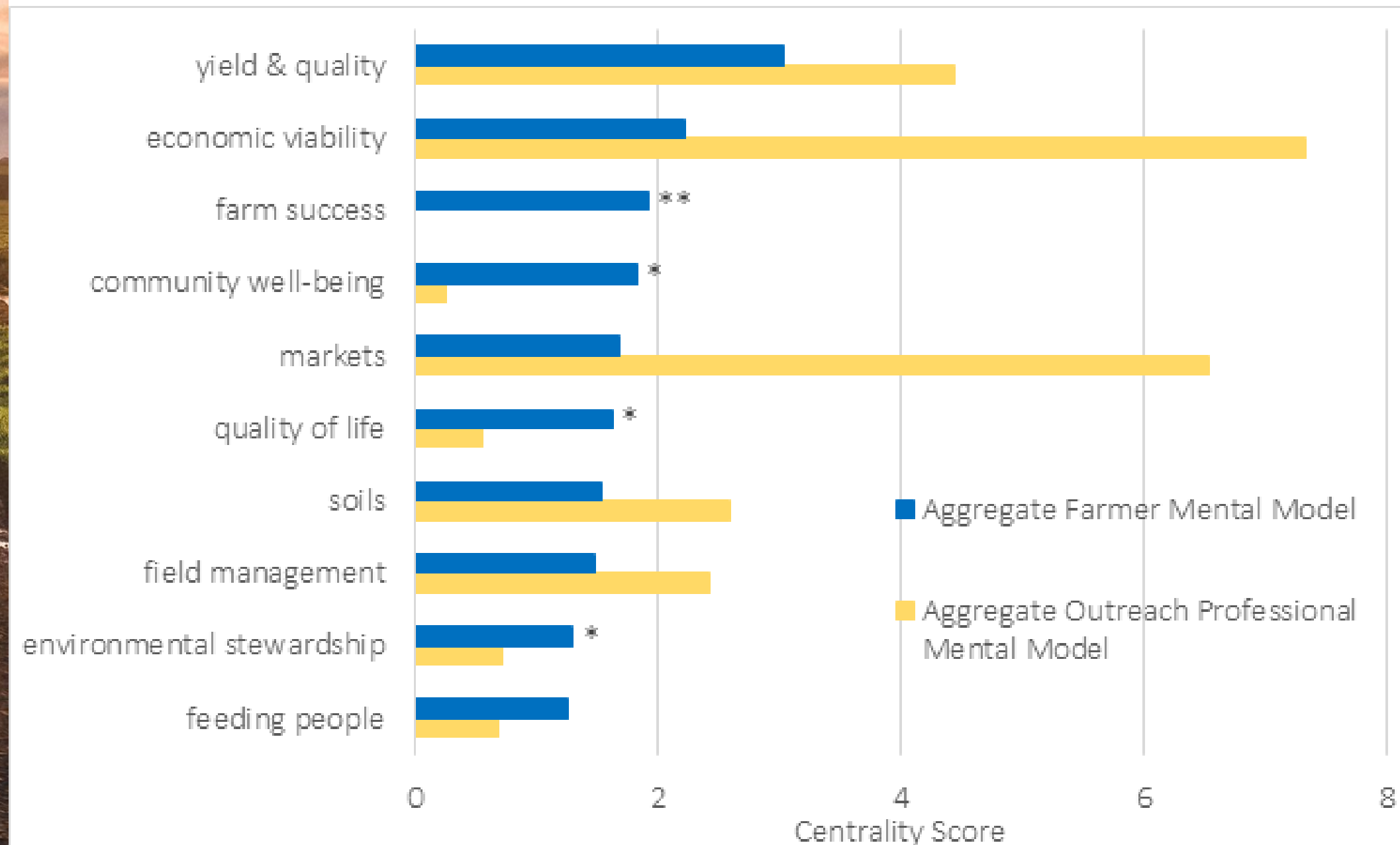


Other Factors

Mitigating and adapting is about more than climate change

PERCEPTIONS DIFFER

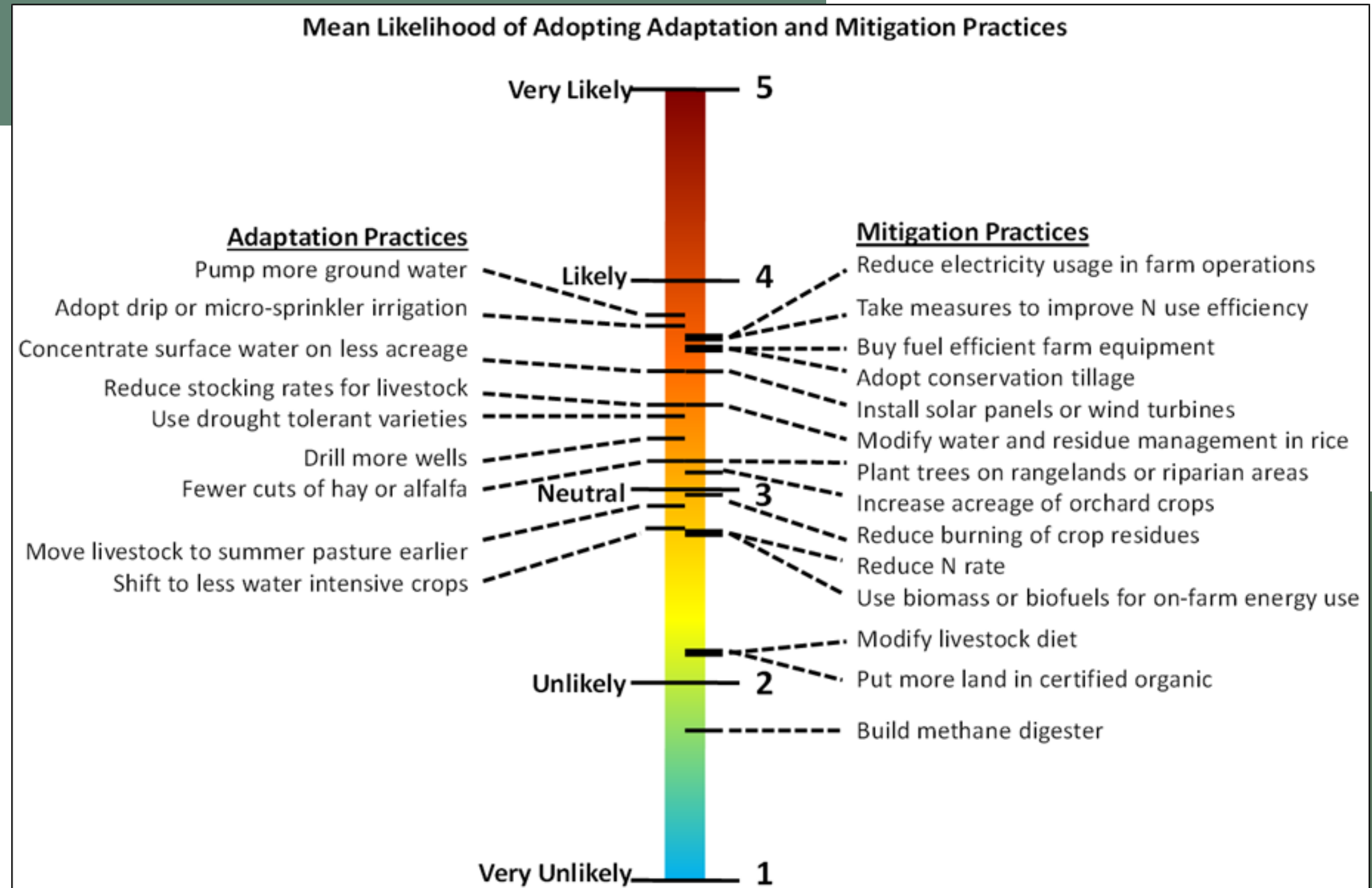
Mental models of Maine and Vermont farmers show different priorities. Farmers more likely to value farm success, community well being and quality of life.



What Practices?

Not all will have co (or public) benefits

- Conservation practices, crop insurance, and technologies most likely adaptation (Mase et al. 2017)
- Adaptation greater interest than mitigation
- "Payment for ecosystem services?" Friendly language?



Likely adoption of adaptation and mitigation practices among Yolo County farmers (Haden, Niles et al. 2012)



Concluding Thoughts

WHAT WE KNOW

A lot about farmer perceptions of climate change, potential factors affecting adoption

WHAT WE KNOW LESS

Mix of co-benefits across practices and how this affects potential adoption

POLICY DESIGN

Many (most?) farmers don't want to participate in government programs

OPPORTUNITIES

Non-government partners? Trusted advisors? Regulatory versus incentive structures?



Acknowledgements

Coauthors: Jessica Ball and Amy Nickerson (CA farmer shift),
Luis Alexis Rodriguez-Cruz (Puerto Rico),
Ruth Clements, Sonja Birthisel, Adam Daigneault, Eric Gallandt, Thomas
Wentworth, Devon Johnson (Maine and VT)
Courtney Hammond Wagner (California groundwater)
Alissa White (New England no-till adoption)
All other published studies- co-authors listed in publication

Funding over the years: USDA Water for Agriculture Program, Jeffords Center
for Policy, Water Foundation, National Science Foundation Graduate Research
Fellowship, California Energy Commission, Switzer Foundation, University of
Vermont College of Agriculture and Life Sciences

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Questions?

