Preparing to Adapt

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Northeast Climate Hub Partners Meeting
Rutgers University
MARCH 14 - 15, 2018

When to Adapt?

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Adaptation: adjustments in response to climatic changes (direct & indirect)

- Changes in practices (farming, financial, decision making)
- Changes in infrastructure

Mitigation: Reducing greenhouses gases in the atmosphere by limiting emissions or increasing their uptake

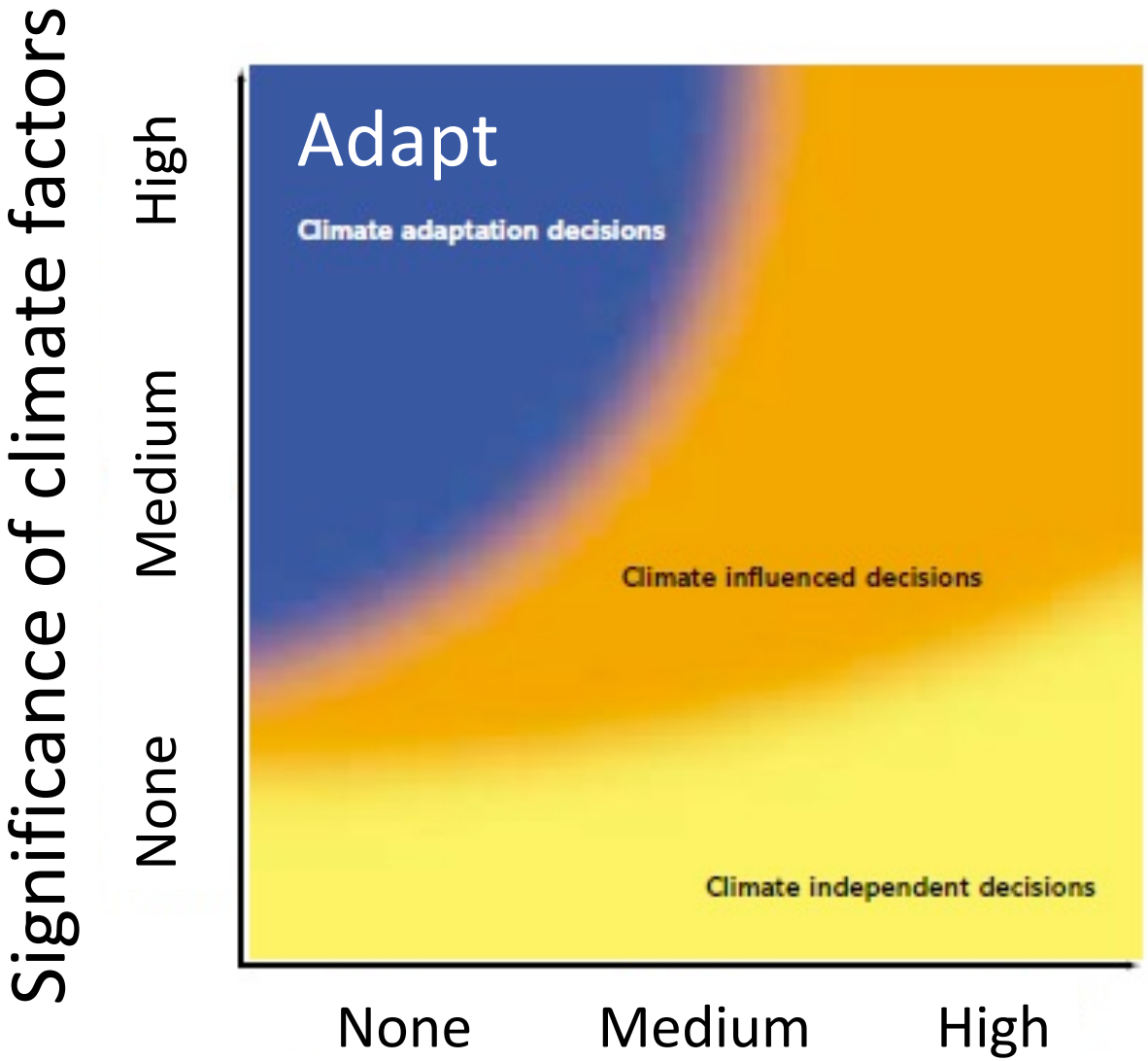
When to Adapt? When to do what?

- Business decision (What will it cost? What are the benefits?)

and keep in mind

- Climate change is only one of many factors already impacting an operation (prices, labor, weather, regulations)
- The details of how the climate will change are riddled with uncertainty

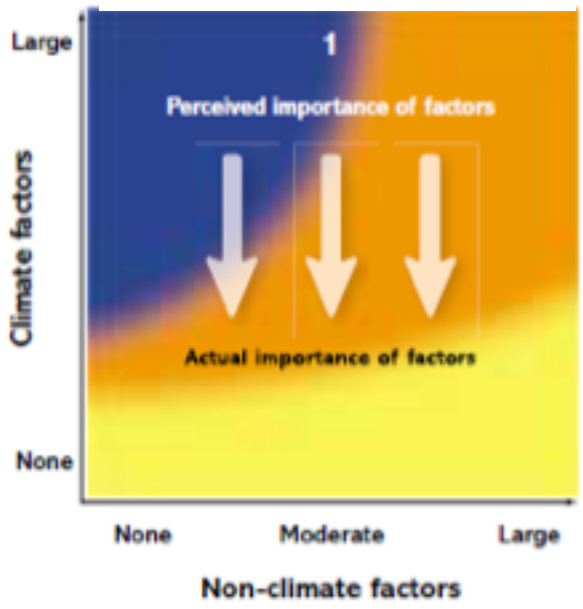
Consider climate and non-climate factors



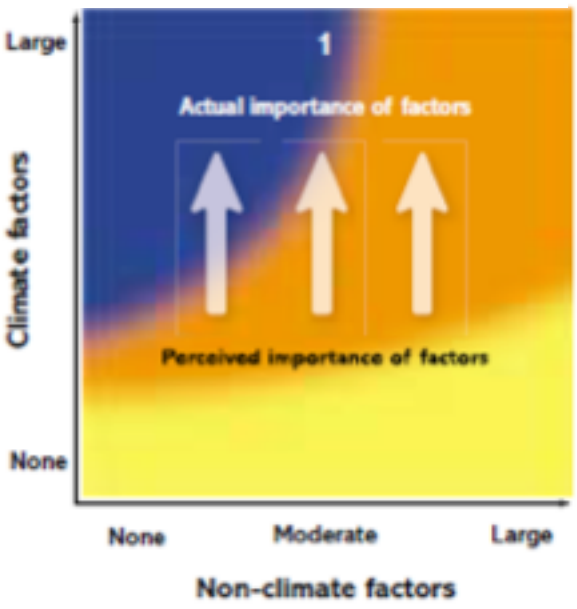
Willows et al. 2003 *Climate adaptation: Risk, uncertainty and decision-making.*

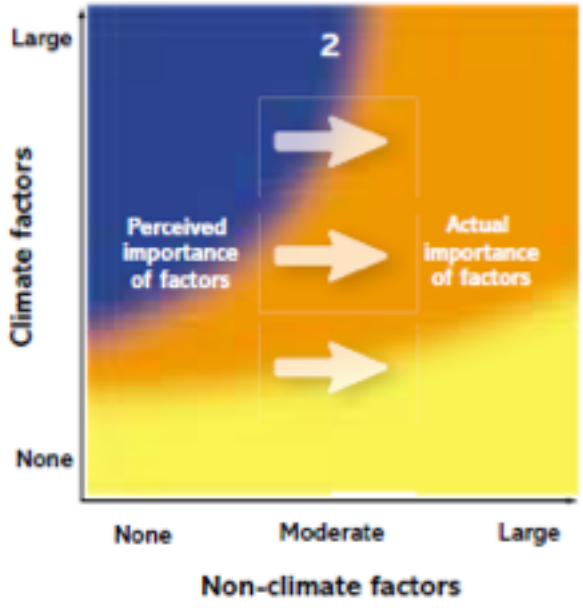
Adaptation Decision Errors

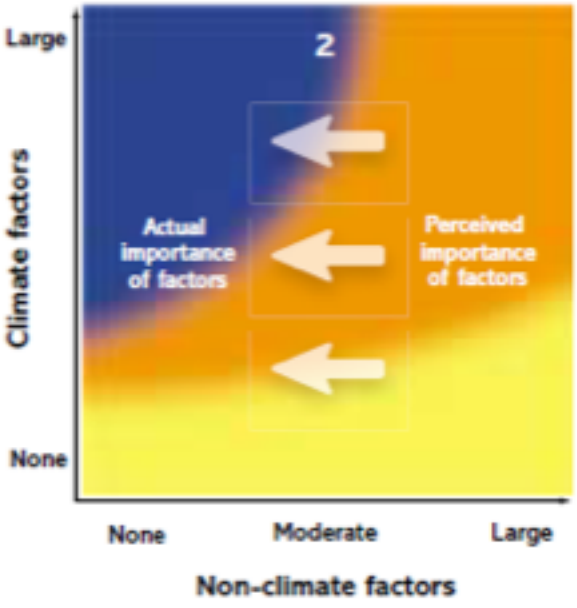
Over adaptation



Under adaptation







Willows et al. 2003 *Climate adaptation: Risk, uncertainty and decision-making.*

Before we can answer the question "When to Adapt?" We need to know more.

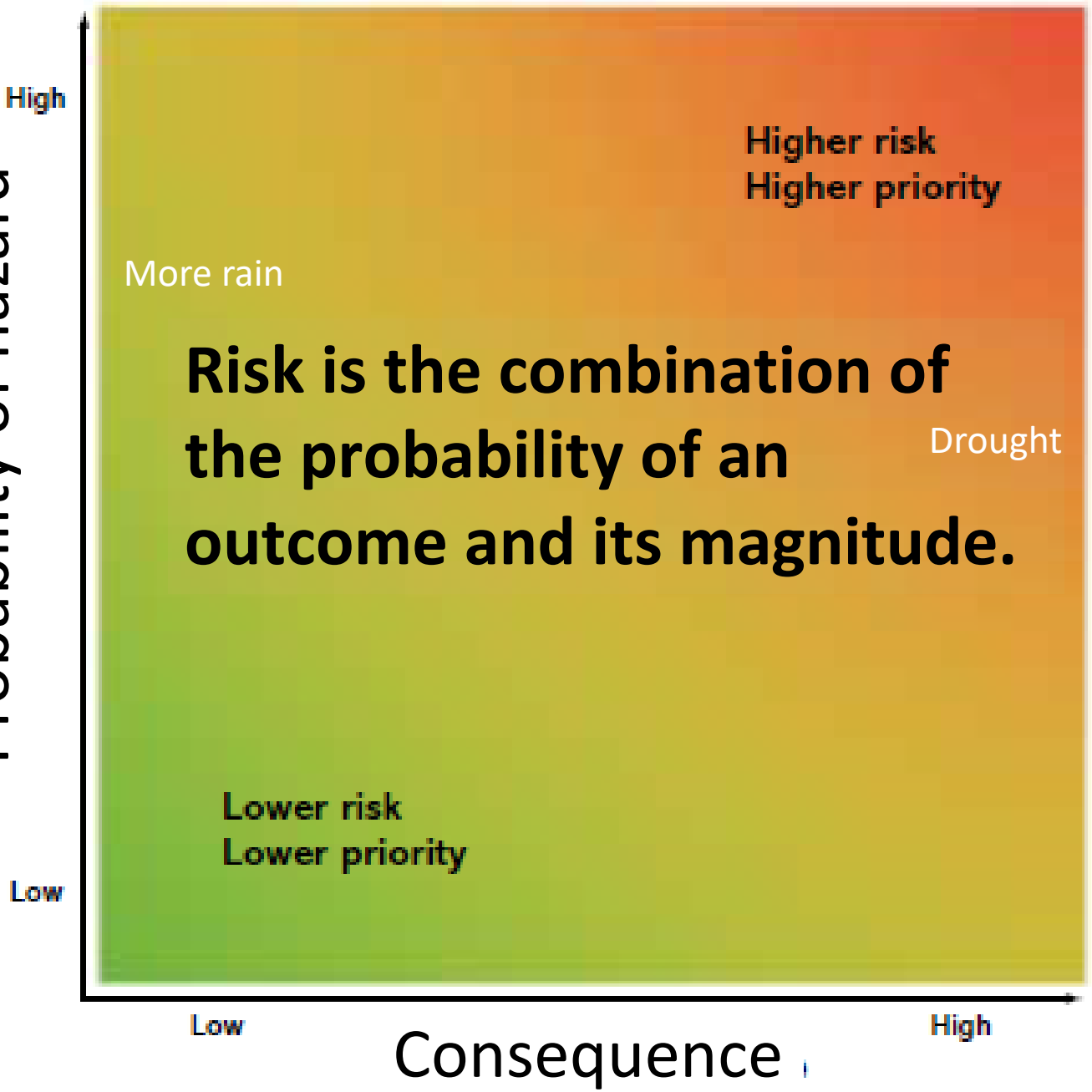
1. What are the risks? Different climate events will have different risks (drought, excess rain, frost, freeze).
2. Risks need to be prioritized.
3. What will it cost to address the risk?
4. How much certainty do we have about this?

Willows et al. 2003 *Climate adaptation: Risk, uncertainty and decision-making.*

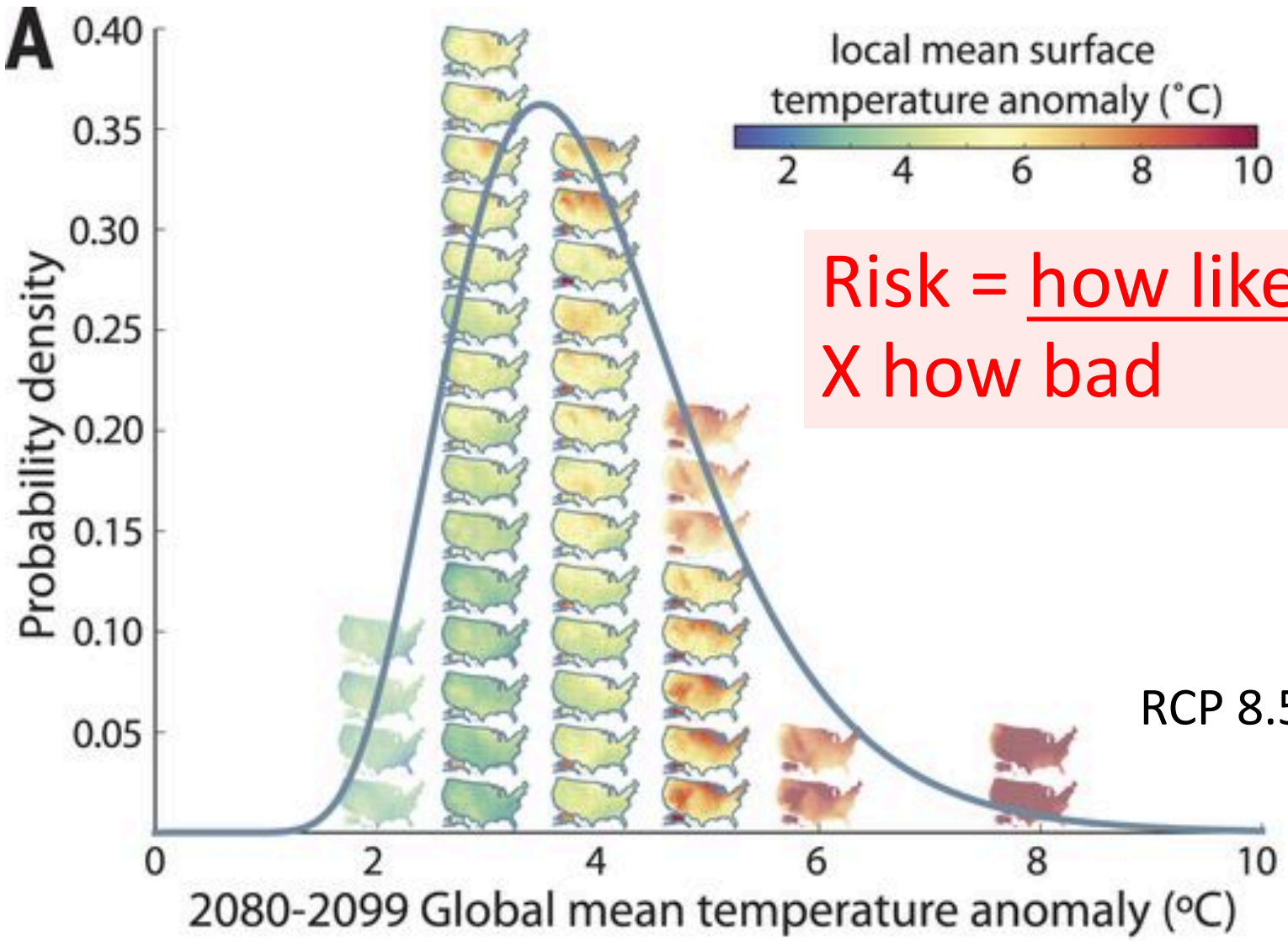
Risk = how likely X how bad ($$)

(bad can be good!)

Risk depends on individual



Likelihood of temperature change



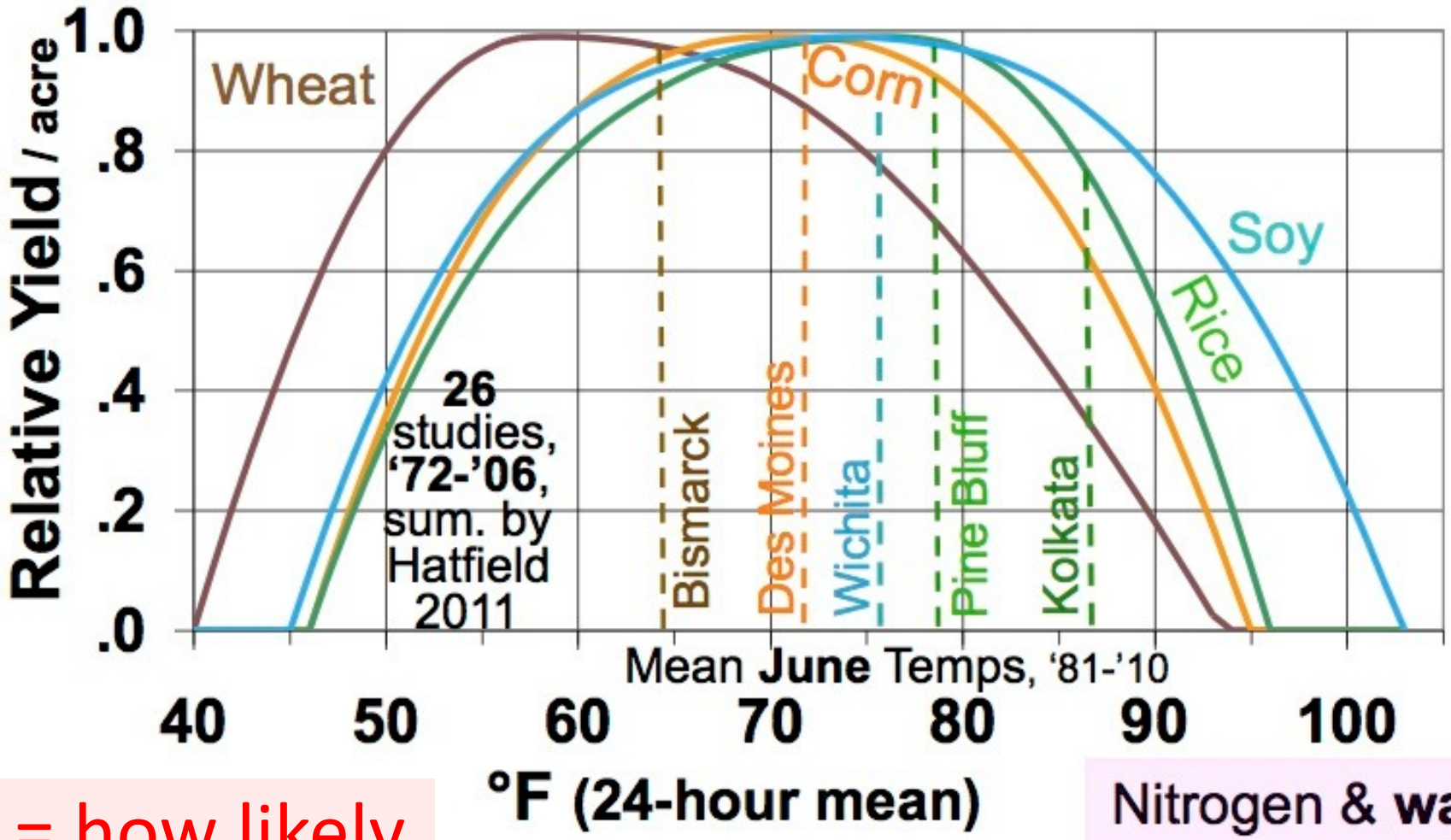
Risk = how likely
X how bad

RCP 8.5

Science
AAAS

Hsiang et al. 2017. Estimating economic damage from climate change in the United States. Science 356:1362-1369

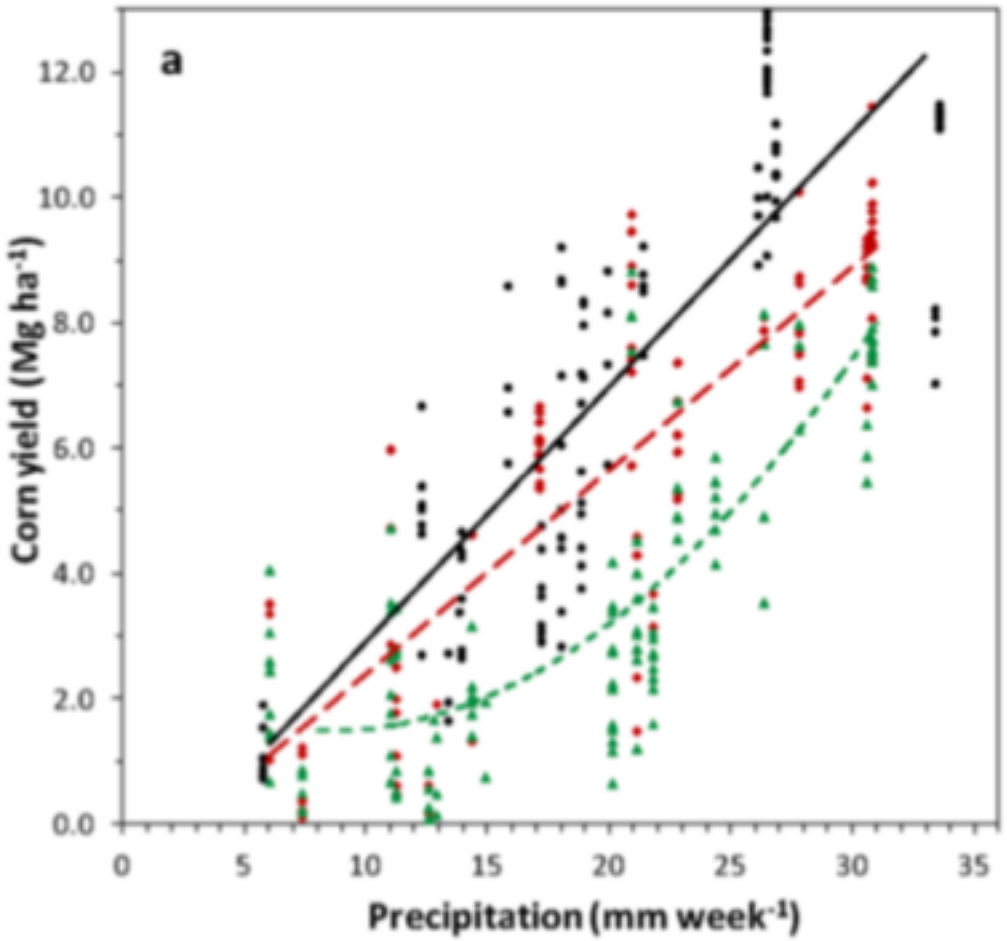
Crop responses to warming depend…

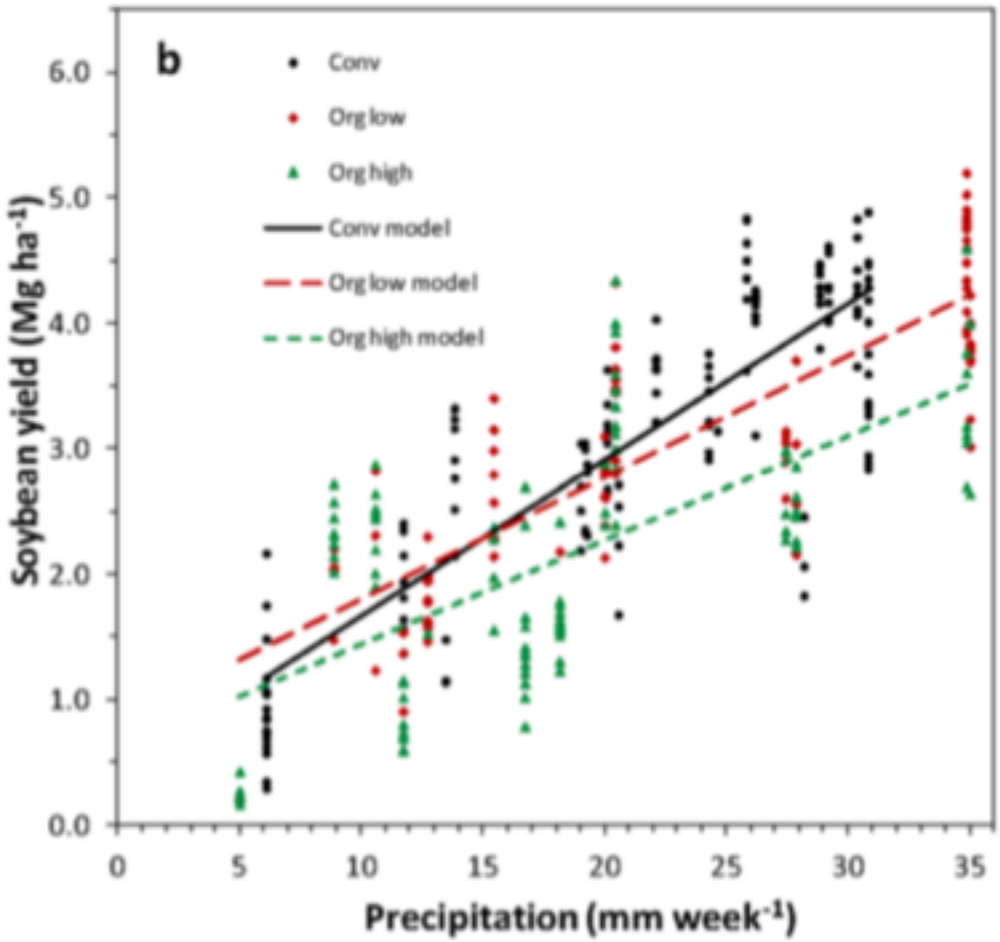


Risk = how likely
X how bad

Nitrogen & **water** not constraining.

Rainfall has a large impact on yield





Risk = how likely X how bad

Teasdale, J.R. and Cavigelli, M.A., 2017. Meteorological fluctuations define long-term crop yield patterns in conventional and organic production systems. Scientific Reports, 7(1), p.688.

Uncertainties

- How much and how fast will greenhouse gases rise? (economics, technology, policy)
- How will climate and weather respond to these changes?
- How will non-climate factors change?

However, the near-term (<20 y) is fairly well known

What to do when we can't estimate risk?

Risk = how likely X how bad

'**WIN-WIN**' situations – options which reduce the impacts of climate change and have other benefits (not directly motivated by the need to adapt). Cover crops, precision N

No regret options - worthwhile now (in that it would yield immediate economic and environmental benefits which exceed its cost), and continues to be worthwhile irrespective of the nature of future climate. Irrigation, drainage

Limited or **low regret** decisions - costs are very low while, bearing in mind the uncertainties in future climate change projections, the benefits under future climate change may be large. Siting of vineyards on N slope, new varieties

Wait for better information

Key Principals for Adaptation (and NE Hub Priorities):

1. **Estimate Risks** (how much is climate change going to cost?)
2. **Prioritize Risks** (what do you focus on?)
3. **Cost-benefit analysis of adaptation** (case studies, etc.)
4. Choose **"No regrets" and Win-Win** options first
5. Focus on near-term (<20 y)

Thanks!