CENTER FOR SCIENCE & TECHNOLOGY POLICY RESEARCH

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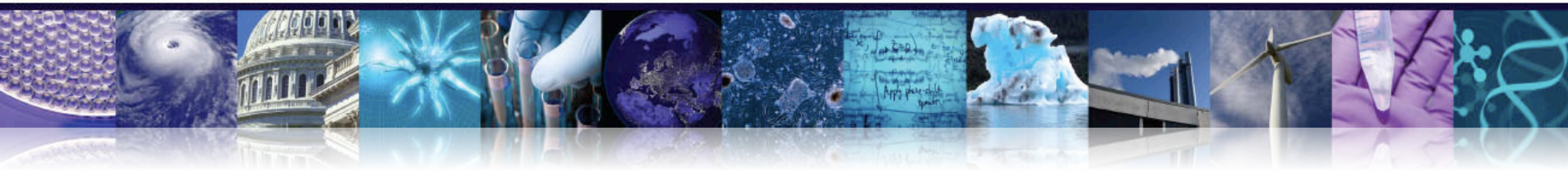

Adaptive Actions: Why communities take them and implications for vulnerability

Lisa Dilling

With collaborators: John Berggren, Ashwin Ravikumar, Tim Bardsley, Krister Andersson

University of Colorado Boulder

With thanks to and acknowledgement of all of our research team members over the project's life: Courtenay Brown, Adrienne Kroepsch, Jim Pripusich, Kelsey Cody, Morgan Holmgren

Overarching Motivation:
How can we improve societal outcomes with respect to climate-related risks?

How can information be more usable in decision making?

SPARC/NSF:
- RSD Carbon science
- Science policies for usable science
- Public lands adaptation

Nat'l climate assessment SH needs/WWA

USDA:
Public lands and C decision support tools

How do decision processes incorporate climate-related risk and opportunity?

Characterizing the carbon stewardship landscape/NOAA

Drivers of Adaptation/NOAA/WWA

What factors shape the adaptive capacity of organizations?

SPARC/NSF:
- State governance of water as adaptive capacity?
- Public lands management and adaptation (with WWA)

Interactions of Drought and Climate Adaptation – urban water management/NOAA

1. Drivers of Adaptation: Overall Project Strategy

In the context of climate change adaptation, we seek to understand what motivates proactive action in response to an uncertain, future threat

- Focus on decisions made in municipalities (cities)
  - Most of the world's population lives in cities
  - Cities are frontline for responding to existing natural hazards
  - Adaptive actions will need to be carried out at the municipal level
- Focus on policy behavior of cities in response to existing natural hazards
  - Already a long history of why and what adaptive decisions have been made with respect to climate variability
  - By understanding behavior in the face of a well-known hazard, can examine likely behavior regarding a future, distant, threat (CC)

Research Question

- Given a similar level of climate and weather-related exposure, why do some municipalities take action and others do not?
- Long history of hazards research in this area which is not conclusive. Events, perception, champions, information, resources, all hypothesized to play a role to varying degrees.
- For this talk: Reporting on stage 1– establishing that municipalities do indeed show variable responses to hazards

Scott G. Winterton / The Deseret News via AP

Research Design and Methods

- Study Area: The U.S. states of Colorado, Wyoming and Colorado (our WWA RISA region)
- Unit of analysis: Municipal governments
- Selected 60 municipalities. All cities > 70K in population selected. Then a random selection of cities between 10K and 70K to obtain full sample of 60 cities.

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Data Collection

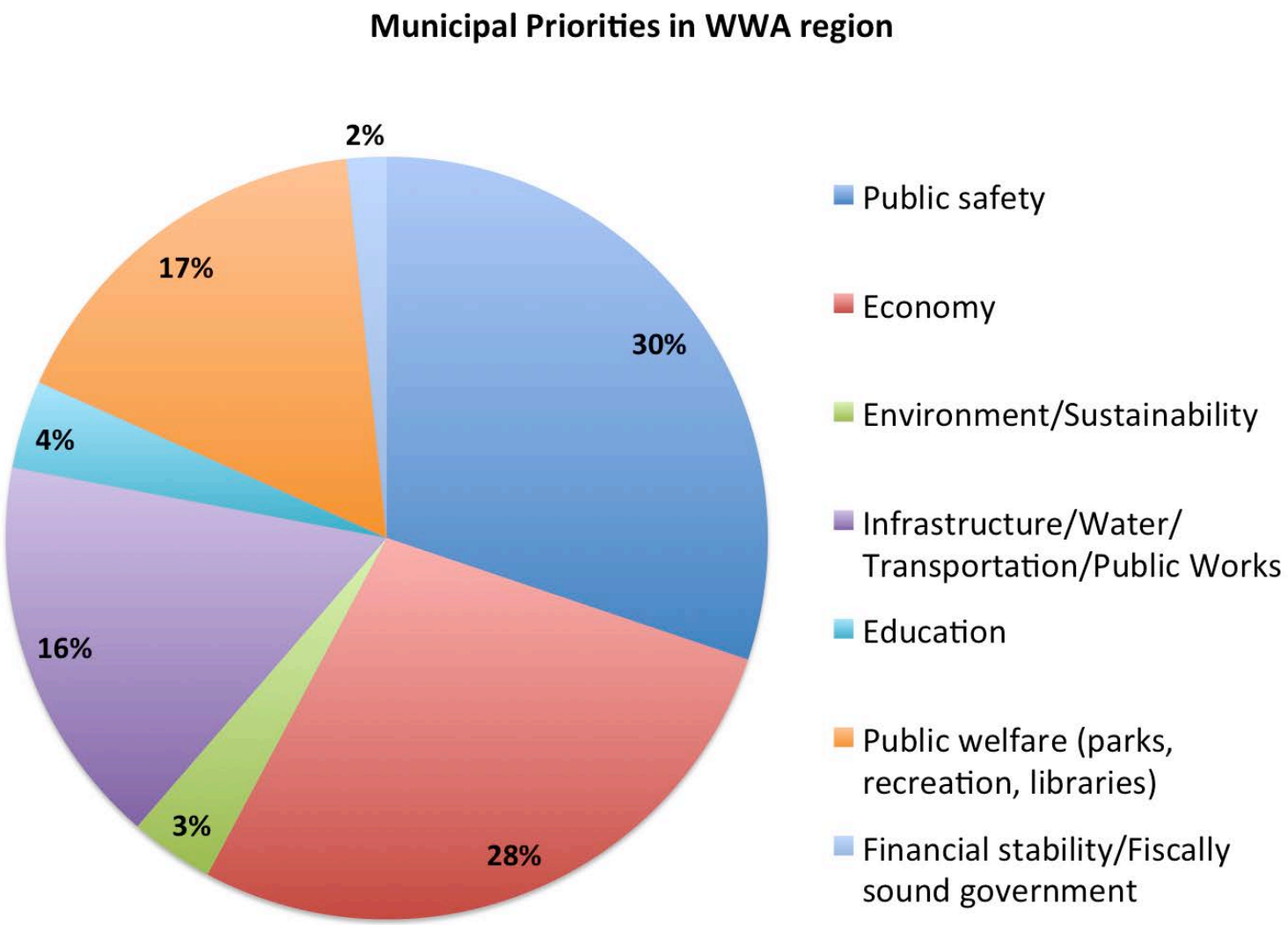
- 3 individuals from each municipality interviewed: one manager (either city or emergency), one planner or other person involved with responding to hazards, and one elected official.
- Interviews took place in Summer and Fall 2011/Winter 2012- many in person, some by phone
- Protocol refined after initial sampling.
- For this talk, coded responses in N-Vivo to analyze one interview from each of 56 municipalities (most often emergency manager or city manager)
- Initial results, not all of the sample analysis is final.

Interview Question Areas

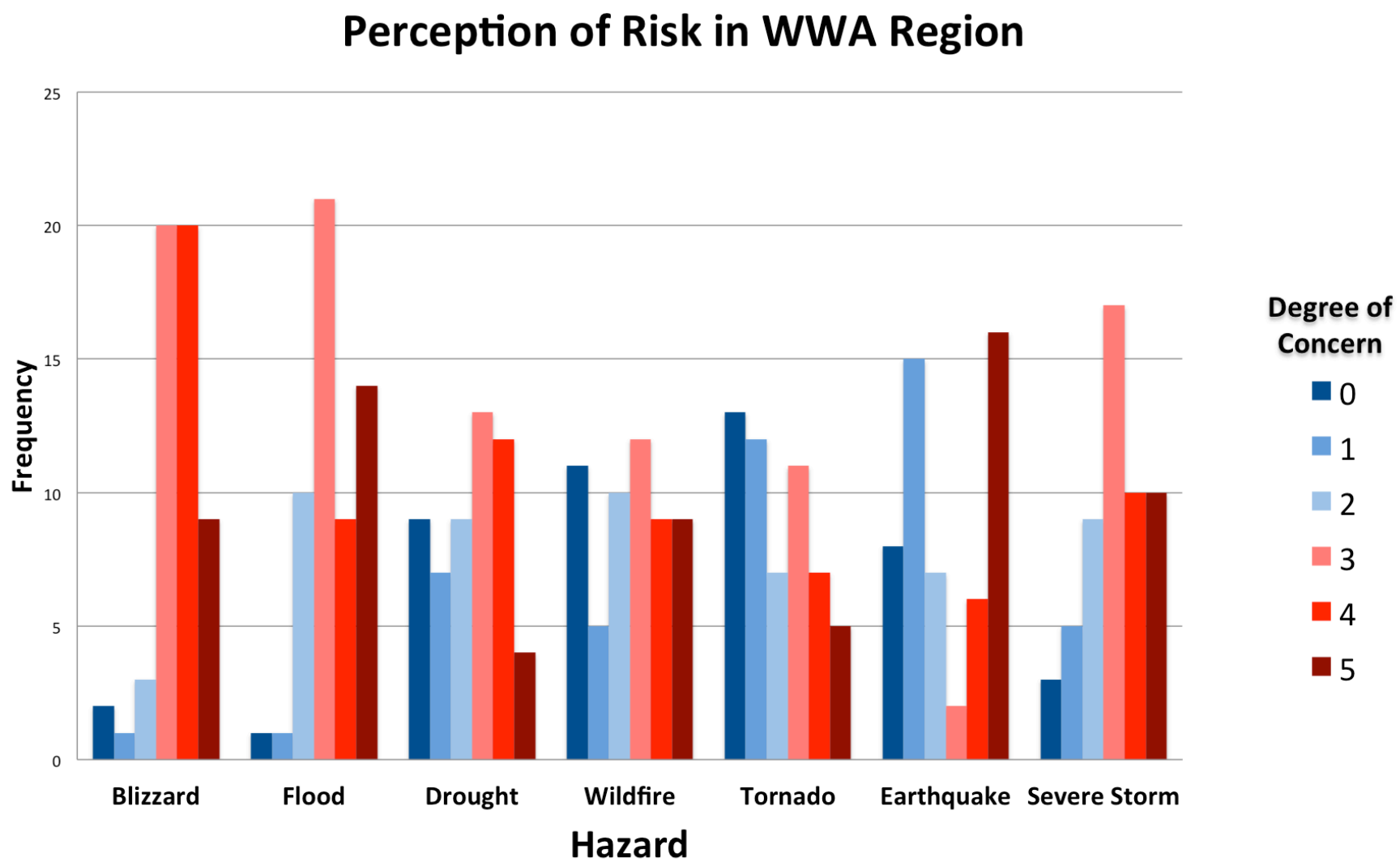
- Municipal priorities
- Areas of hazard concern
- Responses, e.g. activities, hiring, infrastructure
- Planning
- Lessons learned
- Sources of Information
- Collaborations and community involvement
- Views on climate change
- Demographics

PRELIMINARY RESULTS

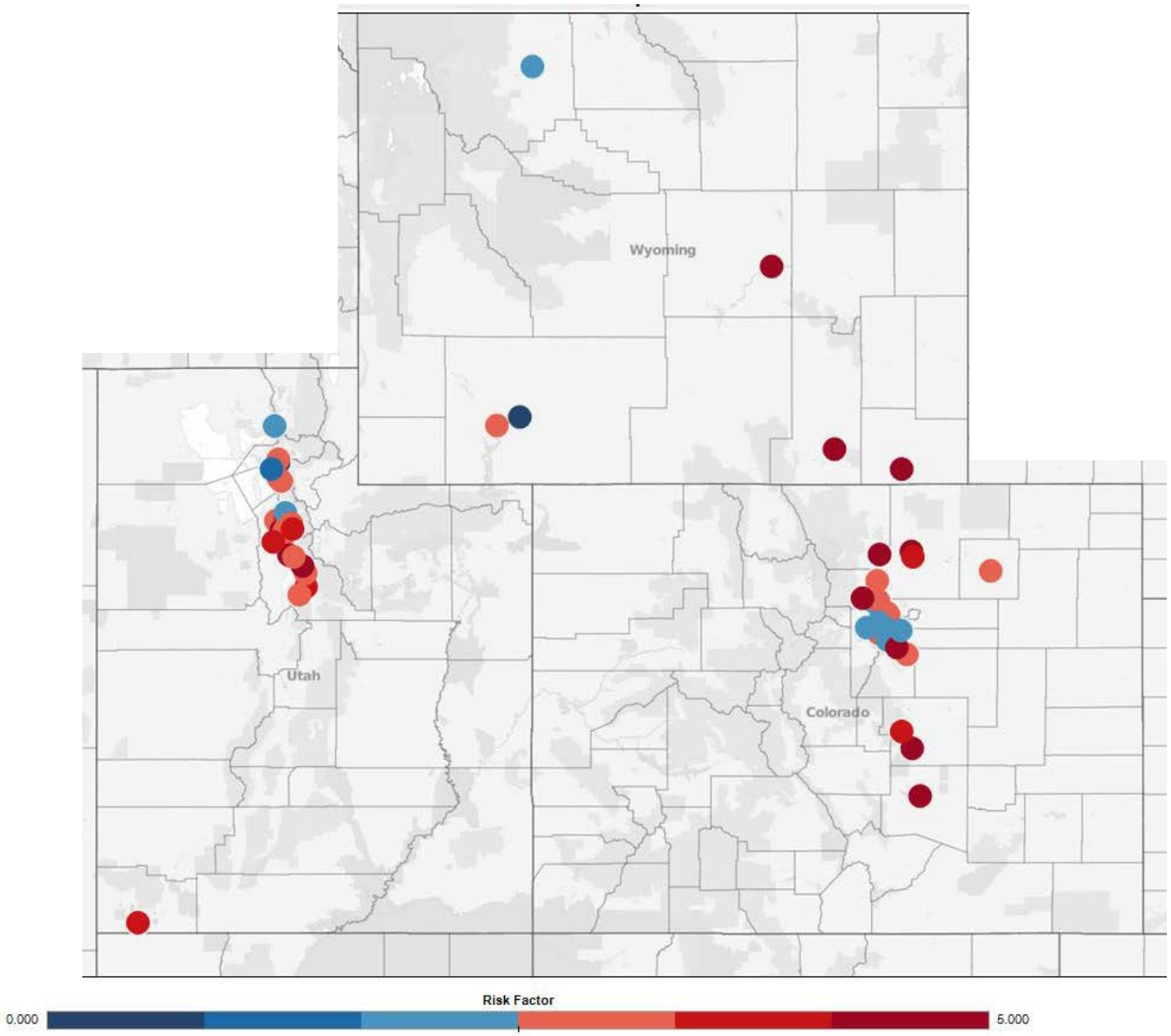
1. Municipal Priorities



2. Perception of hazards across the region

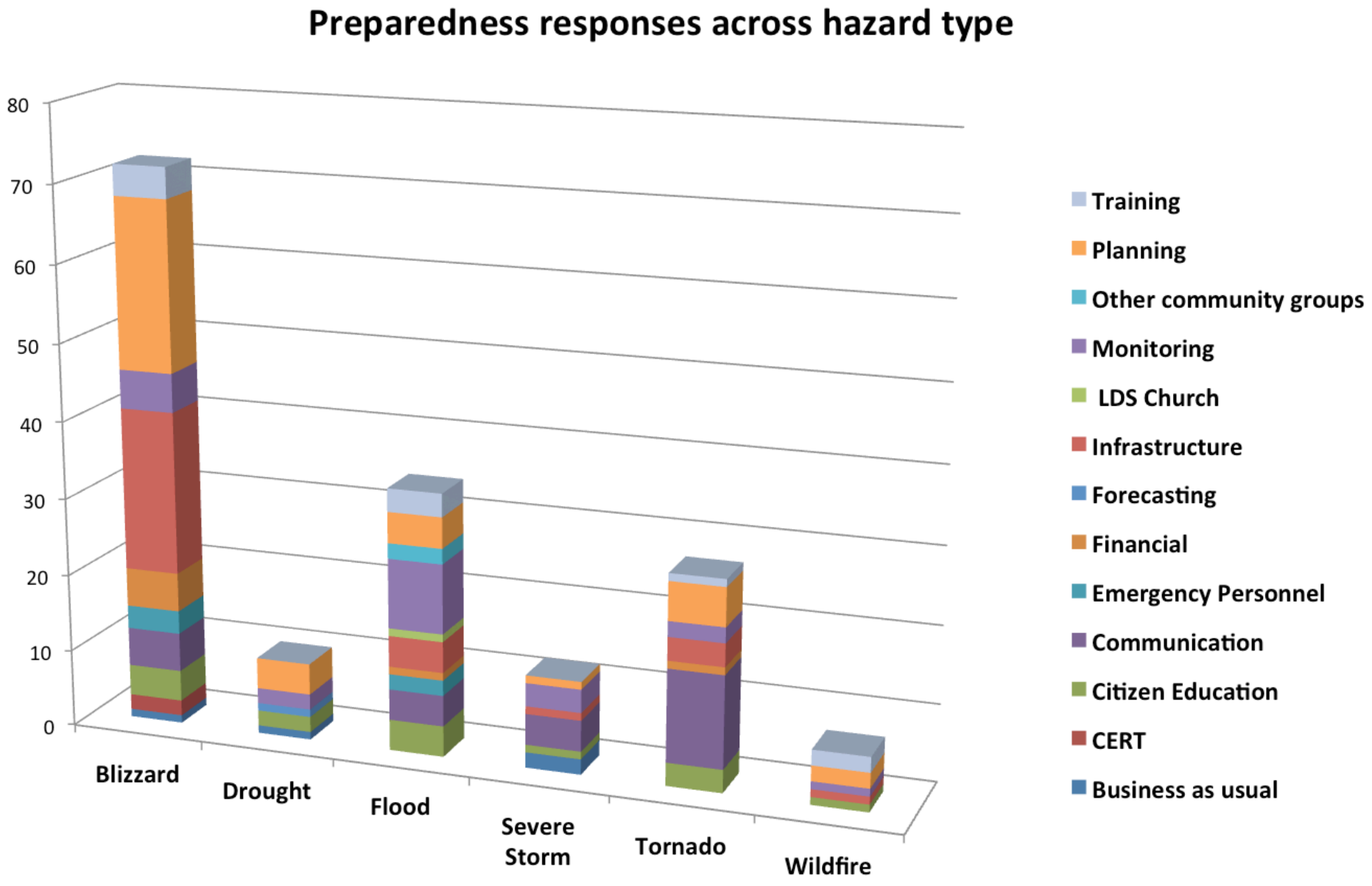


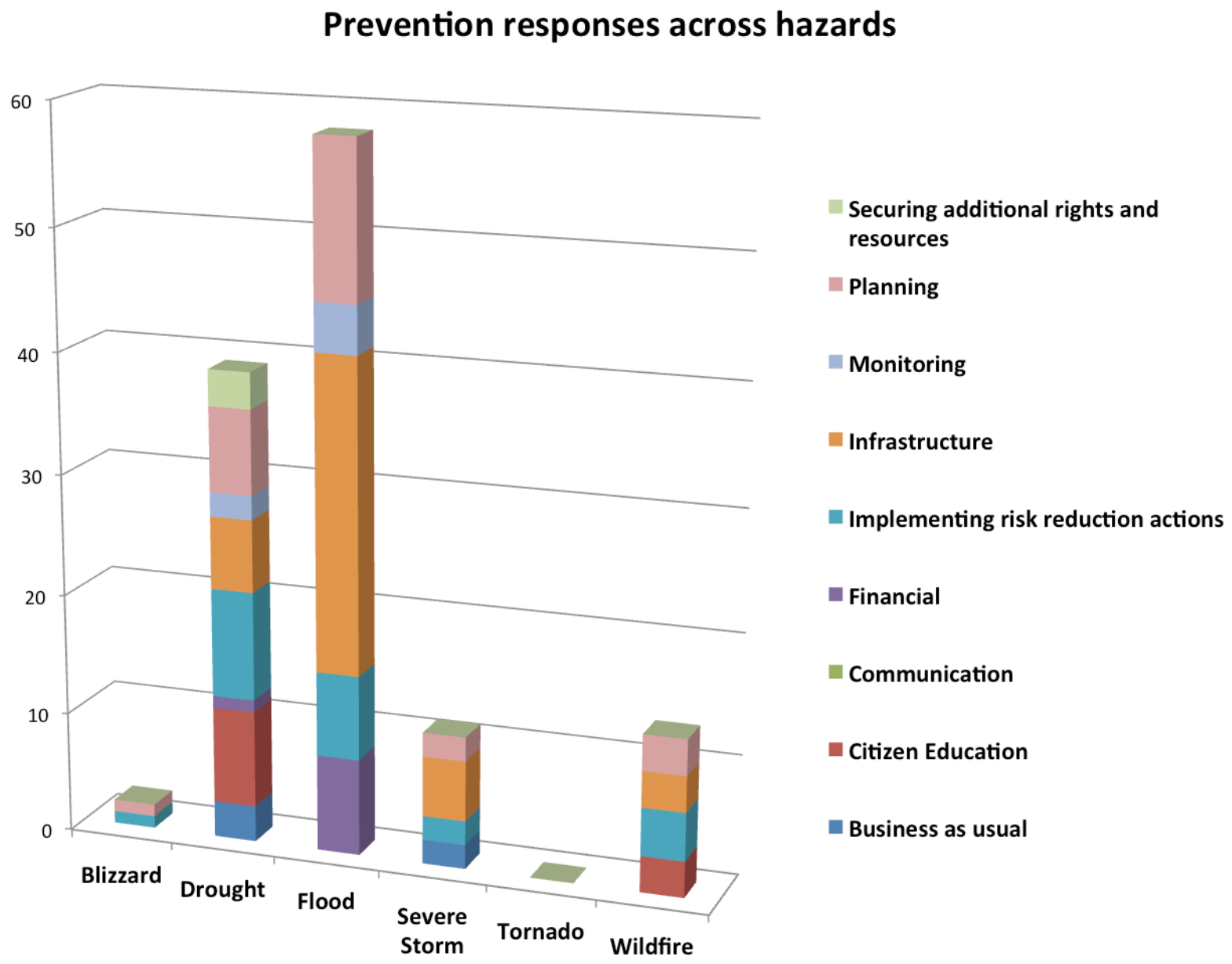
Flood risk perception



3. Variation in Responses

- Responses grouped into three categories for coding purposes:
  - Preparedness (focus on reaction during event)
    - E.g. citizen outreach, emergency communication during events, training, equipment and infrastructure, planning, monitoring, forecasting, financial expenditures, citizen response teams, business as usual
  - Prevention (focus on preventing a disastrous event)
    - E.g. citizen outreach, planning, physical infrastructure, securing additional rights and resources, monitoring, forecasting, financial expenditures, implementing risk reduction actions, business as usual
  - Other
    - When the above couldn't be categorized, and also for securing financial resources (grants), seeking political support, or expanding departments, hiring


Preparedness responses across hazard type
80
70
60
50
40
30
20
10
0
Blizzard
Drought
Flood
Severe Storm
Tornado
Wildfire
Training
Planning
Other community groups
Monitoring
LDS Church
Infrastructure
Forecasting
Financial
Emergency Personnel
Communication
Citizen Education
CERT
Business as usual


Prevention responses across hazards
60
50
40
30
20
10
0
Blizzard
Drought
Flood
Severe Storm
Tornado
Wildfire
Securing additional rights and resources
Planning
Monitoring
Infrastructure
Implementing risk reduction actions
Financial
Communication
Citizen Education
Business as usual

Example: Blizzards

Blizzard Rank	Number of Cities
0	2
1	1
2	3
3	20
4	20
5	9

Glenn Asakawa/The Denver Post, via Associated Press

Blizzards – Those who gave “5” ratings:

Very different answers to “what do you do”?:

#7: “...we bury our water lines 6ft deep, we bury everything below the frost level, so we can ensure water and sewer will run all year. The other thing is we are still the only city in the state that plows all our streets when it snows, pretty expensive to do that...”

#61: “Not a whole lot other than training and working with our emergency action plans.”

#23: “We have a fleet of plows, we work to advise our citizenry of a pending storm and to be prepared...”

Blizzard responses- state to state differences

- All three states mentioned having snow plows, plans for which roads to plow first, etc.,
- Utah also had an emphasis on community involvement/trainings through CERT and church groups. E.g., of the 17 responses in Utah, 8 of them mentioned working with community groups.
- "And we rely a lot on the LDS Church, they are really organized, and have lots of volunteers they can rally”

Next steps

- More coding and work with this extensive data set; work with SHELDUS hazard record.
- Ultimately: What can explain variation in action related to hazards?
- Not exposure to previous hazard
- Not wealth or per capita income
- Generate hypotheses– local champion or availability of grant funding appear to be strong contenders
- Pursuing 3 in-depth comparative case studies of why certain actions were taken, who was involved, what the major motivators were

And…are these actions adaptive for climate change?

- In a separate project we tackle this question
- We are asking this question with respect to urban water management and drought
- How do policies put in place to reduce short-term drought vulnerability in urban water systems affect capacities to respond to long-term climate change?
- http://sciencepolicy.colorado.edu/idca/

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Thank you!

- Student researchers: John Berggren, Ashwin Ravikumar, Courtenay Brown, Adrienne Kroepsch, Jim Pripusich, Kelsey Cody, Morgan Holmgren
- Tim Bardsley WWA's Utah Liason
- NOAA Western Water Assessment
- NOAA Regional Integrated Sciences and Assessment program and Sectoral Applications Research Program
- Questions?
- ldilling@colorado.edu

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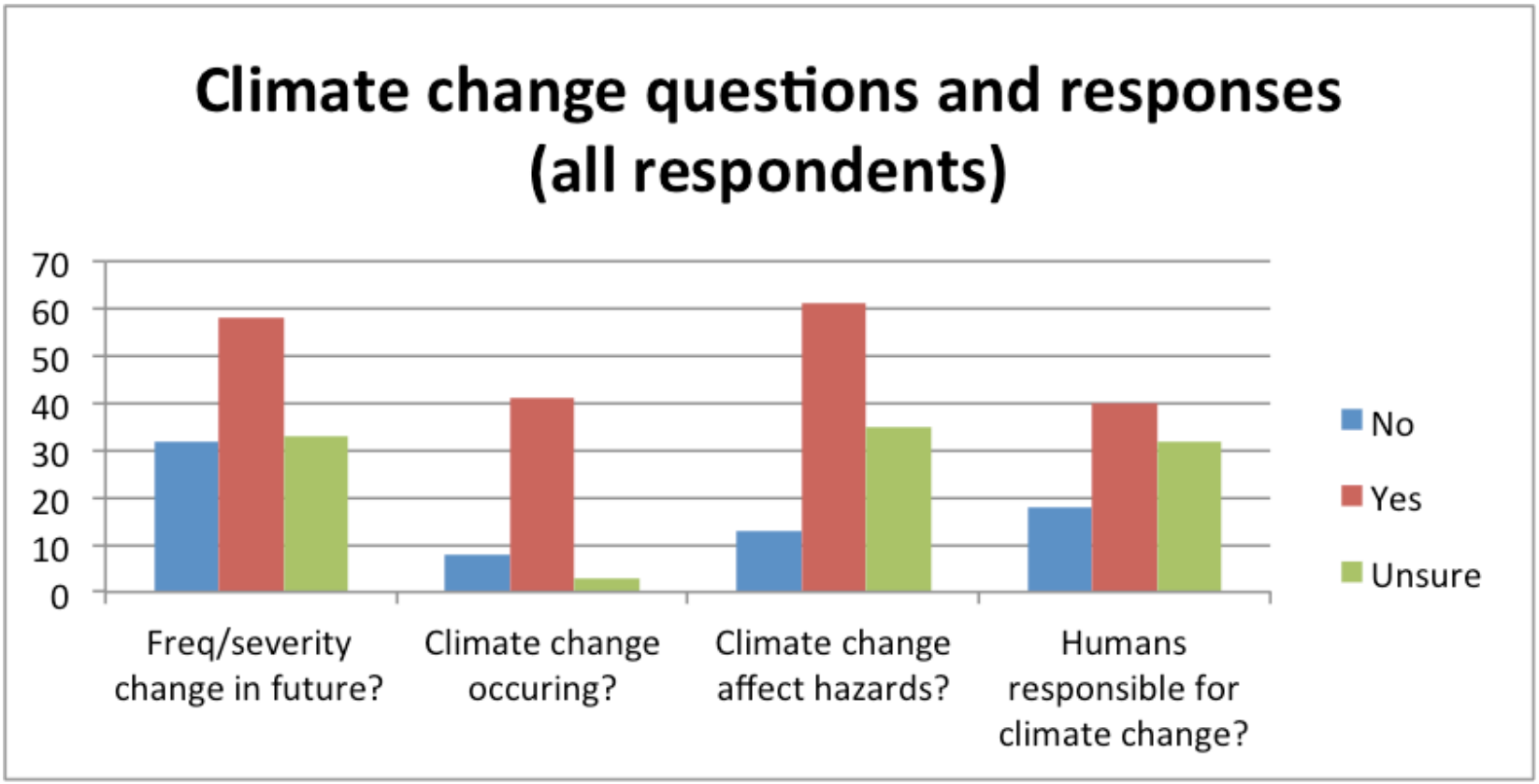
Western Water Assessment

EXTRA SLIDE

Climate Change Perception