The relation between dispositional and organizational variables of a citizen science application to drought: revealing indicators of commitment

Master thesis research on a crowdsourced project 'Condition Monitoring Observer Reports' (CMOR) with a focus on the U.S.

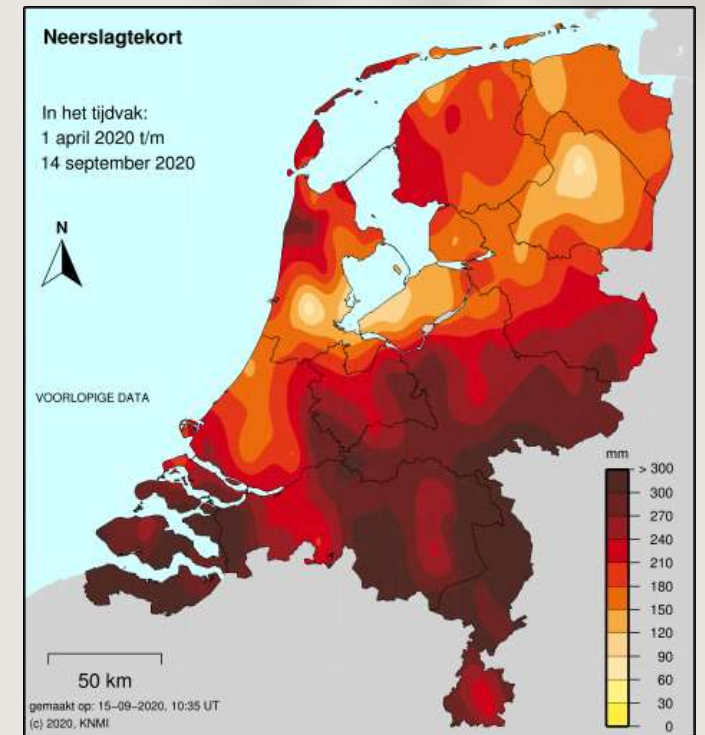Marleen Lam – 16/05/2023

PhD research Wageningen University & Research

- PhD candidate, WUNDER project

- Drought in the Netherlands and abroad: impacts and adaptation

Netherlands Now Facing Drought After Centuries of Fighting Too Much Water

Many European nations are becoming drier due to climate change, and the Dutch are attempting to engineer a solution by preserving water rather than squandering it

by **Belinda Teoh** — October 14, 2022 in **Climate Change, Environment**

Neerslagtekort

In het tijdvak:
1 april 2020 t/m
14 september 2020

N

VOORLOPIGE DATA

mm
> 300
300
270
240
210
180
150
120
90
60
30
0

50 km

gemaakt op: 15-09-2020, 10:35 UT
(c) 2020, KNMI

Drought, Drought and Drought

The "Hunger Stones" in some Czech and German rivers, saying (1616): "If you see me, cry" (ArchaeoHistories)

The Rhine river in Bingen, Germany, 9 August – Wolfgang Rattay/Reuters

Importance of monitoring drought (impacts)

- Drought understanding, drought early warning systems, policy and planning priorities
- Difficult to grasp drought impacts
  - Drought and impacts not aligned
  - Can take place elsewhere
  - Complex trickle down through economic sectors
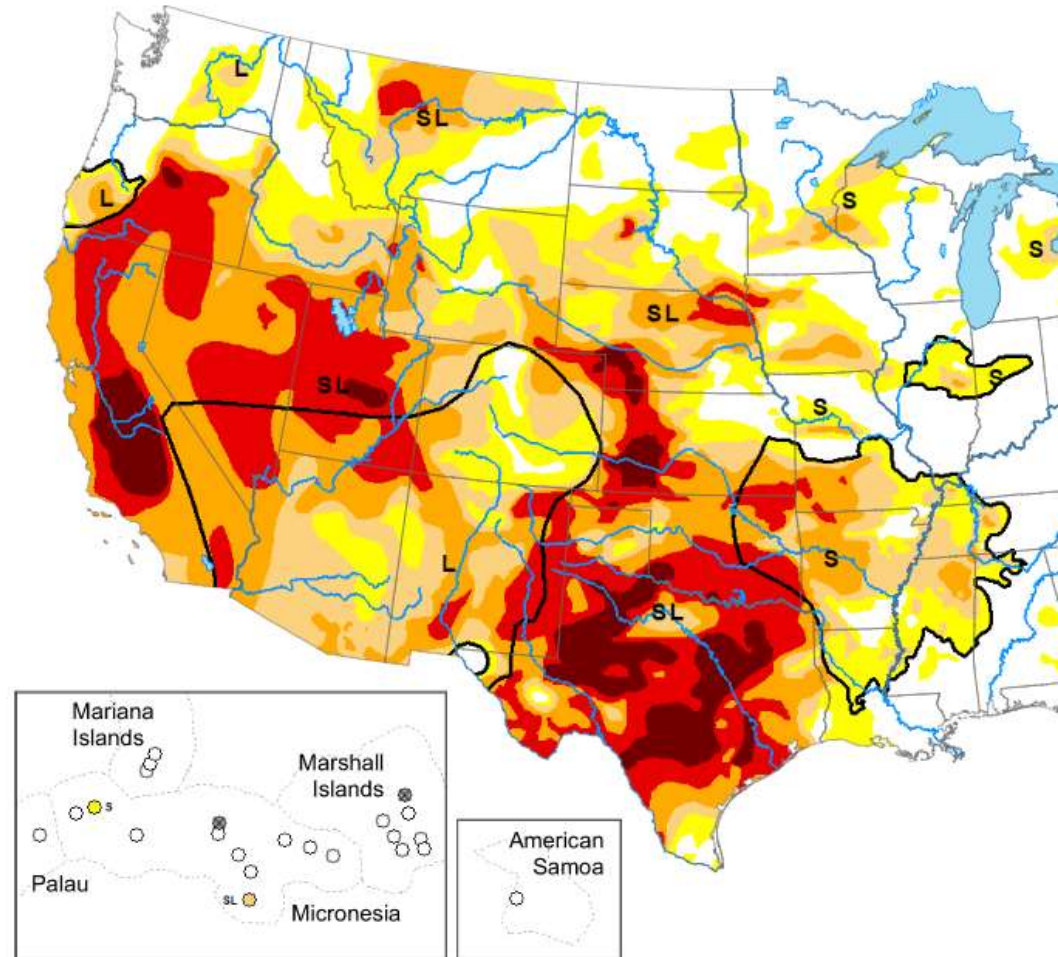- Citizen science

Citizen science - CMOR

- Implemented in 2018 by the National Drought Mitigation Center (NDMC) at the university of Nebraska-Lincoln

- 7-point scale ranging from severely dry to severely wet

- Linked to U.S. Drought Monitor map, resulting in financial incentive
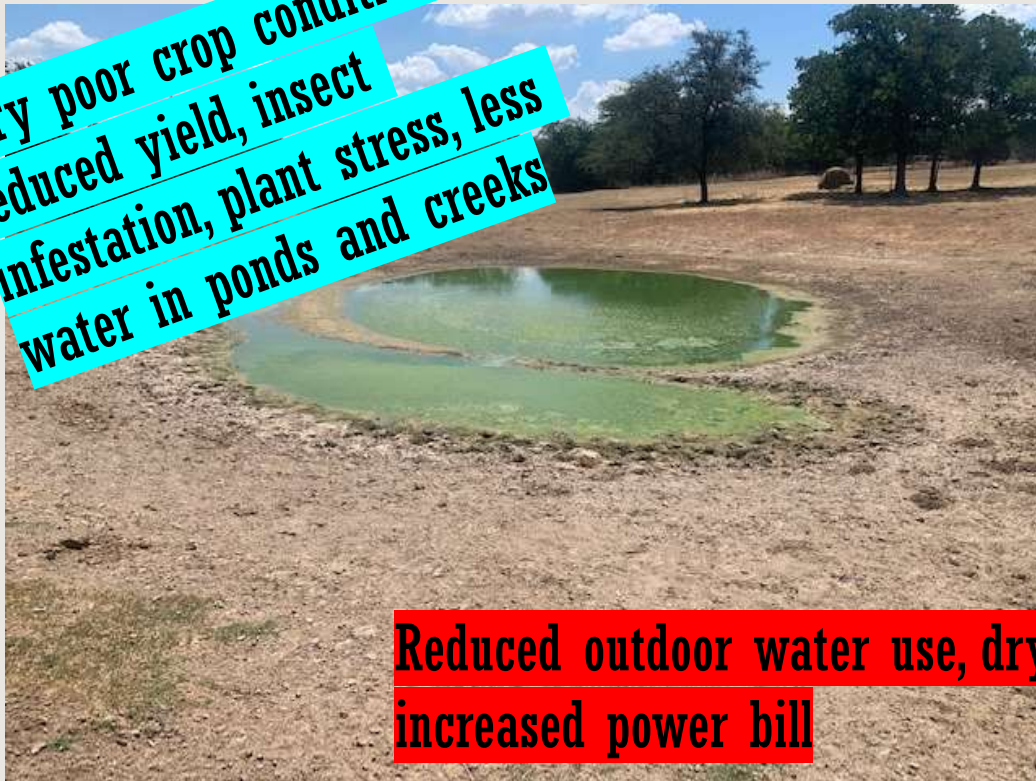
- Mostly 'event-driven' reports

Map released: August 18, 2022
Data valid: August 16, 2022

- Texas, Hood
- 22-7-2022
- Severely Dry (D3: Extreme Drought)
- 10-20 years of experience
- First picture 06/20/2022, second picture 07/15/2022

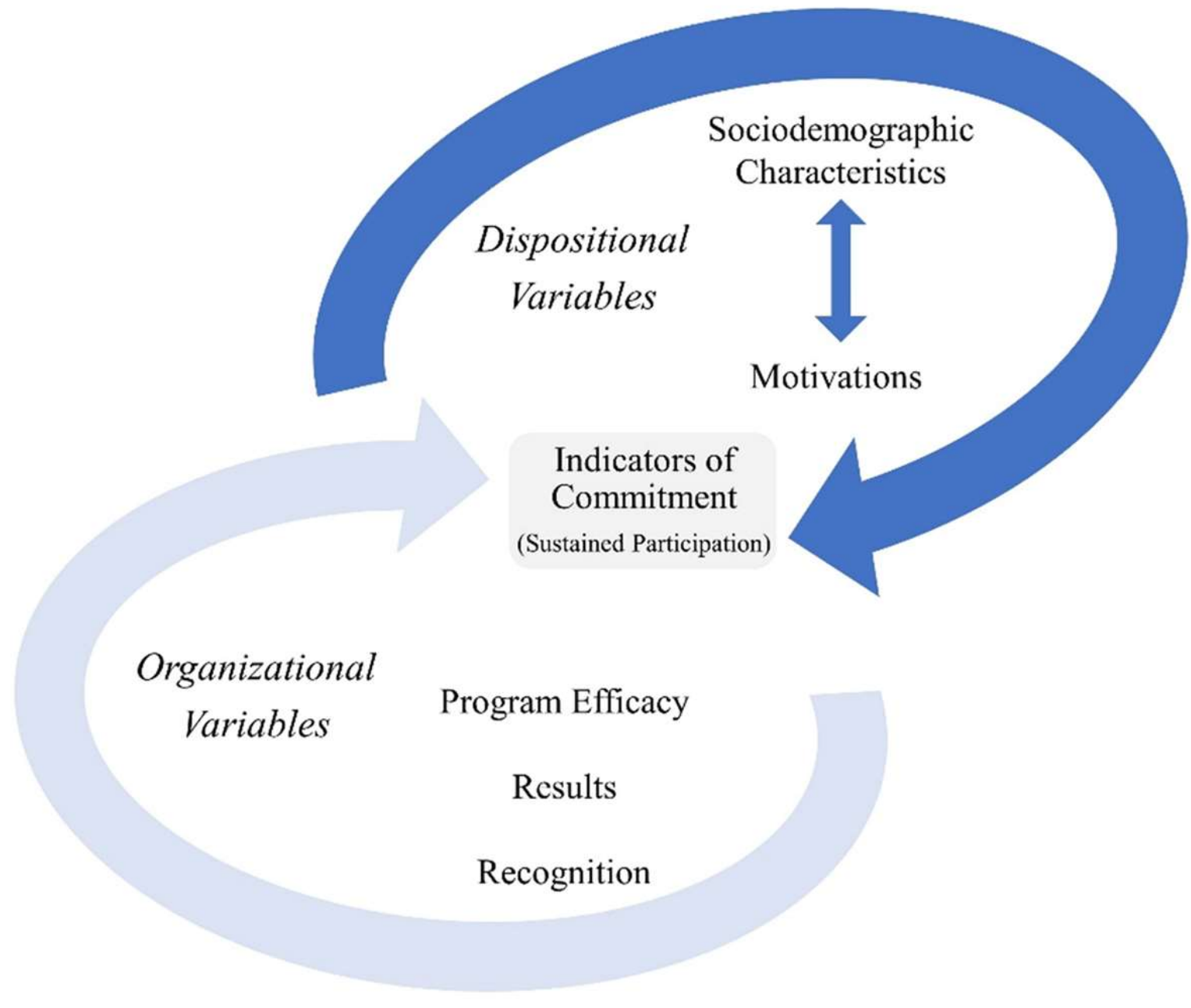Very poor crop conditions, reduced yield, insect infestation, plant stress, less water in ponds and creeks

Reduced outdoor water use, dry land, increased power bill

Very poor range conditions, reduced pasture and forage, feeding hay early, supplemental feed, purchased hay, decreased stock weights, animal stress etc.

More fires than usual, more intense fires, more fire risk, property damage, smoke from distant fire, burn or fireworks bans

The Dispositional-Organizational Interactions Framework (DOIF)

According to Lopez (2021)

Research questions

- **How are the dispositional and organizational variables related to indicators of commitment for the crowdsourced project CMOR in the United States?**

  - ❖ What are the dispositional variables (sociodemographic characteristics and motivations) of citizens contributing to CMOR?
  - ❖ What are the organizational variables valued by CMOR participants?
  - ❖ How are the dispositional and organizational variable related to each other?

- **What are the recommendations for the implementation of a crowdsourced projects, specifically CMOR, in relation to drought (impacts)?**

Methods

- Survey send to 3059 CMOR observers
- Motivational and organizational statements grouped into factors by Exploratory Factor Analysis (EFA)
- Mann-Whitney U and Kruskal-Wallis tests
- Open-coding using ATLAS.ti

How often has it been this dry in your part of the country?

○ Never ○ Once ◉ Twice or more

Let others know by submitting a **Condition Monitoring Observation Report** at

go.unl.edu/cmor_drought

NDMC

Categories Motivational and Organizational variables

Motivational factors

- Intrinsic
- Learning
- Prosocial
- Career
- Extrinsic
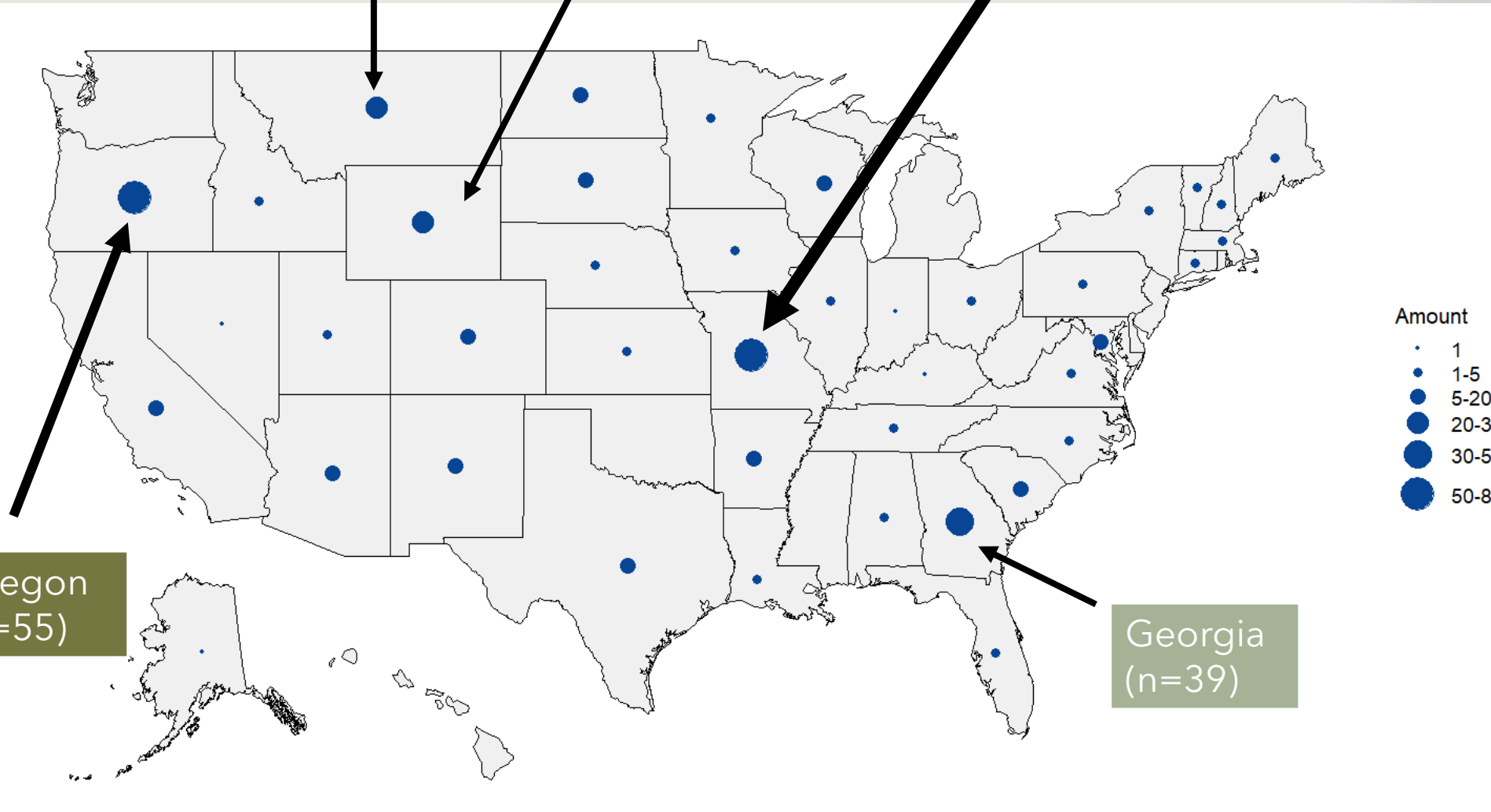
Organizational factors

- Recognition
- Interaction
- Tangible results
- Efficiency
- Updates

Results

Montana (n=28)
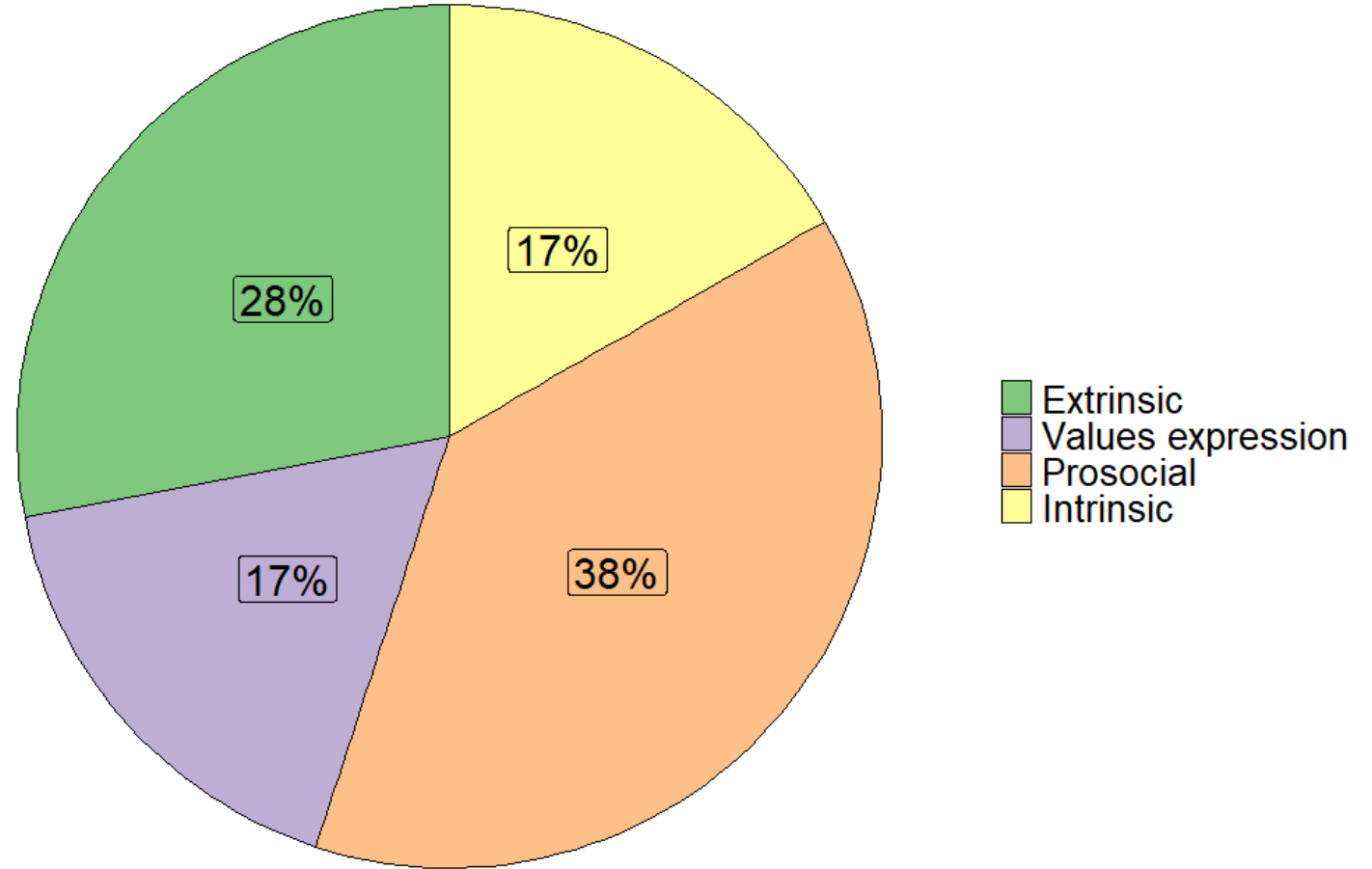
Wyoming (n=29)

Missouri (n=73)

Oregon (n=55)

Georgia (n=39)
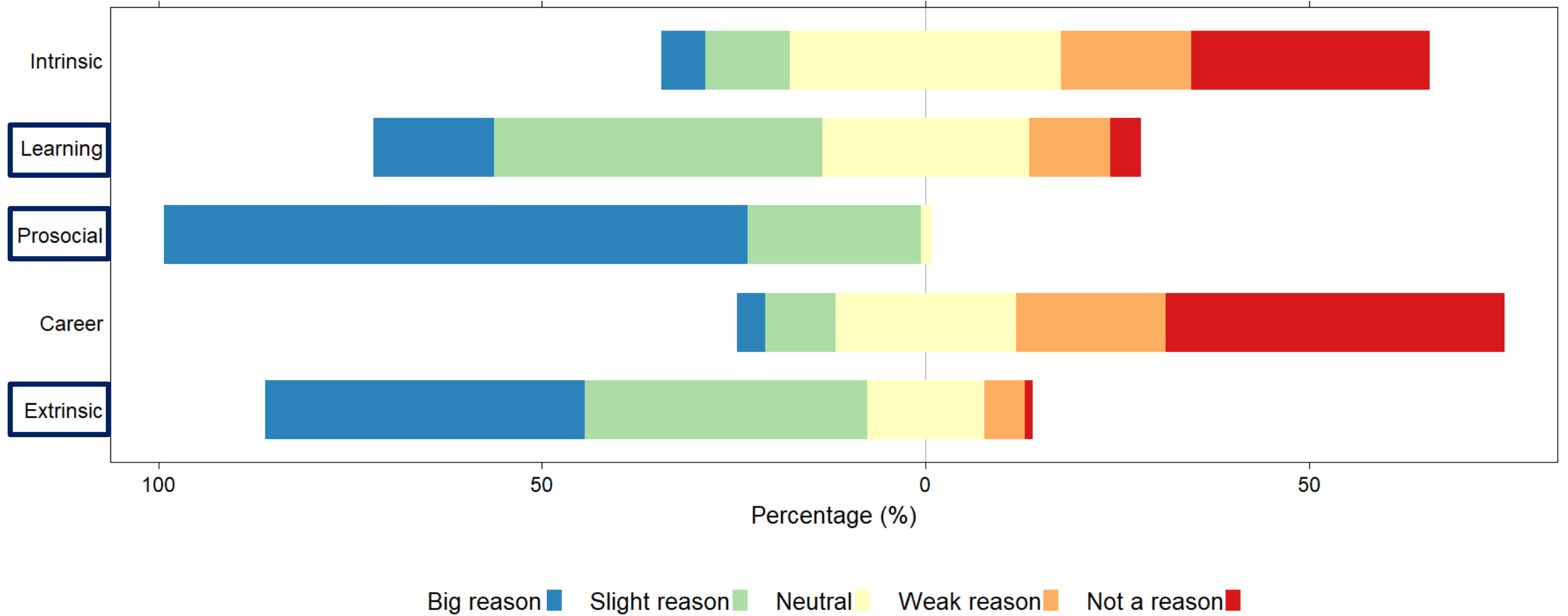
Amount
- 1
- 1-5
- 5-20
- 20-30
- 30-50
- 50-80

- 567 surveyed, 445 surveys fit for analysis
- 65% men
- 37% agricultural producer
- 68% never participated in earlier volunteer work

Open-coding

- *"I am a Texas farmer/rancher who serves on my local FSA committee. These drought reports directly affect our eligibility for FSA drought assistance programs, so it is in my best interest to give as accurate of a picture concerning my local area as possible."*

- *"Very concerned about climate change and how drought will affect everyone"*

Motivations to submit CMOR reports

Highlights relation sociodemographic characteristics and motivations

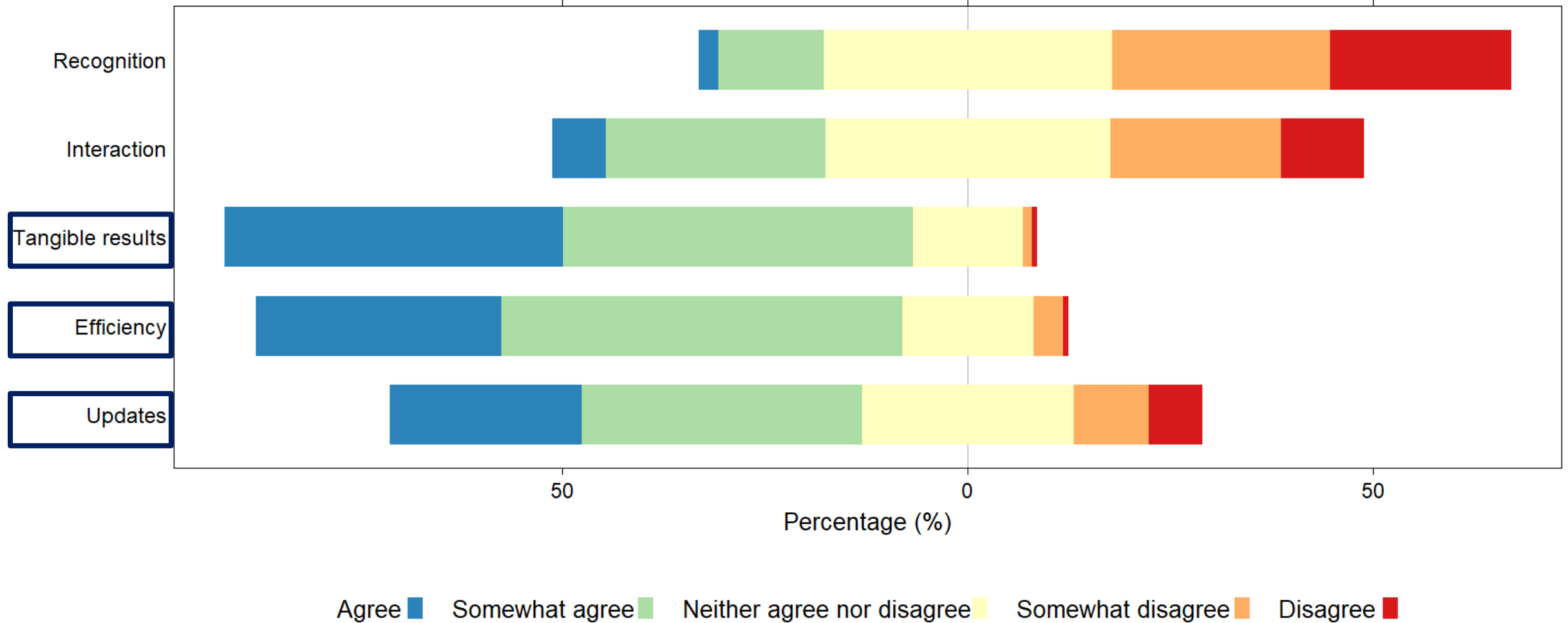| Intrinsic	Learning	Prosocial	Career	Extrinsic
• Retirees • Oregon	• Retirees • Oregon	• Woman • Agricultural producer • Montana and Georgia	• Younger people • Extension or university researcher	• Fewer degrees • Agricultural producer • People that never participated in volunteer projects • Montana and Georgia

Organizational variables

Highlights relation organizational variables and motivations

Recognition	Interaction	Tangible results	Efficiency	Updates
• Intrinsic • Learning • Career • Extrinsic	• Learning • Career	• Learning • Intrinsic	• Learning	• Prosocial • Extrinsic

Indicators of commitment

In the future, how likely are you to …?			
	Median	Mean	SD
Submit only at changing conditions	2.00	1.64	0.74
Submit at regular intervals at drought conditions	2.00	2.04	1.04
Submit at regular intervals at all conditions	2.00	2.51	1.12
Recommend CMOR to others?	2.00	2.16	1.02

Relation IoC and motivational and organizational variables

	Only at changing conditions	Regular intervals at drought conditions	Regular intervals at all conditions	Recommend to others
Intrinsic	"likely" or ""neutral"	"likely" or ""neutral"	"likely" or ""neutral"	"likely" or ""neutral
Learning	X	"likely"	"likely"	"likely"
Prosocial	X	X		X
Career		"likely" or "neutral"	"likely" or "neutral"	"likely" or "neutral"
Extrinsic		"likely" or "neutral"	X	"likely"
Recognition		"likely" or "neutral"	"likely" or "neutral"	"likely" or "neutral"
Interaction		X	"likely" or "neutral"	"likely" or "neutral"
Tangible results	X	"likely"	"likely"	"likely"
Efficiency		X		
Updates		"likely" or "neutral"	"likely"	X

Discussion

- Geographical differences
- Person's need for autonomy, competence and relatedness (Zhang, 2007)

Conclusion

- Prosocial and Extrinsic - biggest drivers to participate
- Learning – sustained participation
- Tangible results, efficiency and updates – most important
- Tangible results and updates – increase or sustain participation

A follow-up about how the data was used
Training on how to make the drought observation as useful as possible
A personalized dashboard that lets you view detailed summaries of your report
Reporting as part of a local group or network
Reporting as part of a state-wide group or network
Information on what I can do to prepare for drought
More engagement with others reporting to CMOR and the team behind it
Other
Recognition for reporting more regularly
Adding some specific game elements to turn it more into a competition
I would not submit more regularly even if I got support and feedback

Recommendations

Fulfil both intrinsic as extrinsic motivations

Send regular updates, mentioning how the data has been used

Focus on new, interesting 'challenges': focus on learning

Work together with local or regional organization

Include features to explain how to make CMOR report as useful as possible

❖ Assess how motives evolve over time
❖ Link between drought impacts reported and motivations

Any questions?

"I have enjoyed observing weather all of my life and also have concerns for my area when it is very dry."

Report detail: 14-2-2022	
State/Territoy	Oregon
County	Deschutes
Date	14-2-2022
How dry or wet is it?	Severely Dry
How much experience do you have with conditions there?	20 or more years
How many times in the past have you seen it like this?	Twice or more
When was is most recently like this?	2014
How localized or widespread are the conditions you are reporting?	Private wells are going dry – people who lived here for decades are now have major water shortage issues. No more golf courses/resorts should be allowed in these areas!

Report detail:17-8-2022	
State/Territoy	Montana
County	Garfield
Date	17-8-2022
How dry or wet is it?	Moderately Dry
How much experience do you have with conditions there?	20 or more years
How many times in the past have you seen it like this?	Once
When was is most recently like this?	2017
How localized or widespread are the conditions you are reporting?	Most of Garfield county and Western McCone county have real sub moisture and forage problems.