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# Drought Resilient Ranching Workshops Report

Central Montana Tour  
Clyde Park, Two Dot, and Winnett  
January 23<sup>rd</sup>-25<sup>th</sup>, 2018

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Hosted by:

One Montana, Montana State University Extension Service,  
and Musselshell Watershed Coalition



**Report Authors:**

Mitch Lassa – *Big Sky Watershed Corps Member, One Montana, MSU Extension-Gallatin County*  
 Zach Brown – *One Montana*

**INTRODUCTION**

One Montana’s (1MT) mission is to create a vibrant Montana by connecting rural and urban communities. 1MT’s Resilient Montana program focuses on creating infrastructure for statewide conversations on water, agriculture, and climate. In rural ranching communities, the temporal and geographical variability of climate conditions pose many challenges. In cooperation with MSU Extension Service and the Musselshell Watershed Coalition, One Montana hosted three workshops (Clyde Park, Two Dot, and Winnett) to provide an opportunity for collaboration in regards to drought resilience. The goal was to facilitate conversations and share knowledge to answer several important questions:

- ◆ In times of drought, how can farmers and ranchers implement effective management strategies?
- ◆ How can producers adapt to changing weather conditions?
- ◆ What resources are available to predict weather and soil conditions?
- ◆ What resources do producers already utilize?
- ◆ What recommendations do participants have for the USDA on improving drought-related programs?

Workshop content included presentations from Michael Downey of DNRC about the Flash Drought of 2017, Lee Schmelzer of Stillwater County Extension about the Montana Mesonet, and a talk from Jeff Mosley (Clyde Park and Two Dot) and Mat Walter (Winnett) of MSU Extension titled “Managing Plant Communities After Drought.” The workshops also included group discussion sessions during which participants shared their experiences with the 2017 drought, their perspectives on effective rangeland management strategies during and after drought, and their feedback on resource availability and agency response during times of drought.

Number of Participants in Attendance					
Clyde Park	33	Two Dot	21	Winnett	18
Total				72	

**FLASH DROUGHT OF 2017 – PRECIPITATION, TIMING, AND MONTANA’S WATER SUPPLY**

Michael Downey – MT DNRC – mdowney2@mt.gov – (406) 444-9748

**Hydrologic Drought:** This drought type is associated with the effects of precipitation shortfalls on surface or subsurface water supply (i.e., streamflow, reservoir and lake levels, groundwater).

**Terrestrial Drought:** Terrestrial drought links various characteristics of meteorological drought to impacts on the landscape like crop loss and forest and range impacts, focusing on precipitation shortages, differences between actual and potential evapotranspiration, soil water deficits, etc.

**Some Things to Keep in Mind:** Precipitation timing and the amount of effective precipitation (precipitation during the growing season) is more important than the total yearly or total accumulated precipitation.

### Precipitation Timing

- ◆ As late as mid-April of 2017, all signs indicated a strong snowpack and the very wet fall of 2016 seemed to indicate good soil moisture across most of the state. Available models did not adequately account for the early loss of prairie snow pack, higher than normal spring temperatures, and consistent windy conditions that dried things out quickly.
- ◆ The lack of moisture in April, May, June, and no moisture at all in July, coupled with higher than normal temperatures caused conditions across Montana to deteriorate extremely rapidly.
- ◆ As a result of high snowpack, most areas across the state saw good stream flows throughout the summer despite extreme soil moisture depletion. Producers with irrigation had difficulty keeping enough water on crops. Dryland producers generally suffered severe losses and many spring plantings failed to germinate at all.
- ◆ April, May, & June are Montana's highest precipitation months. Large moisture deficits at the end of April usually require some management steps to adjust to summer conditions. Higher summer temperatures have worsened this situation.

Annual average precipitation projections vary across climate models, but most agree that summer precipitation will decrease significantly (up to 30% by the end of the century) (Mote et al. 2014). These projected future climate conditions are expected to result in dramatic changes to the region's water supplies, as well as the frequency and severity of wildfires, droughts, floods, and pest and pathogen outbreaks.

**Montana Drought Impact Reporter:** Producers should report local drought conditions early and often to help alert local, state, and federal officials of local conditions. Google: [drought.mt.gov](http://drought.mt.gov)

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## PRODUCER RESPONSE TO 2017 DROUGHT

Following Michael Downey's presentation, participants had the opportunity to discuss their experiences with the flash drought of 2017. This section includes summary bullet points and quotes gathered from group discussions at each workshop.

### Clyde Park

- ◆ The water year started with great snowpack.
- ◆ The drought came on fast. The grass went from “green to crunch” in about two weeks.
- ◆ Lower calf weights were observed by multiple ranchers.
- ◆ There was plenty of initial grass growth but it ended up not being very nutrient-rich. Anecdotes about nutrition supplement demand and hay quality testing results demonstrated this outcome. Salt and mineral consumption was high. “It was a good year to be selling salt licks in Park County.”
  - *“It was almost like the grass was there [for my cows], but there was nothing in it. It’s like when I eat salad. I get full, but I’m not going to be happy about it.”*
- ◆ Producers generally considered themselves lucky compared to folks farther east.

*“Our dry land hay was cut about three weeks early, but it was double what it has been the last few years. It was kind of embarrassing going around to rodeos and everyone’s talking about how they’ve got no grass, and we’ve got grass galore...at least until it really started to get dry. We kind of wanted to hide our heads because everywhere else was bad, but our little pocket up there was good.”*

#### Two Dot

- ◆ Irrigated land did fine while dry-land hay burned up. Persistent heat did the most damage after the rain turned off in May and June.
- ◆ Some felt water was managed well in preparation and response to drought.
- ◆ Producers reiterated that the timing of precipitation is most crucial.
- ◆ *“We don’t need a lot of rain, but we need it timely. Our useful moisture comes in such a limited window, we try to keep a close eye on that and try to get ahead of it.”*
- ◆ *“We can stand one drought, but it’s the second year that kills us.”*
- ◆ Some observed slight decrease in calf weights.
- ◆ There was a noticeable drop in feed quality.
- ◆ The 2017 “flash” drought caused high threat of range fire.
- ◆ Attendees generally felt lucky compared to other folks along the Musselshell.

#### Winnett

- ◆ Early spring moisture and moisture from previous fall led to good early growth.
- ◆ Not much precipitation was observed in April and May. One data collector recorded precipitation on April 26<sup>th</sup> and then no more until July 26<sup>th</sup>. There was not much precipitation to speak of after that either.
- ◆ Rotational grazing helped some individuals to buffer the effects of drought.
- ◆ It was a tough year, but it was said that “one drought is manageable.”
- ◆ Range specialists were unable to complete range inventories because of the threat of fire – the Lodgepole Complex drew a lot of resources and attention.
- ◆ Some attendees expressed their view that the 2017 response from USDA and the Governor’s Drought Committee was better than previous years, and aid came more quickly.
- ◆ On the other hand, some individual federal agency personnel expressed frustration towards the 2017 drought because of the limitations in their ability to speed up the process on relief programs.

- There was minimal late-season growth due to persistent heat and lack of precipitation.

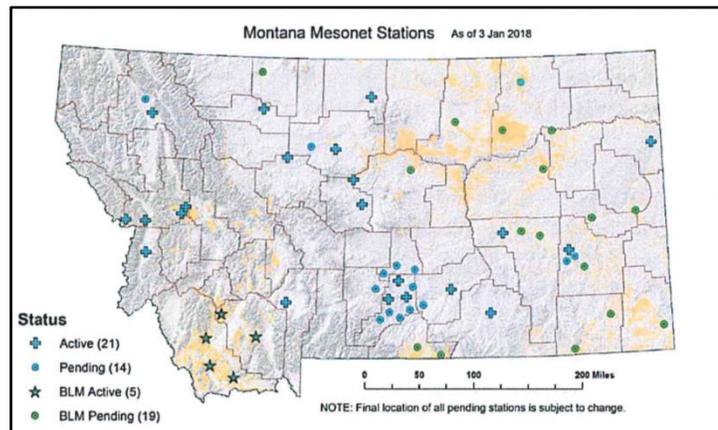
*“We have a ranch. We got hit hard. In March and April, the rainfall wasn’t what it should have been. Temperatures were already peaking in the 80s. By April, we knew we had problems. Our crested wheat and alfalfa were coming up really well. By May, it was burning up.”*

## THE MONTANA MESONET

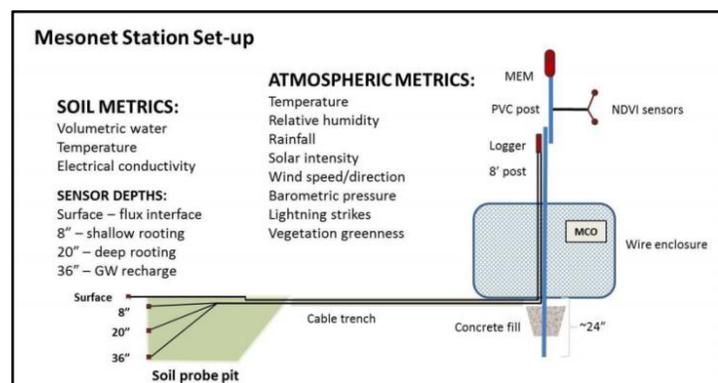
Lee Schmelzer – Stillwater County Extension Office – [lees@montana.edu](mailto:lees@montana.edu) – (406) 322-8035

### What is the Montana Mesonet?

The Montana Climate Office (MCO) is leading the development of the Montana Mesonet - a cooperative state-wide information system consisting of a network of meteorological and soil moisture data monitoring stations. The data are transmitted via AT&T cellular signal and can be viewed on the MCO website ([Montana Mesonet - Montana Climate Office - University Of Montana](#)). It is designed to support adaptive management and decision-making in agriculture, range and forested watershed contexts with the aim of building resilient and sustainable economic and ecological systems. This network will add new remote sites and integrate existing cooperator networks to develop the first statewide soil-climate network. Over time the MCO aims to respond to many outstanding requests for additional stations in cooperation with local watershed groups, NGO’s, private sector, tribal, state, and federal partners.



**Figure 1.** Current status and distribution of the Montana Mesonet.



**Figure 2.** Diagram of a Mesonet station with data collection metrics.

The Montana Mesonet seeks to integrate collected data by developing user-based applications and decision tools to support precision agriculture and adaptive management decisions for farmers and ranchers.

Resources are in the process of being developed. Stakeholder input has been crucial to the process. Based on feedback gathered from these types of workshops, potential application functionalities might include planting and agronomic decision-making tools, forage production prediction tools using NDVI (Normalized Difference Vegetation Index) to ground-truth satellite information, grain yield prediction tools, and enhancement of state and county drought maps based on stored soil moisture data.

### Background

The Montana Mesonet began through conversations with agriculture and water sector stakeholders about how to better assess and address needs related to drought and climate information in Montana. Available data at the time consisted solely of hydrologic data, i.e. USGS stream gages, NOAA weather stations, and SNOTEL snowpack monitoring sites.

*“We started asking ‘how can we capture what’s happening in the ground – the soil moisture?’ We know our rainfall falls and it either evaporates or runs off. But there’s a bunch of stuff we don’t know. How much enters the soil? How deep does it go? How long does it stay? How does it change over time? All of that plays into – along with management and how you treat the ground – what grows on top of it.”*

- Lee Schmelzer

Initially, support in terms of funding or interest was limited. In 2016, a plan was implemented to revitalize the existing stations. Lee secured a Western Sustainable Agriculture Research and Education (SARE) grant from USDA and is currently in the process of establishing twelve new stations in and around Stillwater County.

### Challenges and Limitations

- ◆ A sustainable funding model to support continued installation and maintenance of the stations does not yet exist. The Montana Climate Office continues to explore funding sources that could provide growth and longevity for the Montana Mesonet program.
- ◆ Drastic variations in climate, environment, and topography are present across the state. The density of Mesonet stations does not yet exist so that data is representative of every community or ranching operation in Montana. However, Mesonet stations are characterized by soil types throughout the state. A water retention curve is generated from each soil type. Therefore, by knowing the soil type of a particular pasture or ranch, soil moisture comparisons can be made in areas that are currently not represented by a Mesonet station.
- ◆ Dead zones in AT&T cell coverage exist throughout the state, which limits potential Mesonet station locations.



Figure 3. Mesonet station.

## MANAGING PLANT COMMUNITIES AFTER DROUGHT AND FLEXIBLE STOCKING STRATEGIES

Jeff Mosley – MSU Extension – [jmosley@montana.edu](mailto:jmosley@montana.edu) - (406) 994-5601

Mat Walter – MSU Extension-Golden Valley and Musselshell Counties –  
[m.petersonwalter@montana.edu](mailto:m.petersonwalter@montana.edu) – (406) 323-2704

Abnormal conditions like the flash drought of 2017 require abnormal management strategies. Some strategies will apply to certain operations or pastures and some may not. Proactive planning is a useful skill to cultivate. In dealing with drought, it all comes down to an “I can” vs. “I can’t” mentality.

### How can you reduce forage demand?

- ◆ Can you cull deeper?
  - Culling young cows and replacements – *pros*: worth more money to sell, *cons*: valuable genetics are lost and it takes time and money to rebuild.
  - Culling on both ends – *pros*: improves performance of herd by getting rid of low-performers, balances short-term and long-term effects, *cons*: not worth as much money, initially.
- ◆ Can you wean earlier?
  - Nutrient requirement and forage demand goes down.
  - How early can you wean? What is the youngest a calf can be and still wean it successfully?
    - Approximately three months, or ninety days.
- ◆ Can you sell calves and cull cows earlier?
  - Having a contingency plan in place that allows for earlier sale in case of drought conditions will reduce forage demand. However, you must be willing to accept changes in market price.

### How can you avoid running out of grass?

- ◆ Can you graze somewhere else? Be proactive in obtaining lease pasture in case of drought.
- ◆ Do you have tame pasture available?
  - To save native range, you can put grazing pressure on tame pasture. These plants have been selected and bred to take grazing a little heavier.
- ◆ In the following year, can you graze where grazing was light during the drought?
  - The water source in a pasture may have dried up during the drought. Therefore, the cows may not have grazed there as heavily as normal.
  - Adjust timing to graze lightly grazed areas early in the coming year. Conversely, graze areas that were grazed heavily before plant dormancy later in the coming year.
- ◆ Can you utilize rested pasture?
- ◆ Can you delay grazing?
  - Rather than waiting until seed-set stage to graze, delaying grazing until soft-dough stage will still yield the same forage growth results.

### How does drought affect plant recovery?

- ◆ After drought, there is less carryover grass for the coming year. If your cows eat carryover grass and now there is less, you will need to reduce your stocking rate.
- ◆ That carryover grass turns to mulch in a few years' time. Mulch is good for preventing soil erosion on steep slopes, allowing precipitation to infiltrate into the soil rather than running off, cooling the soil in summer and insulating it in winter. If mulch is important to your operation, you may need to reduce your stocking rate for longer than one year.
  - In the year following a drought, heavy spring grazing may have an effect on plant recovery. Late-season moderate grazing will have no effect on plant recovery. The challenge: can you do it moderately?
  - Heavy grazing is a level of forage utilization that is too severe for plant species to maintain themselves. Moderate grazing is a level of forage utilization that allows for plant species to maintain themselves but usually does not permit them to improve their production capacity.

### How can you predict grass production?

- ◆ By July 1st, assume that 90% of grass growth is done.
- ◆ Make multiple plans (A, B, C, D) to prepare for potential management adjustments before July 1st.
- ◆ April/May/June precipitation is the main driving force of forage growth. Using local NOAA weather station average precipitation records over the last thirty years for April/May/June will allow for the creation of a precipitation probability chart, which will aid in planning and predicting forage growth. For examples, follow this link (<http://w2.weather.gov/climate/xmacis.php?wfo=ggw>) and select "Monthly Summarized Data."
- ◆ Precipitation probability charts can be extended through the crop year (September-June).

### Is grazing during a drought harder or softer on a plant?

- ◆ It depends on when the grazing occurred in relation to the drought. If grazing happened early in the year and then a drought hits, the plant does not have an opportunity to recover and regrow. If grazing happens later in the year after the drought and when the plant is dormant, the plant will be impacted less and recover more easily.
- ◆ However, different plant species grow on different schedules. It is important to recognize that the timing of the drought's effects on the pasture depend on the pasture's plant species composition.
- ◆ Past management during drought will affect future growth and plant vulnerability.

### Is grass tetany more common after a drought?

- ◆ It depends. If there is less carryover grass to buffer nutrient-poor plants, then yes. If there is good grass growth and good grazing management, then no.
- ◆ Weeds and poisonous plants will utilize available moisture early and will experience minimal impacts from drought.

## Conclusion

All in all, your abnormal management strategies will likely change and require flexibility to endure drought. Strategies will most likely need to be implemented on longer timeframes rather than just for the first year after drought. The magnitude of those strategies and adjustments will depend on your assessment of current and previous drought impacts for each particular pasture.

*“I’m certainly not a climatologist....But this is what I do know: I do know a little bit about weather – just because I’ve got gray hair, right? I can tell you that in my lifetime, it seems like fall comes about three weeks later and spring comes about three weeks earlier. I’ve seen that just in the last forty years.”*

- Jeff Mosley

## PRODUCER STRATEGIES

During this segment of the workshops, participants discussed their perspectives on management strategies that can generally be helpful during times of drought, as well as strategies specific to the 2017 flash drought.

### Clyde Park

- ◆ Cull early before turning out to grass – focus on older cows that cannot perform well and younger cows that need larger amounts of forage.
- ◆ Be proactive, not reactive in combating drought.
- ◆ Plan for drought by leasing additional pasture.
  - *“I’m leasing pasture, and I don’t need to lease pasture, but I’m doing it to put rest on [my own grass] and arranging it so that we don’t go to the same pasture every year in the same way.”*
- ◆ Examine hay supply and manage inventory to prevent hay shortages.
- ◆ Diversify. *“Don’t just raise cattle. Don’t just raise grain.”*
- ◆ Develop new and existing water sources to increase storage.
  - *“Putting in cisterns and piping changed our place. In drier years, it’s gold.”*
- ◆ Evaluate vulnerabilities on your property.
- ◆ Keep good records.
  - Taking forage tissue samples on



Figures 4 and 5. Clyde Park breakout discussions.



pastures from time to time would help you understand why hay was out of whack one year and why salt consumption was so high.

- Track your rain/precipitation records in April, May and June, which can be compared to 30-year averages.
- ◆ Cross-fence with progressive pasture rotation to keep grazing light in times of drought. Temporary electric fencing can help guide rotational grazing.
- ◆ Supplements and lick tubs are valuable if drought conditions lead to poor forage nutritional quality.
- ◆ Annual forages.
  - Willowcreek winter wheat and Sanfoin in addition to alfalfa will help replenish hay deficit.

**Two Dot**

- ◆ Performance-based culls have worked well when conditions require you to cut numbers and replacements. Be flexible in your stocking rate and able to accommodate shifts in cattle shipping.
- ◆ Contract grazing.
  - *“Rather than culling our own herd, we just brought on a reduced number of contracted cattle.”* This strategy might lead to lower margins for grazing but also a lower risk of needing to cull or sell off cows with good genetics.
- ◆ Enact flexible grazing strategies such as temporary cross-fencing to enforce quick pasture rotation and avoid overgrazing.
- ◆ Plant annual forages to help replenish hay deficit.
- ◆ Think ahead and create long-term goals. *“Have a drought plan – good, bad, or indifferent – just have one. See how it works; change it for the next one.”*
- ◆ Develop water sources and on-site water storage tanks.
- ◆ Water rights enforcement on the Musselshell has aided storage and late-season flows.

**Winnett**

- ◆ Have contingency management plans in place in case favorable conditions change.
- ◆ Keep at least one year’s worth of hay as a surplus in case of drought.
- ◆ Consider planting annual vs. perennial or mixed cover crops to replenish hay deficit. These considerations are dependent upon your operation, your goals, and your climate conditions.



**Figure 6.** Mitch Lassa reporting results from breakout discussion group in Two Dot.



**Figure 7.** Mat Walter presenting in Winnett.

- ◆ Rest-rotation vs. deferred rotation – both grazing strategies may help maintain plant species propagation.
- ◆ Cull and wean earlier in preparation for drought. Consider other potential options for flexible stocking strategies.
- ◆ Develop water sources to increase storage capacity and prepare for drought.
- ◆ Network among local producers and landowners to share knowledge and foster community growth.

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## PRODUCER FEEDBACK

During this segment of the workshops, participants provided feedback on resource utilization and availability as well as agency response during times of drought. Questions and concerns were also discussed.

### Clyde Park

- ◆ The 2017 drought hit almost overnight. However, it was not severe enough in Shields Valley to prompt seeking much outside help from Extension, FSA, etc.
  - Normally, Extension agents, neighboring ranchers, and watershed groups are utilized during times of drought.
- ◆ USDA could increase resource distribution flexibility and understanding of local conditions and microclimate variations across the state when responding to drought.
- ◆ Environment and weather conditions can vary greatly. *“I grew up ranching, but we just bought a place. We’re essentially starting over somewhere different. We moved four miles and the ecological and weather patterns are so different it’s become redundant that what I did there you cannot do here.”*

### Two Dot

- ◆ The most common resource utilized is local weather stations. Other weather and climate forecasting data are not centralized or easily accessible. Data are not very user-friendly or easy to manipulate and are therefore difficult to apply to a particular operation.
- ◆ *“I think a big thing is gathering the information quicker and more efficiently and getting it sent on so that drought declaration comes early enough that it does some good. By the time the CRP fields are turned loose, it’s like what’s the point? [The grass] is all down; it’s strawed up; it’s no good. If we would have had that three weeks sooner, we might’ve actually had some value to it. However, the drought declaration did come faster this year than in years past.”*
- ◆ Mesonet has clear limitations due to lack of network density and lack of user-specific tools.
- ◆ Hesitations in giving advice to Clyde Park or Winnett exist because of vast differences in climate and topography.
- ◆ Creating opportunities for ranchers to communicate and share knowledge is beneficial.

- *“We all get so busy managing our own, a lot of times we don’t talk with even our closest neighbors. So things like this [workshop] are good for that, I think – to share ideas. And I think we probably need to do it more often than we do.”*

### Winnett

- ◆ The US Drought Monitor was not quick enough in assessing actual drought conditions. Therefore, the USDA/FSA were slow to issue assistance programs.
  - Drought declarations came out earlier than in the past – maybe two to three weeks earlier – but still not fast enough.
- ◆ Emergency Conservation Program was released, but by the time approval was given to applicants and money was allocated to those counties, producers had already been forced to seek out other solutions.
- ◆ CoCoRaHS data was not recognized or taken into account when drought declarations were being made. Why does that disconnect exist?
- ◆ *“It’s almost like somehow the state has got to designate someone in the county to be responsible to facilitate those conversations and be responsible for reporting those conditions between the people on the ground and the governor, FSA, or Drought Monitor folks.”*
- ◆ Could Drought Committees be established in every county? How can that committee gain credibility to get support sooner in times of drought?
- ◆ Vast geographical and topographical differences, even within one county, create difficulties for accuracy of predictions and generalized trends.
- ◆ The first drought year is manageable. The second year is crucial.

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## ACKNOWLEDGMENTS

**We would like to sincerely thank all of the individuals and organizations who made these workshops possible.**

*Co-hosts:* MSU Extension and the Musselshell Watershed Coalition.

*Presenters:* Michael Downey, Lee Schmelzer, Jeff Mosley, and Mat Walter of Musselshell and Golden Valley Extension who filled in for Jeff Mosley in Winnett.

*Community logistics organizers:* Tracy Mosley and Laura Nowlin.

*Facilities:* The Clyde Park Community Center, the Two Dot Community Center, and the Winnett Methodist Church.

*Lunch providers:* Faith Petersen at Crazy Mountain Catering, the Two Dot Bar, and the Kozy Korner Cafe.

*Participants:* All of the producers, Extension staff, and USDA/NRCS agents who shared valuable perspectives and feedback throughout the workshops.

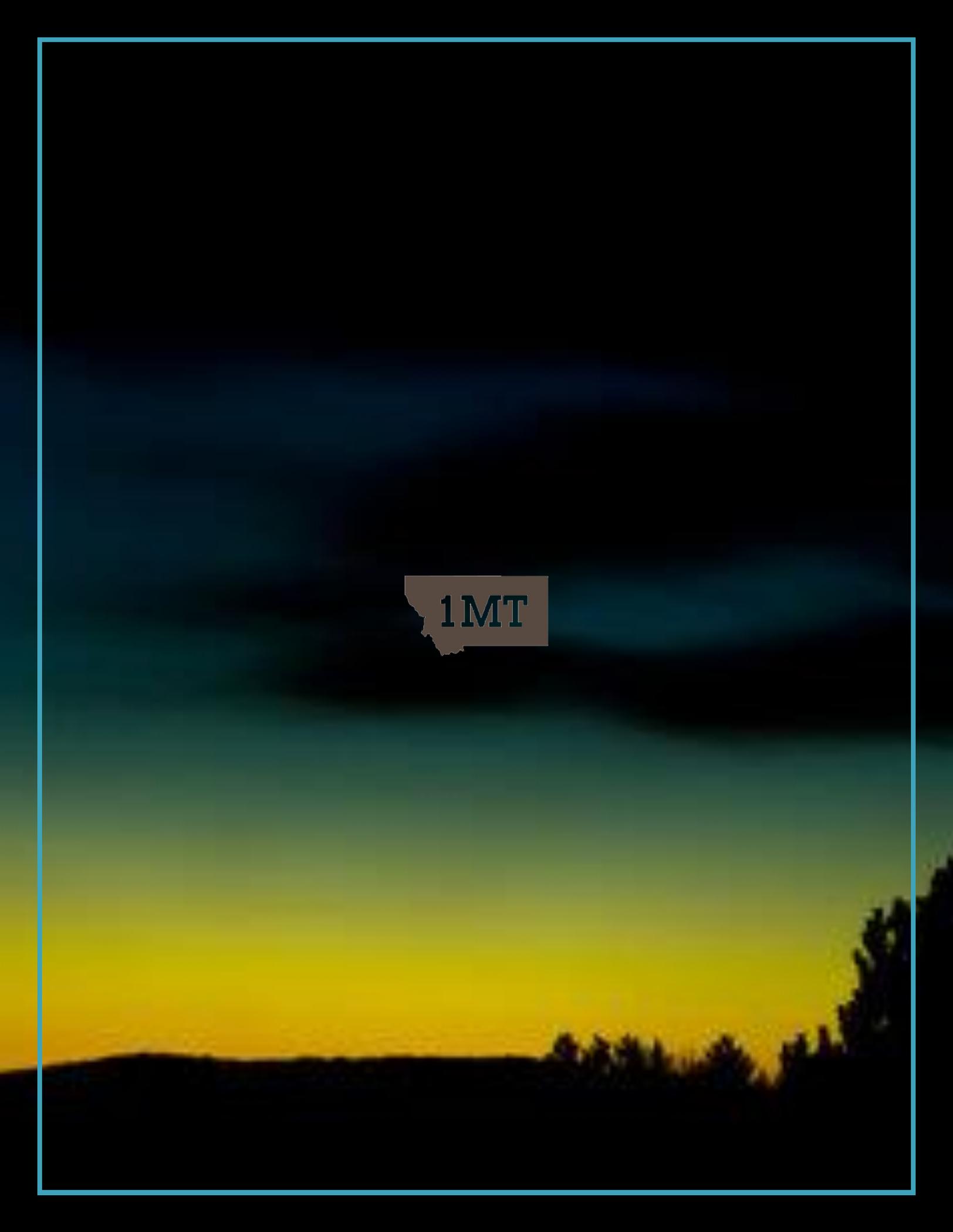
*Funders:* Bayer Corporation and the Kendeda Fund

## FURTHER INFORMATION

Workshop content audio was recorded and full transcripts can be accessed here:  
<http://onemontana.org/what-we-do/resilient-montana-water-agriculture-and-climate-program>.

For more information about these workshops please contact Zach Brown of One Montana at [zachb@onemontana.org](mailto:zachb@onemontana.org) or (406) 522-7654.

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