

DROUGHT RESILIENT RANCHING WORKSHOPS

Central Montana Tour

Clyde Park, Two Dot, and Winnett

Hosted by One Montana, MT Extension Service, and Musselshell Watershed Coalition

Workshop Transcripts and Summaries



Author: *Mitch Lassa – Big Sky Watershed Corps Member, One Montana, MSU Extension – Gallatin County*



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Introduction

This document serves as a compilation of transcripts from audio recordings at the 2018 Drought Resilient Ranching Series workshops in Clyde Park, Two Dot, and Winnett.

Presentations

Presentations by Michael Downey, Lee Schmelzer, and Jeff Mosely were recorded at the Clyde Park workshop and transcribed below. These presentations will be kept separate from the workshop content. Following the presentations will be the remaining content from each workshop.

Michael Downey, DNRC

Michael Downey: I work for DNRC for the Water Management Bureau. I staff the governor's drought and water supply advisory committee. I've lived in Helena for about 25 years and I grew up on a ranch northwest of Reno, Nevada. In some ways, it's kind of similar country. Anyways, it's been my job to track the drought. We interact with the US Drought Monitor, which USDA uses those drought designations in terms of providing drought assistance. I work with DES and others to try and get the word out when we are facing a drought. I think it's fair to say this last year was a little bit different in that I think it caught pretty much everybody off guard. And that's really what I'm going to talk about today.

There's a variety of definitions of drought and for the purpose of this talk here today, I think we can see hydrologic drought and terrestrial drought, which are a little bit different. This year was unusual in that all the way up through the end of September, we had above normal flows on the Yellowstone. If you looked around the state, our rivers, generally speaking, were in pretty good shape. Especially with how extreme the drought was, especially up in the northeast. What we saw this year was a terrestrial-centered drought. The guys that had winter wheat tended to do alright. The guys that had spring wheat just got slaughtered. That really had a lot to do with timing in how we got our moisture this last year.

This was on May 1st, and this was for SNOTEL and what the SNOTEL sites were telling us for our snow pack. Here, you have the lower Yellowstone with 172%. Here, the upper Yellowstone, 137%. Pretty much everything except for the Smith-Judith-Musselshell in this country - I think you guys knew - here in the Crazyes we were a bit dry. And probably the driest part of the state as you got up into the Little Belts. The rest of the state looked real good. This was May 1. If you look at the US Drought Monitor, on May 9th, the southeast corner of the state was in drought. They were in D3 drought, extreme drought last year. It's not a surprise that they would be a little bit dry coming into the Spring. What was driving this were those snow pack numbers that we were looking at here. And what I'll show you is that we missed the boat, to a certain degree. By July 18th, that's how bad things had deteriorated. We were in D3 drought in the northeast and in some parts D4. D2 all

throughout the southeast, abnormally dry. Things here in the southwest were pretty good, but even here in your country things were drying out. By September 5th, this is what the state looked like. All of the state was in some form of drought. Last year was a little bit different. Typically, in most drought years, if we look in May, this is usually what we're looking at. In 2002, that drought was centered around Havre, and typically, we have a pretty good idea of conditions coming into spring when we haven't had the snow pack, and we haven't had those spring rains. Typically in a drought year, this is how things look. Then, if you look at where we ended up September 3rd of that same year, you can see that things have improved a lot. The reason for that is that here in Montana we have really dependable moisture in June and July. For you grass guys – that's your bread and butter. And what really separated this year is that when we hit June, it just shut off. Here on September 1st, if you went back and looked at accumulated precip and snow pack for the year, we didn't have a bad year. I would offer that that map is not reflective of what, in fact, we experienced.

If we look at Glasgow, this is a graph of accumulated precipitation. It shows that all the way up through here, we're above normal until about June. That's our tipping point. What that was driven by is that we had a really wet October/November out in that country. They had about 9 inches of precip. That staggered our numbers in terms of what we look at in the water year. The water year runs from October 1 to October 1. We were looking at accumulated precip for the water year and we were like "well heck, things aren't so bad." Well in fact, if you really look back at the year, in Glasgow they had all this precip here in October and good precip in September too. It was through the roof. But looking at what they got over the course of the Winter and into the middle of March, April, is when it was really starting to get dry. That's why we changed our focus and we're now looking at more 30 – 60-day trends. If you look at snowpack and what we've gotten for the whole year, that's not going to tell you the whole picture.

One of the things we did this year to help us with that is that we've got our Montana Drought Impact Reporter. As we're trying to assess conditions around the state, if you go to our website you can help us by reporting conditions in your area. That really is critical. That way, we know where things are drying out faster than what it may seem from the precipitation and temperature data that we're looking at. This last year also, especially up in the northeast, another thing that played into it was wind. They had wind like they'd never had before. Those warm winds dry things out fast. So, this is a complicated process and there's a lot that goes into it. That's why we're trying to push this Drought Impact Reporter to get people to use this to report conditions in their area. It helps us understand what's happening on the ground.

Now if you look at West Glacier for this last year, again they had this high precip in the Fall and great snowpack over Winter, their June is about normal. For the water year, they ended up with 40 inches as compared to a normal year at 29 inches. This was not the year that you would have thought come September they would be evacuating West Glacier because it's all burning up. But what happened was that precip in July just went to nothing. That combined with higher temperatures, next thing you know, the forest was burning. What this tells us is that it's about timing. Timing and temperature. Again looking back at West Glacier – for the entire year they were above normal on their precip. And yet, we had

one of the worst fire seasons since probably '88. That's not something you would expect to be the case in West Glacier in a year when they had 10 inches (30%) above normal precip.

If you look at stream flows for the end of September, all of our lowest stream flows were up in the northwest. You look out in the northeast where we were really burning up and we had normal stream flows. That's because there is a bit of delay, especially out in those prairie streams that are mostly fed through groundwater. I suspect that this year, even if we get a good winter out in that country, that we're going to see low stream flows there because there's a bit of a delayed effect.

Just to compare to other years we've had – in 2004 in southwest Montana it was a real dry year. We had D4 through all this country back in 2004. If you look at when they got their water, they were way low in these months here when we should have been putting on our snow pack. April actually went up in that year. They got some good precip. What's interesting, if you look at what was going on in the Big Hole, here on May 1st flows were at 8 cfs. They were next to nothing. Part of that was because they had 70 degree temperatures in Wisdom in February and all that snow pack came off early. But then, your stream flows came way back up when we had all that precip in April and May that came as rain. Therefore, while we are really dependent on our snow pack, a snow pack won't necessarily make us or break us. When I talk to the hard-core weather geeks at NOAA, they said "it's all about April/May." A lot of that in the high country will be coming as snow. That's going to be feeding our snow pack for later on. At your mid-elevations, that's what's growing your grass. So if you look at where 2004 ended up, we ended up here. Havre had an above normal June. What makes Montana Montana, it is our really dependable late-Spring/early-Summer rain.

The other thing we need to factor in here is temperature. In Roundup, I looked at 1950-1967 and 2000-2017, about 50 years apart. Back in the '50s, we weren't getting days up into the nineties until about the middle of July. Now, we're seeing our first 90 degree day at about July 3rd. That two weeks is an important two weeks. Once you start seeing those higher temperatures, it makes your grass grow but you're really going to see your soil moisture drop off.

Given the trends of where we're headed, and what this might look like, it's interesting to look at other areas, like Carlin, Nevada. If you've been on that drive from Salt Lake out to Reno on I-80, that's pretty rough country. If you look at Carlin, Nevada, which is right in the middle there on I-80, they're at about 5900 ft. Those are their average temps June/July/August, which are pretty similar to what we've got here. They get about 12 inches of annual precip. If you look at Helena, whose average precip is 11.85 vs. Carlin at 12.89, look at the difference in when we get our precip. We get our precip in April/May/June. They get their precip October/November/December and January it starts to drop off. June, it goes to nothing. What we have here is it's that Summer precip that is so critical. When you're evaluating what kind of year to look forward to, it's a function of temperature and a function of that late-Spring/early-Summer moisture. I know there are some guys here that run yearlings, and if you've got some pasture leased up in the northeast, I'd be worried if we have a dry Spring up there. Odds are, you're going to hit July and you're probably not going to get too much more precip. The message here is that it's a combination of precipitation timing and temperature, which is probably not a great deal of news for most of you.

That's my presentation. I'd be happy to take questions.

Audience Member 1: I don't know if you calculate the drought stuff that goes to the state where we get our – if we get – a drought payment or how that works, but do you guys calculate the temperatures on that? I know if we get 40 ft. of snow in the winter but it's 40 below and then it turns 80 in April, that moisture's gone.

Michael Downey: Right. And that absolutely does factor in. We're not the ones. The USDA, through the Farm Services, they are the ones that provide that drought relief. But they do so based on the US Drought Monitor. It's when an area gets to D3 drought. We interact with the US Drought Monitor on a weekly basis. We were doing that on a monthly basis in the past [?]. A lot of times we find ourselves getting at odds with them. Part of that, is that there are four Drought Monitor authors that are spread around the country. Things are a lot different in Montana then they are, say, in Nebraska. They were looking at our accumulated precip numbers, and like you say, we may have a great snow pack and then suddenly in April we've got 80 degree temperatures and all that water comes off. What was it, in 2012, we were up into the high 90s end of June. It's a real different situation. That's why we've kind of changed our approach on how we work. So now, we work with the US Drought Monitor on a weekly basis evaluating conditions. We've got a group of state, federal, and local folks that feed information in. As a result, I think that we're a lot closer to actual conditions in terms of the US Drought Monitor. Hopefully, there's going to be a better correlation between what's going on on-the-ground and how FSA and USDA are reacting with those relief programs.

Lee Schmelzer, MSU Extension – Stillwater County

Lee Schmelzer: So, I'll talk a little bit about the history of what we've done – what this Mesonet is if you haven't heard about it. Then, some ideas on how it might be used. And then I'm going to ask you guys some questions. That's what these clickers are for.

What they asked us to do is to get a drought committee together. The commissioners asked me to get something together so I got about 10 folks – like you guys – together and we started talking about this drought deal. A lot of it was just like what we heard. A lot of things were happening on the ground and that's important, but the other thing I asked them is what can we do about it? What would help from your guys' perspectives? What we came up with, with the drought committee – other than gathering that information – and I'll put a plug in for what Michael said on that Drought Impact Reporter. That's really important. If you take the time to do that, it helps make those maps that you saw. Any of our disaster stuff now is based on those drought maps, the Drought Monitor, and the drought impact statements. The stuff that you share today, if you put that out there, it helps the people making those decisions if they're on the borderline of whether they can put us into those disaster declarations.

At that time, we were only gathering that hydrologic data – the stream flow, the storage, snow pack. You saw those two maps in there from 2002 and 2004 in Stillwater County and here. Most of the folks in our country thought we should've been in that dark as

you can get. We kept in the D3 and D4 because we got these big rainfall events in the Summer and early Spring, but nothing went in the ground. We didn't feel like we were taking in what was happening on the ground. So, we started looking at how we could do that. We started taking aim at some of the stuff that was happening on the ground.

I gotta throw a few things in there like that: this is our prairie dog control unit in Stillwater County.

Audience: [Laughter].

LS: Anyway, we also started going up to the State Drought Advisory Committee and representing the stuff that was happening on the ground. So, what happened at that time, we weren't qualifying for the disaster declarations because we got that rainfall and we didn't have affected[? 4:01]. So, 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. We're just talking simple terms here.

So, we came up with the idea that we needed better information on soil moisture. In Stillwater County, we installed five weather stations with soil moisture monitors that we could start recording some of this. In the meantime, we found out that some of the folks in the northern county had similar ideas. We ended up with about 30 stations scattered throughout Montana – the central part, and some into eastern Montana – that had a full slate of weather information, but also, soil moisture. We started trying to develop tools that could be used for you guys out on the ground.

It was really hard. We didn't have much support that we could find as far as money or interest, at that time. We formed the committee. We got a lot of stations put in. Then, around 2006/2007, we kind of went into a more wet period and it was even harder. A lot of those stations declined or stopped working.

So, about a year ago, we started trying to revitalize that. We were able to get a SARE grant that we're putting about 12 stations in and around Stillwater County and some of the surrounding counties that had stations before.

It's a lot easier now. There's a lot more interest in there. What I'm talking about now is this Montana Mesonet. How many have heard about that? Ok, so in August of 2016, the Montana Climate Office – which started about in '15, is that right? – we didn't have a state climate office until about that time frame there. They developed the Montana Mesonet. That's exactly what we're talking about. It's weather stations with soil moisture sensors in the ground scattered around the state. It's mostly on range ground, but we're working some with the research centers – either USDA or College of Ag research stations. They have developed a system. They're talking about more than just the stations. They want to be a repository for all the data that's gathered from these. They want to work with a lot of other folks, that we'll get to in a minute, to make sure this happens. It can't be one agency; it can't be one group. It has to be a whole bunch of folks that get this going. And that's what they've seen in other states that have been successful. With them, we want to develop some user-guided applications and tools. They're working with the research centers to apply this, to

make sure the data gets used. And then, of course, they have to make sure that the data is refined and quality checked. One of the biggest reasons why we're excited is that – like I mentioned – the original system that we had in place fell apart. We were a bunch of feed[? 8:25] commissioners and a couple of Extension agents and there wasn't a system in place to keep this going. And that's what they've promised that the Mesonet will provide – a longevity approach. There's also a lot of folks that are interested in this data, as far as people that want to use it – like the Weather Service, like DNRC, like Water Resources, those sort of things. It's gained a lot of momentum.

This is what it looks like today. If you look at the pluses, those are the stations that are active. The BLM also has some stars here that are active. There's the pending stations that have funding, but haven't been installed. So, they've got a good start. What they hope to get is about 150 stations scattered around the state of Montana. One of the big reasons why they'd like at least that many is – I'm sure you know – is that you may have arguments every day with your neighbor that they get more rain than you do. What it amounts to is that climate is variable and different in Montana. From the north to the south of Stillwater County is usually different. Some people blame politics, some people blame religion, but anyway, we know that climate is variable in Montana.

So, what are we doing? This is the receiver for moisture, temperature, that sort of thing. It'll collect all these atmospheric information and then also, it gathers these soil conditions and soil information. These are mostly set up, at least at the time being, where you have to have a cell signal and then it's relayed near-real-time back through the cell signal. We have to go out and scout and make sure there is a cell signal available. There are some technologies that they're looking at that may be able to change that if we're in a spot that can't get it. Or, we can download them manually, if there's somebody that can do that. But this is what I think a lot of folks are interested in and why we started originally is to get this soil, temperature, and water content at these different levels down in the ground.

This is also just another picture of what they look like. There's minimal disturbance. We have to dig a soil pit to be able to get these probes in the ground. And then it goes back to the station where all the electronics are, basically. This just shows the setup of what the sensors are and where they're at.

The next part of this, and what we put into the western SARE, and if you're not familiar with SARE, it's a funding source – Sustainable Agriculture Research and Education. One of the things that we found when we were talking with producers in the 2000s is that there are some things that might be valuable to them that we could develop with these soil sensors and our climate sensors. We want to develop decision tools – with feedback from you folks – that makes them valuable, as well as how we can get the information to you. We've all been to websites where it takes you half an hour to get to something you're looking for. We want to make sure that what's put out there is useable also.

We'll talk in a minute about some of them. There's quite a few examples of things that are out there that we could build off of that have been developed in the last ten years. There's some other research that we can put in and use the data that we collect. And we want to build it with Montana data and make sure that it works for you. That's really the goal of what we're trying to do with the western SARE and the Montana Mesonet.

Right now, if you go onto the website and you search for Montana Mesonet, you can get to these stations that are out there now and get the information. It's pretty basic now.

There's a seven-day graph of information that's there on both soil temperature, soil moisture, and all the other stations. We want to get to something like this. These are in the development stages over the next couple of years. Another place that has information already for six or eight or ten years is Oklahoma. Oklahoma has already a Mesonet that has developed some of these tools. They're a little bit different country than we are, but some of theirs is geared more towards the farm ground as well. They have a Mesonet in place and developed some of these tools that we're talking about.

So, that will be everything from being able to select a station and compare it to history to look at some kind of trend on soil moisture, some maps that are similar to what we saw with the drought monitor, some of those things. And I'll get into the specifics and ask you guys what you think about them in a minute.

What we're trying to do in the next couple years is develop some of these prototypes and then get with folks like you to see if they actually work. All of this leads back to the stuff that you talked about earlier: the decisions that you have to make during the year. How can we provide more information that might help you make those decisions a little earlier or a little more confidently? Hopefully, we have some information that we could share with you so that this flash drought doesn't surprise us quite as much. I'll get to some graphs that show that a little bit, but in 2000, 2004, 2005, I don't remember the year, we had a similar situation where we knew it was dry, we knew there was no moisture in the ground because we'd been through a period of hardly any rain, but the grass still kept looking good. And it turned out kind of like this year and in '13 where it turned hot and in two days we lost all of our dry land hay because it just burned everything up. I don't know if you guys were affected as much, but I think it was '13 in particular out east towards Billings that in June people couldn't cut it fast enough; it just dried up. If we had some of that information that you guys could readily access, it might be something that you could look at that helps you with some of those decisions. Same thing, we talked about buying and selling cows. I don't know about you guys, but Stillwater County probably lost about 40% of its cows in the, whatever you want to call it, '98 to 2006 drought. 40-50% of our herd went down the road, or at least, was shipped to the pastures out of state to try to survive. So maybe there's some things that can help you with that.

The other thing we're going to be asking is when are these predictions needed? We heard a little bit and we'll get to a graph in a minute, but most of our grass is determined by Fall rain - October/November plus the April/May/June rain. So, if we can give you something in April that gives you what our stored soil moisture is and what our likelihood based on climate records is of getting a normal year or 50% of normal, that might help you make some of your stocking decisions and when you're going to have to move your rotations a little better. It's stuff you're already doing, but it's another tool to help you. And a lot of that is back to the drought planning and what we've been talking about. Most of you could get through a dry year. When we hit the 2000's, everybody got through the first year fine. You might've had to move up a little bit on your rotation. You might've had to use a pasture that you didn't want to use. You can get through one year; you can probably get through two years and not be in too bad shape. A lot of you have hay that's stored up for that long too. It's when we get into that 3rd, 4th, 5th, and 6th year that things get really dicey and you have to make some hard decisions. We all know we're either coming in or going out of drought in Montana.

So, we want to develop something and capture something that's quick and easy that shows soil moisture conditions for Montana. We developed a real simple thing when we had the stations up before. Basically, it was just the station areas and then when you clicked on it, you could get a color chart that showed, in this one, if we were blue it meant you had good moisture; if you were orange it means that you are 20-50% of plant-available water; and then it got worse after that. So, some type of color gradient map like the drought monitor that shows our local conditions around there.

The SNOTEL site that Michael showed earlier is a good example of what works. If you pull up the SNOTEL site and the interactive map, you can see the colored buttons for each station. The colors represent how much the snowpack is.

This is just a picture from a couple days ago of this station right here. This is Placer Basin, south of here in the Beartooths. That particular station has 50 inches of snow right now. So, it's color coded and it's similar to what we could have in this kind of country. It might look something like this.

What I want you to do now is pull out your clickers. We're still in the beginning phases of this, but we also want feedback. The next slide asks you whether what I just talked about – this quick, color coded map of soil moisture conditions – whether that would be helpful on your operation.

[Participants provide clicker responses]

So, a lot of you agree that that's useful.

Audience Member: I got a question. When you monitor the geospatial monitoring of vegetation, you've got deep-rooted stuff and you've got shallower – like 70% of the root system of most range plants is in the top 2 ft. Then you've got sage brush that goes deeper. You've got juniper as well. Is there a differentiation in that? Because what you want to measure is grass. I couldn't give a hoot about the sage brush. Is there a differentiation?

Lee Schmelzer: I don't think I can answer that. I'm not sure how they're using this and frankly, they didn't put it on our stations. I know the BLM is requiring it on their stations. I'll try to get some information on that and get it back to Tracy and she can forward it. I don't know much about the monitoring, but I agree with you. My basic understanding is that they can differentiate those different types of plants by the different signatures that they give off, but that's above my pay grade, basically.

I know that when I was at that meeting, the modelers argued back and forth on a lot of those terms and I didn't understand a lot of what they were talking about. What I came away with from that meeting is there are a lot of folks trying to figure this out. One way or another, it's going to happen. And I think those questions are good ones that we need to bring from the local level to make sure it gets what we want.

I love research, don't get me wrong, but if you don't direct research and provide feedback to it, a lot of times it ends up in a direction that isn't useful to folks on the ground. So those kind of questions are great.

Audience Member 2: What does NDVI stand for? They're not just using a regular camera, right?

Lee Schmelzer: No, I wrote that down so I wouldn't forget it. It's Normalized Difference Vegetation Index.

Audience Member 3: I got a question. We're talking about this, but you'd need a station on everybody's property to make it work because there's that variable difference between where I'm at and the neighbor. He kept really good rainfall records and we did and I had 10 inches of rainfall difference and I'm not 5 miles from that guy. You know, I'm on a north slope at 5,600 ft. and he's down on the valley floor and he's at 5,000 ft. You get that kind of difference and, so we say soil moisture it's like your need. That's where I'm struggling is that overall, state-wide is one thing, but everybody's situation is way different. My summer grass is at 5,800 ft. and by Bend, what we've got over there is way different. That's where I'm struggling with the usefulness of something like this.

Lee Schmelzer: The quick answer is yeah, you're probably right. The more that you have, the greater density of these, the better. What we tried to do, and I didn't mention it because of time, is that we didn't put it in any soil type that's only 1% of the county. So, I don't know about your area, but is your soil type similar? We characterize all of the soils because you have to develop a water retention curve for the soil that it's in. So, to some extent, we could expand that to a lot bigger area in our county, at least, based on soil type. Yes, our precipitation and our climate might be a little bit different, but at least we know that soil types will be similar. So, you kind of have to gather those into soil type. The other thing I'd say is yes, we need them as dense as we can, but some information is usually better than no information.

Zach Brown: Just to throw in a little anecdote, Alan wrote a big check to the university system a couple sessions ago to do research. One of their big projects was on this question. They worked with some dry land farmers and they installed sensors on combines that was connecting soil moisture data from these types of stations to their fertilizer applicator. So, in parts of the field where there was maybe more moisture than others, you were putting down more fertilizer or less. And different parts of fields were responding differently to that. So that was a specific application that the research was looking at for these stations, which kind of helped get this Mesonet idea off the ground.

[Clicker questions continue and feedback is gathered on other aspects and features of the Mesonet such as predicting forage production using NDVI and ground-truthing satellite information, stored soil moisture data allowing for planting and agronomic decisions to be made, predicting grain yield based on soil moisture data, and using soil moisture data to enhance state and county drought maps]

Jeff Mosley, MSU Extension

Jeff Mosley: I'm certainly not a climatologist. I'm not even sure I believe in climate change. I definitely don't know why it's changing. 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. The other thing that was mentioned this morning too was that drought is a natural part of Montana and if your operation is still in business, you already know how to deal with drought. Drought is something you can pretty much count on in Montana. You're going to hit at least one or two a decade. That's been true for a long, long time. In some places, it's worse. Drought – officially, in rain circles anyways – occurs when you get 75% or less than normal. When you're a little bit below normal – 25% or less – you're not in a drought. When you start to below 75% of normal, that's when you start to see an influence. Well, like I said that's normal to happen one or two years in a decade, but it does depend on where you're at. I've got a friend of mine who ranches over in Weebo[? 1:47] and he keeps track of his precipitation records really well. In Weebo[?], six out of every ten years is below normal. How can that be? Well, when you start aggregating things and averaging, you take all the rain that came and divide by ten years, you've got this mean average, but you never hardly hit it. In fact, six out of every ten years, you're below that average. So it's variable. That's going to affect your decisions and a lot of the things we're going to talk about. It's variable from year to year. It's variable from place to place. We're going to start talking about options. And what we're going to talk about might not have any applicability to your place. Or maybe you can think about how you can tweak it so that maybe it does. We're going to talk about options.

Everyone has been through this kind of thing before. The one thing about the new weather – the new climate – is that it seems like these things are coming more often. They talk about how it's more erratic. So, if you're used to dealing with drought, that's good. Maybe not good news to say that maybe you have to deal with it more often.

So, we've been talking about how things are variable. What I would you encourage you to do is to figure out just how bad the drought impact is on your place. It's probably different from pasture to pasture. When you're trying to assess the drought impact, let's talk about a few things to think about. Again, depending on what the impact is, that should maybe affect what kind of management change you're going to make. Some things to look at – weeds. If you have a pasture where weeds were a problem before the drought, you can just about guarantee that it's going to be worse after the drought. A lot of these weeds get going early in the year and use that moisture early. If you have any moisture in the ground coming out of a drought, those weeds are going to grab it and use it first. More than likely, especially like last year's drought, they got along just fine because they used that early moisture and then the drought hit – well, they were already done. Those weeds were not impacted very much by the drought. They're going to come out this Spring like gangbusters. If you have a place where weeds have been a problem, that's a place you should be concerned about coming up here in '18 because they're going to be worse. It's the same thing with poisonous plants. A lot of our poisonous plants are these early-growing things – death camas, low larkspur, and tall larkspur. A lot of these are also going to come up early and you're going to get a lot of them. Now, you might not actually get more of them, but it's going to seem like it because there is less grass to go with it. In a drought, we've used up a lot of that grass or it just didn't grow. So, we're going to get to Spring, early Summer next year and even if the poisonous plants just grow normal, because there is less grass carry-over, they're going to comprise more of what's out there. That's a big deal because the poison is in the dose. The way these animals eat some of these toxic plants is

that they counterbalance it with eating the other stuff. If you don't have as much other stuff to buffer that, you're going to have toxic quantities, potentially, in the animal's gut that you wouldn't have normally. Especially those early Spring pastures, those will be ones to watch.

Let's talk about grass tetany. What I want you to do, humor me a minute, if you can find a buddy next to you, I'm going to ask you a question and I want you to share your answers with your buddy. **Is grass tetany more common after a drought?** Turn to your buddies and share your wisdom.

Let's just talk briefly about grass tetany. Grass tetany is an imbalance between magnesium and calcium. Usually it's a problem in our active lush-growth pastures. For us, in dry land, that's usually early Spring. So, you have all of this green, lush growth and those nutrients and minerals that are in the forage are out of balance. If an animal eats a lot of those, it gets out of balance and dies of tetany problems. You can see it sometimes too on Fall green-out pastures and you can see it sometimes in irrigated pastures. For us mostly it's April/May/June. Why would it be less of a problem here? 1. If there's more carry-over grass, it helps balance that diet out. In a real dry environment, you've potentially got less carryover every year. In a drier environment, that flush of green might be really intense for a little while because the growth period has shrunk. You've got a lot of green, lush growth just like you do here, but it comes in a narrower time.

Audience Member 1: I have something to add. We were talking that people don't believe in grass tetany around here and I think it's because we have better grazing managers than they do down in Beaverhead County. [Laughter]

Audience Member 2: I've been ranching for a lot of years and what I've seen is that people are feeding minerals much more than they used to. The cows come into it better, equipped.

Jeff Mosley: Okay, that's a good lead-in to our question here. So what did you guys come up with? Is grass tetany more common after drought? Yes? No? So why would you think it might be more common after drought?

Audience Member 3: Less carryover grass from previous year to buffer.

JM: Why would you think there would be less after a drought? Or no difference?

Audience Member 4: We pull our cows off quicker.

JM: So you were a good grazing manager.

Michael Downey: It's just going to depend and it's going to depend on how that ground was grazed outside your drought year or even during your drought year. If it ended up a year where they were raising rocks, even if you've got a good to normal or maybe above normal year, you're not going to get the growth.

JM: Exactly. As we go through here, you can answer every question I'm going to ask you with those two words: it depends. That's the beauty of what we do. It also points out that

every place is different. We're going to talk about these principles, but is that applicable to your situation and your pasture? Well maybe, but maybe not on this pasture or across the fence. The idea that if the plants were stressed before the drought, they might be slow to rev up and come up after the drought, which could help because they may not be growing quite as lush and robustly so you might have less grass tetany in those situations. Like you said, it depends on those situations.

Another question for you and your buddies: **is grazing during a drought year harder on a plant or softer on a plant than in normal years?**

For those of you who thought grazing during a drought is harder on a plant, why do you think that?

Audience Member 5: It's harder during the growing season. When it's gone dormant, then it's not.

JM: You're right. It depends on when the grazing occurred in relation to drought. If it was during the growing season, why would that be potentially harder on a plant?

Audience Member 6: The plant can't recover. It doesn't have the nutrients.

JM: And water, right? If it gets too hot and there's no water, it won't regrow. A lot of times we count on that recovery.

So then, if grazing occurs after a drought hits and the plant is dormant, in that situation it's easier on the plant. Grazing on a dormant plant is relatively easy on the plant. Whether it was harder or softer depends a lot on when it was grazed in relation to when it got hot and dry. So the pastures that you grazed early – before it got hot and dry – those are the ones that maybe took a little hit. As soon as you got done grazing, they didn't get a chance to recover because they normally would have some moisture and now they don't. They go into the drought a little bit stressed.

The plants that you didn't graze until later in the year, by the time you got there, those plants are dormant. That's not too hard on the plant. This is the one silver lining that I know of drought: more of the grazing season occurred when the plants were dormant. For most of the plants out there, drought years are easier on them.

Michael Downey: Is the species composition of your pasture going to make a difference too in terms of when you have warm-season or cool-season grasses?

JM: Yeah, great point. We don't have too many warm seasons in this state, but the idea is still true that all the plants, no matter what they are, are all on a different schedule. So grazing hits them at different times in their life cycle. The timing of the drought's effects on the pasture depends on what the pasture is.

Audience Member 7: Also, I feel it affects pasture raising history. If you've been hit hard, that drought is going to kill that grass.

JM: Exactly. That makes a big difference. I can't remember the years, but it was one of those drought years in the late 90's, early 2000's and I'll bring up this one example. We were on [anonymous rancher's] land and he's a really good grazing manager. I could not believe it. We were in the middle of this terrible drought, and he had grass everywhere. That's when it paid off – all those years of taking care of those plants allowed him to get through that drought really easily. Those plants were healthy and they could take that extra stress. But if it's been hit hard in the past, then they're a little more stressed. Everybody has got some portion of their pasture that needs a little help. That's a place where those plants are a little less healthy. That's a place where you need to be careful because this drought is going to hit those plants more. The impacts are going to be harder on them. They are going to be more vulnerable to weeds and other stuff. What I'm suggesting is that you think about your pastures and weeds and poisonous plants and when the grazing occurred last year in relation to the drought, what their composition is, and how healthy they were going into the drought. All that affects how much change or adjustment you're going to need to make.

If drought is abnormal, like the drought of '17, then it takes abnormal management. If things are different than normal, I've got to make some kind of adjustment. The more abnormal it is, the more abnormal I've gotta be. Let's start talking about options for being abnormal. It's all about attitude and effort. I believe the big part of how you deal with drought is this "I can" vs. "I can't" mentality. If you say "I can't do something," then you are absolutely right. That's a self-fulfilling prophecy. If I adopt this "I can" idea, I can actually look at options. I could do that, but there might be a very good reason why that's a stupid idea. That's okay, but you open up your brain to thinking about doing something abnormal. Daughters-in-law, Sons-in-law, neighbors, Extension agents, NRCS people, whatever, maybe those people can look outside that box a little easier. People like us are going to come up with a bunch of stupid ideas and that's okay, right? But sometimes, these stupid ideas, sometimes there's a way to make them work.

Let's talk about options. Some of them may apply and some may not.

1. Reduce the amount of forage I need.
 - a. Can I cull deeper? If you are going to cull, would you go on replacements and young cows? Some people say that's what you should focus your culling on. Why would anybody say that?

Audience Member 8: Because they are worth more money to sell.

JM: One of those ideas is that those animals are still growing and they need a high-quality diet. When conditions get rough, those are the ones that maybe aren't going to be able to meet those needs, so let's get rid of those and maybe they're worth some more money. The downside of that, however, you've got a whole bunch of time and money invested in those genetics and you really don't want to part with those. If you do this calculation and you skip a year without keeping any replacements and cull all the replacements, just think about how many years it will take before you get those back into the herd. You create a real lull. That's going to impact you in your stocking rate and how many cows you can raise a few years down the road.

Some people would recommend culling a little on both ends. When I cull my older cows, I'm going to cull a little heavier there and in my replacements than I would normally.

But I'm not going to do it too much on either end to balance the short-term vs. the long-term effects.

- b. Can I wean earlier? By taking calves off cows earlier, their nutrient requirements go down and intake goes way down. When you normally wean, the cows and calves are eating a lot. If you take the calf off, then the cow doesn't eat as much, you can get by on lower quality, and you take away the forage demand from the calf itself. How early can you wean? How young can that calf be where you can wean it successfully?

Audience Member 9: Three months.

JM: Right. 90 days. Now, you're obviously not a dairy farmer because they wean almost at birth. Under normal beef cattle operations, about 90 days. You could take that calf off. Start thinking about that. What am I going to do with a bunch of three-month old calves? Do I have any place to put them? They're like goats, they're going to eat everything. Do you have fencing to keep them in an area? Do you have anything to feed them with? Or is there somebody else who might have that that I could partner with? Can I even get those calves? I'm already turned out on my summer range. There aren't enough cowboys in Park County to go up there and round them up. If I'm going to wean early, I've got to make this decision really early. Are the calves old enough? It depends on when you calve.

- c. Can I sell my calves and my cull cows earlier? Again, you reduce the forage demand. I've got one friend who believes in this so much that when he sets up his private contract with his calves, he has this built in that he wants the flexibility to be able to sell off and ship his calves a month earlier. In return, he's willing to accept a little difference in price. In the contract it says that if I have to – because of drought conditions – my delivery date is going to be moved up and if that happens the price will be this. Now, is every buyer going to be willing to do that? No. But there are some out there that are willing to do that. If we get into these more variable years, maybe more. If you can sell them off, whether that's calves or cull cows themselves, you definitely reduce demand.
2. Option number 2: my favorite. Males in the room, you can maybe relate. When conflict comes up, we just avoid it. If we run out of grass, how can we avoid it?
 - a. Graze somewhere else. Maybe I could lease some pasture. How do you find lease pasture in Park County even in a good year? It's kind of all tied up. It's not easy. But I'll give you one example in a drought. Our house butts up against a CRP field. A few years ago when drought hit, it looked like drought was coming. The landowner behind our house doesn't have any cows, but the landowner next door does. He's looking over there and saying, huh, there's a potential source of grass. So way before the Drought Monitor ever kicked in, he goes to that landowner and says, "if the Secretary of Agriculture allows for emergency grazing on CRP fields, I'm your guy. You will lease it to me." He says, "Yeah, okay." Sure enough, a few months later the Secretary of Agriculture kicks it in – emergency grazing on CRP ground. Guess what? He got that contract. Other people started calling the landowner saying, "I hear

that's available." No, it's not available that was tied up months ago. So somebody was forward-thinking.

- b. If you have tame pasture, this is a good time to count your blessings. If you have tame pasture, you can hit it harder. Those plants have been selected and bred to take grazing a little heavier. To save your native range, this is where I'm going to put my grazing pressure.
- c. Can I graze in the coming year, like in '18, where grazing was light during the drought? Well, you might say it was a drought and there was nowhere that was light. Maybe. What if the water dried up in that pasture? In larger pastures, you see this a lot. The water will dry up and so during the drought, the cows actually didn't graze that portion of the pasture like they do normally. Coming into the next year, there's an opportunity. Is there any way to get the cows over there to keep them there in '18? Well, I've got a 14-year-old son and maybe I can put him on a horse and he can herd. Or can I use some supplement? Or not?
- d. Anybody ever haul water? Yeah? Anybody like to haul water? [Laughter]. I did that for three years in Texas every single day and I never want to do it again, but there's another option. Sometimes getting cows to use a place they wouldn't normally use, you might convince me to abnormally haul some water.
- e. Can you adjust the timing of grazing? The places that were ungrazed or lightly grazed last year, or the places that got grazed after the drought hit, those would be the places where I would like to graze early this year. Can I do that? Well, maybe no I can't do that because of the poison situation. Or my neighbor's bulls are over there and that's why I don't normally put my cows over there. Well, okay. How good do you know your neighbor? Can you make adjustments? Is it just because there's a bad fence? Well, maybe in a few months I can put some effort into building that fence back up. But if you're looking at turning out the next day and the fence is lousy, that's not an option. Conversely, I'm looking for places to go late in the growing season this year. Can I go where places were hit hard before plant dormancy? Those places that did get grazed during dormancy, those are the ones that I want to try to use later. Can I make that work? Would it take a temporary electric fence? Would it take salt? Would it take riding? What would it take? Would it take hauling water?
- f. If you have some kind of rotational grazing system, especially if you have a rested field, this is when you use it. The book says it's okay to use those rest fields in times of drought. But can I adjust this to take advantage of it?
- g. A lot of people try to delay grazing until seed-set, but the research actually shows is that most of that benefit comes from delaying until soft-dough. So when the seed is starting to form, but it's not set or matured, if you can delay grazing until then, you get almost all the benefit. Depending on where we are elevation-wise, that might just be July 1st. It's a lot easier trying to figure out a way to delay until July 1st than it is to delay until July 20th.

In terms of forage production after drought, it actually comes back pretty quick. It depends a little bit on how those plants have been used in the past. If you get normal growing conditions and those plants were not stressed too bad, they come back right away with very little lingering effects. But, the standing forage is not going to come back that fast. It's going to take a little while. The standing dead is the difference. Let's look forward to 2018: if the grass grows well and we get good growth, that's great. But there will be less carryover grass from 2017. My question to you is: do your cows eat any standing dead from last year? If they do, then doesn't that make sense that even if I get a normal year and I've got less carryover grass and they normally eat some of that carryover grass, then if there's less of that, then my stocking rate in 2018 has to be less. Now, if your cows don't eat any standing dead, then you've got nothing to worry about.

How much of an issue is plant litter or mulch? Certainly, on a steep slope that mulch helps prevent soil erosion. It certainly has some benefits on flat ground too – it lets the moisture go into the ground instead of running off, cools the soil, insulates the soil in Winter, and keeps grasshoppers down. A lot of good things about mulch, right? Where does the mulch come from? Green grass grows. We take half of it and leave half of it for next year. Now it's standing dead. It goes through the Summer of '18. The next year, it's going to drop on the ground and it's going to be three or four years to get to that point. So the mulch takes three or four years from when it grew. If you don't have very much carryover grass going into the year, it's going to take longer before you get much mulch. So, if mulch is important to you, you've got to be thinking about a reduced stocking rate for more than just a year or some kind of abnormal management to adjust.

Some people might say that grazing in the green Fall period is potentially harder on the plant than grazing in the green Spring period because there is less chance for it to recover. How about recovery now? **Is grazing in '18 coming out of a drought going to hurt the plant?** Maybe if you do it in the Spring. Maybe in the Spring you've got to go a little lighter. If you can do it moderately later in the season, research says no effect. The challenge becomes can you graze moderately? What does moderate grazing look like in a normal year? Some of the plants, more than half, are used at about 70%, a few are used at about 30% and some are lightly touched. When you add all that up, it adds up to 50%. That's what moderate looks like. Does that make any sense? Unless you're in irrigated pasture or some intensive high-stocking system where you try to get that lawnmower effect, on a rangeland situation what I just described is what moderate looks like. So what does that tell you? If moderate grazing doesn't hurt them, in normal management a lot of those plants will be grazed heavily, over 70%. Somehow I've got to figure out a way to lighten that up or even it out more.

Some places are going to green up faster and better and the animals are going to be attracted to those spots. The chances of you keeping that use at moderate in a big field are low. So what all this means is that your abnormal management has to go for a little bit longer than just your first year after drought and the magnitude of your abnormality – how much you're going to adjust – depends on all these things we're talking about when you assess the drought impact for that particular pasture.

To finish up here, you have a sheet of paper that has a lot of numbers on it. There are a lot of efforts out there in trying to predict grass production. People have come a long way. I'm going to show you a cowboy way that's based on a lot of research. First thing is to

know is that in our part of the world, by July 1st you're going to have what you're going to have. 90% of what is going to grow is done by July 1st. What we're seeing now more and more is that maybe that's creeping back into June 20th. The point is, by the time you get to the end of June, you know what you got. So, if you're in a drought, you can look at the ground and say, ah ha! I don't have much grass; I am very smart. [Laughter]. By the time you get there, everybody knows that. When you try to make adjustments then, it might be difficult. Is there any way that I could maybe anticipate my situation a little earlier? The April/May/June precipitation is what really drives forage growth in our country. The precipitation later in the Summer or early in the Fall maybe greens it up and makes it look nice, but in terms of forage growth, what really matters is April/May/June. This is a technique I've used for many years. If you look at this chart – this is for Helena – you can go on the web and find a weather station near you that is closest to your conditions. Some day, we'll be doing this with Mesonet numbers. This comes from NOAA – the National Oceanic and Atmospheric Administration. You can look at the records and make a little chart like this for your place. This is thirty years. People tend to use thirty years because it takes into account a little bit of variation. Using the most recent thirty years is our best anticipation of what is to come. This is how much rain is received in April, May, and June in each of those years. The way you'd use this is on average the April/May/June precip. for Helena is 4.8 inches. We're not focused on what the annual is because what matters in forage growth is mainly April/May/June. Some people will say that the median is the best reflection of normal instead of the average. In Montana, the average and the median don't differ that much in April/May/June. We're just going to use the average.

So, if the April/May/June precip. is 4.8 normally, if we got 2.4 inches of rain in April/May/June, you would get half as much rain and expect to see half as much forage as normal. But the idea is can you know that sooner than the end of June? Look down here in April. The average for April in Helena is 0.98 inches. Let's say that you got 0.5 inches in April. Then, to get to normal, you need to get to 4.8. If you got a half inch in April, what do you need in May and June? 4.3. So now I'm going to look down my May/June column and I'm going to look how many times over the last thirty years did I get 4.3 or more inches of rain? 12 out of the last thirty years. What's 12 divided by 30? 0.4 or 40%. So, at the end of April, I know that there is a 40% chance that everything is going to be just fine. But, there's a 60% chance it won't be fine and we won't have normal precipitation. Let's say you go through May then. Let's say in May you're normally supposed to get 1.74 inches, let's say you got 1.5 inches. That's 2.0 inches combined April and May. I need to get 2.8 inches in June. How many times over the last thirty years did I get 2.8 inches or more in June? Seven. 7 divided by 30 is 0.23 or 23%. So, if I've got 2 inches by the end of May, 23% of the time everything will work out fine. 77% of the time, it won't. This is a workable tool.

Now, Lee mentioned some folks talk about a crop year. So rather than using April/May/June, they do the same thing with precip. from September through June. You can track your precip. for a longer period then. By averaging April/May/June with the crop year, you'll get an even better estimate. It's not perfect, but it can give you a way to make those management decisions.

The last thing I want to say is that it's a way to adjust your plans. You probably should have a Plan A, B, C, and D. A is this is what we're going to do if everything turns out normal. If the likelihood of hitting normal is 50% at the end of April or some cutoff, here

are the things I'm thinking about doing now. How bad does it have to be in May before you're going to do X, Y, and Z. You're trying to make decisions before July 1. For most people, you can talk about that stuff much more intelligently and dispassionately if you do it now. If you wait until April or May, a lot of those things aren't going to be feasible. Making those plans now makes sense to me.

Questions? Comments?

Clyde Park

Clyde Park Community Center
January 23rd, 2018
11:00am – 3:00pm

Introductions to Workshop, One Montana

Tracy Mosley: We're going to start out. We've got Zach Brown with One Montana here. We've also got Lee Schmelzer here with Stillwater County Extension. He's going to talk about the Mesonet and the weather program and how you guys maybe could use that. We've got Jeff Mosley from MSU here to talk about managing plant communities after drought and then we're going to have some discussion after that. So, I will go ahead and turn it over to Zach. We've got lunch coming at about 12:30 so in the middle of Jeff's presentation we'll take a quick break and get food and then finish after we get sat back down. At this point, I'll turn it over to Zach.

Zach Brown: Great. Thanks Tracy. My name is Zach Brown. Thank you all for coming out. I'm from over the hill in Bozeman. I work for a group called One Montana and I'll talk a little more about that in a minute, but first, just a couple of housekeeping things. We have done these workshops in the past and we really focus them on teeing up the conversation with some presentations from all the folks that Tracy just mentioned who are much smarter than me. But the best part of these will be when you all give your ideas, feedback, relate your experiences because you're the ones out on the ground dealing with these issues day-to-day. And part of capturing that is that we record these conversations just audio-wise. We use something called Chatham House rules, which is that if you say something, the idea is recorded but we'll never connect what you said with your name. I just like to put that out there at the beginning if anybody has any sort of issue with that, we certainly don't have to use them. It's just helpful for us in making really detailed notes that we can share afterwards. Is that alright? If it's not, like I say, it's easy to not do that....Ok, well with that I'll just talk briefly about One Montana and then we'll get going on drought stuff.

[One Montana presentation].

In the context of the experts we have here to present, we'll present some ideas, some tools, some thoughts, but really what we hope to come away with today is a good discussion led by you all. I hope you'll consider sharing your experiences, perspectives, what's worked, what hasn't worked, what worked well in 2017 or what resources came up short. And how can we all, I guess, do better if we experience similar years to 2017 in the future? So with that, thanks for having us, thanks Tracy. And now I'm going to pass it to Michael Downey from DNRC. He has a presentation about what this last drought year looked like.

2017 Drought Reflections

Tracy Mosley: Other questions? So at this point on the agenda, we're hoping that you guys could talk a little bit about your experiences with the drought this year. Whether it's weather-wise or how it affected your grass or cattle.... They're going to Two Dot tomorrow and Winnett the next day and I'm sure it'll be a little bit different there. The USDA Climate Center certainly hoped to be here, and they'll have the recording, but they're hoping to get some information from you guys about how they can better serve the ag community when a drought hits. So, if you have insights about how the drought – when it hit hard – this year affected you, that would be helpful. Besides that it hit hard and fast, right?

Audience: (Laughter).

Audience Member 1: I can back up and I can compare '87 and '88, and 2004, and in that time period I switched [? 29:36] sprinklers and changed perspective on a lot of things. But the last four years, I figure [? 29:45] it a month ahead on what are we doing. Normally, I don't care [? 29:49] for the alfalfa seeding in the ground for almost June 1st. Now, May 1st I'm fine [? 30:00]. It just works out that way. This year, I had good grass, I had way too much. It got pretty tinder dry and we got lucky with the rain. That was my biggest worry then, was come about August I've got six-foot tall grass and I'm a little worried. We got a lot of Fall moisture the year before; we got Fall moisture this year. I think we're going to have grass; I'm not worried about that. We got snow pack, so I'm not too worried about my Spring. Then it might dry out and I know that I am going to cull cows. Every year you have a set number of cows that [? 30:54-31:12]. I put them on pellets and those calves won't know the difference. It gets my numbers down that way. And I'm also getting 200-250 bucks a head by doing it in August. That's one way that saves me money. The thing I didn't do this year, which I've done in the past, and I should've done, is I put the [? 31:43] out because the protein's falling off that grass. I didn't do it this year. Consequently, everybody's cattle were off, maybe 20-50 pounds on the average, compared to last year. That's because hay-wise, it's the most [? 31:58] crop I ever put up under irrigation.

TM: Well, and you know you're going to cull cows every year, you've just adjusted when you're going to do it.

Audience Member 1: Well yeah, and we'd already been doing that anyways and we bumped it a little more.

TM: And then depending on the year, you may cull heavier....

Audience Member 1: Right.

Zach Brown: If other folks have thoughts about that or we could flag it for more discussion later...? But the guy from USDA was actually going to present on some topics related to flexible stocking strategies and culling and what you were describing.

Audience Member 1: Well, and this is just because I'm a range management nut anyway, is that I'm leasing pasture, and I don't need to lease pasture, but I'm doing it to put rest on some of these and arranging it so that we can't go to the same pasture every year in the same way. I'm sorry that they don't have poison in their plants so I have to go in the same way every year. So by leasing some grass, I can take some pressure off that other land. When they come up with a way to [? 33:26] larkspur then I can [? 33:27].

Audience: [Laughter].

Note: At this point, the drought reflections will be summarized. Each bullet point will represent a different audience member's comments.

1. Good grass. Very tall, which was worrisome come Fall with drought conditions and fire danger. "I don't know how we got by it, but we didn't have any lightning strikes." Lower calf weights.
2. Further east, by Sidney, folks didn't have grass green up as well in the Spring. And if you had grass this Fall, it snowed on it and it's now laying on the ground.
3. I've been testing hay for 8 years now. Had some of the weirdest hay tests this year. Had some toxins in the hay that I've never seen before. Even for hay under pivots, it was bizarre.
4. People were concerned about their grass being washy all through June because it was so wet. As soon as June ended, it got hot, and the hay went from washy to burnt-up.
5. "So, what you're saying is our productivity may have been up, but it wasn't to the levels we were anticipating."
6. Yeah, and it could've been affected by the drought, or past droughts?
7. That's why I always preach hay tests.
8. Anyone that produced hay without irrigation?
9. Yes, I had phenomenal hay. I had two-tons plus.
10. Yeah, 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.
11. I don't know if you guys would agree, but I think the biggest effect here was on calf weight gains.
12. We were in pretty good shape up in the higher country, but you could tell the cows were stressed. They weren't eating at a lot of the places they normally do. They stayed by the water more.
13. I noticed with a lot of our cattle, with the yearlings, they were just never content. There was grass all over, but it seemed like they were always looking for more.
14. Do you think that was heat-related?

15. I think so...? "It was almost like the grass was there, but there was nothing in it." They were filling up, but not getting anything from it. "It's like when I eat salad. I get full, but I'm not going to be happy about it." [Laughter].
16. We had the same thing, couldn't even keep up with salt and minerals.
17. Was there anyone whose salt consumption wasn't high? [No responses].
18. How about flies? Did they seem any worse this year?
19. Not as bad as the last couple of years.
20. So that's not why the cows were wandering around at all?
21. No, I don't think so.
22. Did anyone do testing of their grass? Or keep records of testing? Protein levels can vary greatly and it can be deceiving when it looks like such a strong crop.
23. There was a part of the agriculture section of the Montana Climate Assessment that looked at hay yields in irrigated vs. non-irrigated fields for the last 50 years. You'd expect those trend lines to be the same, potentially a little lower for non-irrigated, but they tend to be the same. What they actually found is that yields are actually going down for irrigated. Part of that has to do with timing of rain and temperatures. So, to get the same crop, you have to put more water on that hay field. That's because in those hotter temperatures, the plants are transpiring more water. Does that resonate with anyone?
24. I'd expect it to be the other way – that yields would be higher due to improvements in people's irrigation systems over the years. Our productivity has been up in the 20-30 years we've been doing it.
25. Dry land hay production might equal irrigated production if you have a really good year. That's because the dry land hay doesn't take up as many nutrients from the ground each year, especially if it's dry and production is down. In a good year, that hay is able to use those nutrients and produce as much as an irrigated field. I irrigate and fertilize, but if you get a really good year, there's nothing better than that dry land hay crop.
26. In my experience, over the years since the '80s, [? 44:50-44:55] evapotranspiration has been increasing. [Comparing older irrigation systems to newer ones? 45:10-45:50].
27. You just have to be cautious. I think you can still leach the good nutrients out of the soil with a pivot.
28. Does anyone here have a pivot that they can adjust outputs based on soil types?
29. We've tested our soil types – it's mostly heavy clay. NRCS has irrigation recommendations, but those are totally different from some of the folks I know down the road whose soil is basically just gravel.
30. Can I go back to one question about the cows seeming like they weren't getting enough nutrition? How much was that to do with grass vs. heat? Do you think night temperatures had anything to do with that? The reason I ask is because I was in Miles City a while ago, in Fort Keogh. They were saying night time temperatures were important for lowering cows' core temperatures. And I'm wondering if that played a part in what you guys were observing?

31. I was kind of shocked when it was getting into July and getting really hot during the day, but still getting down to the 40s and 50s overnight. That tapered off after July, but I don't remember night time temperatures being that ridiculous here.
32. So maybe more to do with grass and grass quality.
33. Flies didn't seem to be much of an issue and maybe that was because of those cool nights?
34. "The grass went from green to crunchy in about two weeks."
35. I had a different experience with the flies. I usually put fly tags on the cows and calves and I didn't notice them being bothered all summer. But later in the Fall, when it was still hot and dry, I started to notice more flies on those fly tags. We put our tags in in May.
36. So should they still be working by Fall?
37. No, not really. But in the past that's worked for me before.
38. Just for context, Zach, about a quarter of the folks here are from Paradise Valley.
39. We had a bunch of dust and it was later than normal. I'm assuming because it was hot and dry. And the cattle were constantly moving and I think that had a lot to do with it because they were just stirring it up. They were breathing heavy, and we were fortunate to have good, tall grass, but you couldn't go out and check on them for fear of starting a fire. "You can't ride a horse with shoes on. You'll hit a rock," cause a spark and start a fire. Same with riding the 4-Wheeler out there. So the cows were kind of free range in a couple places. We still check them, but not as much as I'd like to.

Giant Post-It Notes

- Seeding alfalfa earlier
 - May 1st instead of June 1st
- Culling cows more regularly
 - Timing/margins
- Hay testing – bizarre results
- Eastern Montana: too much grass early, led to fires.
- Dry land hay was great in Shields
 - Cut three weeks early
- Cows were angsty, didn't eat. Salt consumption was way up, grass nutrition was maybe low. Heat too.
- Flies weren't huge issue (cold nights in Spring?)
 - More flies in Fall?
- More dust – dry conditions plus angsty cows.

Breakout Sessions

Note: The breakout sessions will not be transcribed word for word. Each discussion will be summarized by the transcriber.

Zach Brown: The next section we're going to break out into small group discussions. Obviously, if you need to use the restroom or warm up your coffee, go ahead and do that. We're going to do three breakouts. We're going to push these two tables together here, two in the back and two in the back. At each of those tables, I'll make sure everyone has a big pad for writing notes. And then the questions are on the agenda, but we've been talking about these all day.

What management strategies worked this year, and which didn't? What strategies will some of you think of using moving forward? In 2017, what resources did some of you utilize to respond to drought conditions? Who or what was helpful? And who or what wasn't helpful? What specific resources were the most helpful? Do you all have any advice that you'd share with your neighbors or people in other communities? Like Tracy said, we're going to Two Dot and Winnett in the next two days and so think about somebody up over there and whether there's lessons that can be learned from the Shields Valley. And then, specifically, do you have any advice to the federalities – the USDA or any other programs that work with this drought information and deliver insurance resources? There's other questions as well, and if our presenters could spread out to different breakout discussions? That way, if somebody wants to dive in a little deeper on what Lee was talking about or what Jeff was talking about, we can do that.

Audience Member 1: I'd be interested in what some people learned in Winnett because a friend of mine there has 600 head of cows and I talked to him in July....Things were tough up there this year. Some of that feedback might be a little interesting.

Zach Brown: You bet. And we'll take good notes there and share back with Tracy and make sure we get that to you.

I just want to make sure that every small group has somebody taking good notes on the butcher paper. And somebody who's going to report back to the group. We'll spend 25-30 minutes in these small groups and then have the groups report back so we can have a discussion and share ideas. Tracy?

Tracy Mosley: Right. And I was bragging on you all about how I think this reporting back section is going to be really valuable. Because, I think, I'm not going to stereotype but we have some pretty experienced ranchers in the room and I'm really happy to see how many younger folks we have in the room too today. So, I think it'll be really valuable for those answers to be shared with the groups.

Breakout Session 1

Member 1: What management strategies have worked and what hasn't worked?

1. Culling early before turning out to grass.
 - a. Culling on both ends – older cows that can't perform well and younger cows that need larger amounts of forage.
2. Be proactive, not reactive. Plan for contingencies.

- a. 2017 drought vs. 2010-2011 flooding.
3. Examine hay supply – surplus vs. shortage from previous year. Inventory management.
 - a. “We try to calculate enough hay to start the first of November and quit feeding the tenth of June. And it doesn’t always happen and if it does, you don’t get rid of that extra hay! Grandpa always said, ‘hay in the stack is money in the bank.’”
4. Lease additional pasture.
5. Diversify. Don’t just raise cows. Don’t just raise grain.
 - a. “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.”
6. Soil type and environment can vary greatly on one ranch.
 - a. “That north pivot of mine – it’s all deep soil on the inside of the pivot and the outside of the pivot is lighter, sandy soil. So, you can over-irrigate where you can’t even hold it and under-irrigate the good soil. With that heat this summer, it was a trick.”
7. Records.
 - a. Tissue samples on pastures from time to time would understand why hay was out of whack this year and why salt consumption was so high.

Member 1: What resources did you utilize? What was helpful? What wasn’t helpful?

Member 2: The drought came so late, it just affected us in calf weights. It wasn’t something that we could react to.

Member 1: Or past years, what were some resources?

1. Supplements and additional feed.
2. Otherwise, not much else. The drought hit almost overnight.
3. Pasture rotation.
4. Water.
 - a. Piping in or hauling in water.
 - b. Develop existing water sources to increase storage.
 - c. “Putting in cisterns and piping changed our place. In drier years, it’s gold.”
5. Didn’t really use any governmental resources this year. Didn’t go to Extension for resources. Maybe next year.
6. Evaluating vulnerabilities of your ranch in terms of resources.

Member 3: I’m going to go back to this question. Was it not bad enough here for you guys to reach out to outside help? Do you know what outside help is available to you? Or is it just a pain in the ass to use the outside help?

Other Members: [Laughter].

Member 4: All of the above.

1. In 2017, not extreme enough to justify it. Here compared to the rest of the state wasn't so bad.

Giant Post-It Notes

Management Strategies

- Culling early – before grass turnout.
- Proactive instead of reactive.
- Inventory management and resource adjustment.
- Diversity
- Records

Resources

- Supplements
- Water
- No outside help with other organizations.
 - Not bad enough in 2017 to use?

Tips

- Analyze weak spots and vulnerability and address in non-drought years.
- Change practices.

Breakout Session 2

Member 1: So what were your management strategies?

1. Cross-fencing with progressive rotation.
2. Lick tubs.
 - a. Use lick tubs to disperse cows across the pastures.
 - b. Some folks don't do this anymore because it won't "pencil out with running yearlings."
 - c. Be careful, grizzly bears love lick tubs. Metal vs. biodegradable.
3. Annual forages.
 - a. Willowcreek winter wheat and Sanfoin in addition to alfalfa.
4. Wildlife management.
 - a. Fences to keep out elk and deer.
 - b. Electric fences – 9,000 volt, 6 foot tall fence.
 - c. Elk and deer come feed on pastures and hay in dry years.
 - d. Fish and Game was one of least helpful.
 - e. Speculation: neighbors could work together to fence off bordering land to keep wildlife out.
 - f. Steep topography makes fencing difficult.
5. Market cull cows early.

6. Pasture management.
 - a. Flexible grazing rotation dependent on climate conditions.
7. Aerial spray for poisonous plants.
 - a. Can be helpful for tree encroachment as well.
8. Run yearlings through the summer.
9. Adaptable management in preparation/response to climate conditions.

Member 2: What do you guys need? What resources? What would help you?

1. Extension agents.
2. Other nearby ranchers.
3. Watershed groups are somewhat useful.

Giant Post-It Notes

- Crossfenced with quick rotation.
- Lick tubs (need bear-proof)
- Annual forages.
- Willowcreek or Sanfoin.
- Wildlife management – elk fence.
- Market cull cows early.
- Taking cows to pasture where available.
- Aerial spray annually for poisonous plants.
- Abnormal management issues due to snow depth, etc.
- Fenced wildlife out, restored original grazing.

Resources

- Least helpful – Fish and Game.
- Information trusted: Extension, NRCS, neighbors, watershed groups.

Breakout Session 3

Mitch Lassa: I think it'd be helpful to start with some quick introductions. I don't know any of you just yet, but....

Members: [Laughter].

Mitch Lassa: My name's Mitch. I'm serving with the Big Sky Watershed Corps and they've stationed me with One Montana and MSU-Extension. So, I'm here to help assist with these programs – these workshops – to listen to you guys, and facilitate a little bit.

[Members make introductions].

Mitch Lassa: Great, well it's nice to meet everybody. Just looking at these questions here, if there are any particular areas that you guys were really interested in talking about more...?

1. 2017 was different for one member: Irrigated property that normally begins irrigation around April 15th. This year, it didn't get turned on until mid-May because of good precipitation. Alfalfa was dormant, grass grew well. First cutting yield was down because of lack of alfalfa growth. One of the best hay crops though. When the heat came later in the Summer, the alfalfa with its deep roots, took advantage of that and produced a decent second cutting. It's hard to say how we were affected until you get into August/September.
2. Drought was good and bad for the hay – needs heat and water. Without good heat and water, the grass will grow, but warm weather crops will not.
3. Owned ranch for four years, still learning.
 - a. Usually, 70% of production comes from first cutting. Second cutting produces less, but it's still valuable.
 - b. Different for another member: "We only can get one cutting, period. If we don't get it right off the get-go, we're done." Last year, started irrigating April 1st. People laughed, but it was a good thing we did because our water quit. Without much precipitation, we relied heavily on snow pack for water. Water mostly quit just before July. Sometimes we can get a second cutting, but then our recovery for that alfalfa is affected. Not enough nutrients for yearlings so they were moved into the hay fields earlier. Usually sell in the Fall.
4. Did anyone try intensive grazing?
 - a. Temporary electric fencing helped guide and rotate grazing. At the time, it increased grass by 25%. Worked well with yearlings.
 - i. Yearlings can be hard to keep contained. However, once they were trained, they wouldn't even cross an electric fence line lying on the ground. Used Gallagher electric fencing.
 - b. Rotating as much as possible through 8 different pastures – quick rotations.
 - i. Utilized herd of sheep to follow behind in the rotation and eat leafy spurge to try and eradicate it. Weeds are controlled, not really decreased, but not spreading. "I'm just leasing this piece of ground and I've been there 8 years, the sheep have probably been there for 15." The spurge infestation is bad near the Crazies. If there wasn't grazing, it would all be yellow with spurge. Owners of the property prefer not to use herbicides. The sheep program was in place and they receive compensation for keeping sheep on property.
5. Drought came on quick.
6. Weevils were terrible in 2017, at least during the first cut.

Mitch Lassa: Any advice to USDA or any sort of resources that might be helpful in the future?

1. USDA could be more flexible with resource distribution. Here, it wasn't so bad, but other parts of the state were bad. USDA could improve their understanding of local conditions and microclimate variations across the state.
2. Mesonet weather reporting could be helpful.

- a. Cost? \$4,700.

Mitch Lassa: Any other final thoughts?

1. You gotta be an optimist. Next year is going to be good. Goal to make enough hay to sustain herd and sell some too. "I might end up only selling one bale of hay, but I'm gonna sell that bale of hay." [Laughter].
 - a. That's another thing with predicting drought. Do you sell hay surplus or save it in case of drought the next year?

Giant Post-It Notes

2017

- Lots of rain by mid-May
 - Alfalfa was dormant at beginning
 - Good hay production, later in summer second cutting.
- Drought was good and bad for hay.
- Started irrigating April 1st in 2017 – good call because then drought came, water quit around July.
- Temporary electric fencing used to manage grazing, worked well with yearlings.
- Lots of rotation, helps to control weeds.
 - Sheep follow to help control spurge vs. spraying.
- Drought came on quick.
- Weevils were bad.

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- USDA could be flexible with resource distribution.
 - Microclimates create drastic differences.
 - Local differences.
 - Mesonet continued development could be helpful down the road.

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2018

- Gotta be an optimist.

Post-Breakout Session Discussions

1. Wildlife management.
 - a. Producers expressed a lot of concerns related to deer and elk coming to feed with the cows.
 - b. Hunting.
 - i. Disagreements and concerns about wildlife numbers, season setting, agency staff capacity, and general wildlife management strategies were discussed at length. As a consequence, rested fields, hay reserves, and other feed and drought security measures are often

under threat from wildlife damage. This adds additional layers of complication to a producer's drought response planning.

- c. Strategies that have worked: payed hazers, high-charge single strand electric fencing above regular fencing, stack yard funding to protect hay bales (funding programs are available to ranchers who allow public hunting).

Workshop Feedback, Closing

Zach Brown: Just five more minutes, mind if I ask each table to give this workshop feedback? What was good? What worked for you? And what didn't? So we know what to leave behind or bring with us when we go to Two Dot tomorrow and Winnett on Thursday.

Audience Member 1: Oh we appreciate you guys coming, definitely. I thought it was all good stuff. We had a good group of talkers and all. I appreciate all the information from you guys.

Audience Member 2: I would personally be interested to see how this year our area varied from theirs and what they did, you know, for future reference. It may or may not work in this area if it happens to us, but...you know, how they survived and managed.

Zach Brown: That was a point that was brought up earlier too and we can definitely coordinate on that.

Audience Member 3: I thought it was good stuff. [Rest of audio is hard to hear from this table].

Jeff Mosley: One of the things I'm really happy to see is all these future people, these young guys. [Rest of audio is hard to hear].

Tracy Mosley: Well I think we have a pretty comprehensive list of email addresses. If you guys are interested in this information and did not give me your email address, that would probably be the easiest way for me to share it. I appreciate you all for taking time out of your day to be here.

Audience Member 4: Thanks for organizing it, Tracy.

Zach Brown: And for whatever it's worth as a city slicker, I appreciate all the challenges that you guys are talking about. I appreciate all the food that you send our way and across the US. So, keep doing what you do and thank you for being here.

Two Dot

Two Dot Community Center
January 24th, 2018
11:00am – 3:00pm

2017 Drought Reflections

Note: The drought reflections will be summarized by the transcriber. Each bullet point will represent a different audience member's comments.

1. People that had stored water to use turned out ok. Anybody who was dry farming had a tough time.
2. I'm not a producer, I'm the Wheatland County Extension agent and my experience with the drought was that I was worrying about all of you.
3. I'm a producer. One of my habits is to check the high and low temperatures for the day when I check the weather. Last year, irrigation held out. Persistent heat did more damage.
4. Our family has been ranching here since the 1880's. Michael nailed it in that it's the timing of precipitation that is most important. People around here have done a good job of managing the water for irrigating.
5. I'll reiterate that it's the timing that's critical. We don't need a lot of rain, but we need it timely.
6. It's interesting to compare precipitation down near Carlin and in the desert country. They get more of their moisture in the Winter and in the Spring the whole desert turns green and blooms. And then the rains stop and everything dries up and turns into desert.

Zach Brown: My experience living in Bozeman is just to remind people who are new to town about the drought because Bozeman is growing so fast.

7. I think we were really lucky. You didn't have to get too far from us and things got pretty ugly. We've seen a slight reduction in calf weights, not radical. We came out of 2017 well. Water held well. 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. If it looks like it's not coming in that 60-day window, then take steps to get out in front of it. Don't wait until you're behind.
8. We've been around since the 1940's. We've only had two years that we weren't able to put up any hay and '17 was not a drought year for us. The times when we were only able to put up a couple hundred bales of hay, when normally we're able to put up a couple thousand or more, has been a combination of when the water came and the fact that it was too cold at night for the grass to really grow. It gave us a short season with stunted growth on both occasions, one in '12 and one in '15. "The drought of 2017 didn't exist for us."
9. Is yours irrigated?

10. No. Well, ditch irrigated. Last year, we put in a pivot to make sure we didn't have to buy hay again. And hopefully, this next year, we'll get a good crop.
11. We're a combination of stored water and stream. We're pretty lucky that way.
12. Our hay yield was pretty average for the year. Our dry land burnt up. We don't start until after July 1st, so our land was a little burnt up by the time we started, but not bad. We sell yearlings not calves, so our weights were actually pretty decent last year. We had tall hay, but there was nothing to it.
13. Fire danger was one of our worries. Hay got real tall, but it was so dry that it was kind of spooky trying to do anything in it.
14. Felt pretty lucky compared to a lot of people to the east of us. We start calving in May, so breeding season for us is August 10th on. What we noticed was a pretty big drop in breed up just from the sustained heat. Otherwise, sounds pretty similar to a lot of you guys.
15. Drop in feed quality as the rain turned off and the heat turned up. Unfortunately for us, that coincides with breed up. A lot of our sub-irrigated stuff that we try to breed on wasn't that green at all. But in terms of quantity, it was a pretty normal year. Just super dry.

Zach Brown: One of the things we heard yesterday from the folks in Shields Valley was to the feed quality point. A lot of folks said they were adding minerals earlier than they normally do and had to do that longer. And there was some discussion about cows just milling around not seeming like they were happy or getting enough nutrition. I don't know if any of that resonates?

16. It was a good year for the salt salesmen. [Laughter].
17. We keep pretty close track of our salt and mineral consumption and we saw no more fluctuation than what you'd expect to see. It's not *that* trackable, but I'd say we didn't see any dramatic increases in that.
18. We calve in April, which makes it a little better for us when it comes to breeding.
19. We lucked out. We had good feed out for our bulls and our breed up was good.

Zach Brown: Thank you all. Any other thoughts? Questions?

20. Just a little history on the stored water – my Dad used to tell about prior to 1939 when the river used to dry up nearly every Summer here.
21. Well, farther down, it dried up nearly every Summer anyway, [laughter], until about 10 years ago.
22. Well, what really helped that is when they put in the MRDP (Musselshell River Distribution Project), the distribution project.
23. I can remember as a kid every Summer the only thing left out here were just puddles.

Giant Post-It Notes

- Lucky compared to more eastern Montana with water storage – issues with grass.

- People with stored water had to use most of it.
 - Terrestrial hit hard.
- Historically, with storage (water) river dried up every summer.
- Check historical highs and lows – large yearly fluxes – interesting comparisons.
- Persistent heat brought difficulties.
- Timing is most important for rangelands – snow pack.
- Slight reductions in calf weight – irrigation not so bad – look at 60 day window – important to get ahead of it.
- Two years since haven't been able to put up hay.
 - Because combination of timing and temperature.
 - Even with 2017 not being a drought year. CBJ (?) ranch.
- Hay yield not bad – dry land burnt up especially after July 1st – fear of burning – fuel/heat.
- Drop in breed – up from sustained heat – lucky with later year precipitation but normal quantity, however super dry. Drop in feed quality.

Breakout Sessions

Zach Brown: For the next section, we're hoping to spend 30 – if not more – minutes breaking into two groups. We have some questions to tee up your conversations. Think of this as an opportunity to ask Jeff, Lee, and Michael more questions or build off any of the things you heard that were particularly interesting. What can you all in this community or this area of Montana share with other communities? In 2017, or in other dry years, what resources did you utilize to respond to drought conditions? Who or what was helpful? What wasn't helpful? Which specific resources were most helpful? Do you have any advice or lessons learned from this flash drought that Michael talked about that you would provide a neighboring community? We're going to be sending our notes back to Shields Valley and Paradise Valley and we're going to Winnett tomorrow. And particularly, even though our USDA friends couldn't make it because of the government shutdown, they asked for specific input as they do a lot of the FSA disaster response programs. As producers, do you have any advice to the USDA on improving drought-related programs or delivering services?

Note: The breakout sessions will not be transcribed word for word. Each discussion will be summarized by the transcriber.

Breakout Session 1

Member 1: What did you guys do last year?

1. Cut numbers. Facing back-to-back droughts up north. 2016 hit hard up on the foothills. Didn't cut first year, but did second. Income is down going forward.
2. We do contract grazing and rather than culling our own herd, we just brought on a reduced number of contracted cattle, which affects the bottom line because you're

making less. Maybe that's one tactic – contract grazing. Lower margins for grazing but also lower risk of having to cull or sell off cows with good genetics. However, problems can arise from telling your contract grazer that you can't take some of their cattle to graze.

Andrew Horvath: Any strategies that didn't work? Ideas you tried that didn't work on your property?

3. Depends on the situation. Annual forage has worked well. Thinking through strategies and their effects on pastures.

Jeff Mosley: Not thinking ahead got us into some trouble. In Fall of 2016, got lots of moisture. Able to feed longer. Hit pastures harder and longer than normal. Next Spring, in some places, the grass didn't grow well. When it was time to turn out, those folks didn't have grass. They grazed it all the Fall before. You don't know what next year is going to look like. Be prepared.

4. We manage our grass by having a drought reserve to take us through to the next growing season in case of drought. However, with a few years of good moisture in a row, we start to think maybe we can graze a few more cows. Then drought hits and you have no reserve and you need to cut numbers anyways. Even when you think you're planning ahead, you can undercut yourself bit by bit, without making one big, bad decision.
5. We share a ditch with our neighbor and we've worked out a system where we watch out for each other. It works well so that we always have water. Second, we're planting forage crops that are grazeable and thinking about long-term goals.
6. Long-term goals, not focused on short-term profit, better set up to adapt.

Jeff Mosley: Don't be too hard on yourselves or others. Unforeseen circumstances can occur that affect management decisions.

7. We'll always say, we leave the house with plan A and when the day is over, we're down to plan D.

Jeff Mosley: Yeah, and the people who can't do that don't ranch. [Laughter] What else have you guys done to adapt?

8. In 2016, we planted teff under a pivot as a forage crop.
9. Some people at MSU are working on a Winter barley.

Colin McClure: To redirect a little, do you have any specific lessons or guidance that helped you get through drought years? The goal of this is to use these teachings and extend them to other Montana communities and small towns. Or any resources you wish you had access to that would have made it easier going through drought years?

10. Any sort of early warning system would be helpful, so you can start thinking about what decisions you're going to make earlier, but it depends how early we're talking. I wanted to pose a question. How does everyone, if you do, quantify the amount of grass you have? It's something we think about. It's almost like having another bank account, we've got excel spreadsheets going and everything. Or maybe we think about it more than we ever should? Do you just know from years past? Do you keep records?
11. We figure it out based on where the elk haven't been. [Laughter].
12. What do you do?
13. Well, we have monitoring sites and we do grass assessments, which would just be ocular. For us, part of it may be that we don't have any set rotation. We have lots of little pastures, so there are lots of options. We always have to run through the options of what we're going to do, which may be a luxury, a blessing, or a curse. It does make it more complicated.
14. We used to use rotation and it worked in the old days but with increase in elk, those rotations don't work well. If the pasture has been grazed down pretty far, they'll move through. But if the grass is long, they'll camp on it and graze it down to nothing.
15. We have a handful of elk, lots more deer. But they don't do the same damage.

Jeff Mosley: Multiple drought plans have been helpful to some and making those plans six months out. It enables you to do that thinking without being in crisis mode.

16. Shifts in cattle shipping.
17. Stocking flexibility.

Jeff Mosley: I'm not a climatologist, but it seems like Spring is coming three weeks earlier than it did forty years ago. And Winter comes about three weeks later than it did. It's had effects on calving with people trying to calve later – to time it with the green. It seems like the green is moving back. Now I know people who are starting to move their calving back too. The other thing is that hay fields used to be dormant around October 1st. Now, I don't really want to graze it then because it's still green and if I do, it's going to hurt those fields. I'm curious how others are adapting to that? I don't really have a good answer for that.

18. Water rights enforcement on the Musselshell has helped everyone. The river stays flowing. Positive development over the years.

Jeff Mosley: Water has always been valuable. With drought happening more often, it's even more valuable. "What you guys have done is thought about the big problem. How do you take care of that water?" Rather than focusing on changing rotations, you know, little things, "you guys have tackled the big problem first, which is pretty impressive." Maybe you guys should work on the elk problem next. [Laughter]

Giant Post-It Notes

Management Strategies – Worked or Not?

- Cut numbers and replacements – hard on this year.
- Reduced numbers.
- Contract grazing.

To think about:

- Be careful – annual forage has worked well with nitrates – with warm + millet has persic acid.
- Think about certain consequences on others, veg. and cover crops.
- Be prepared for what may come the following years.
 - Even with good moisture one year...
- Long-term goal with grazing, not only short-term profit.
- Being able to adapt.
 - Planted left under a divet.
- Quantifying grass? How to...
 - Monitoring plots.
 - Plant assessment – visual.
 - Difficult with elk – so almost better off to graze lower.
- Multiple drought plans throughout the year. Plans A-D – to adapt as the year progresses and can adjust for variability as needed.
- When to ship stock depending on weather, drought, etc. – stocking flexibility to not sell off genetics with more value.
- How are we adapting to shift in veg. timeline?
 - Regional – Musselshell – water rights enforcement.
 - Helps keep water flowing including storage. Regional planning and coordination is important.
 - Big picture – watershed.

Breakout Session 2

1. Complexities of elk and other wildlife management.

Mitch Lassa: I just want to get the ball rolling here about different management strategies that have worked and what hasn't worked for you guys this year and in other particularly tough drought years?

2. In dry years, can dump yearlings.
3. Flexible stocking – sell yearling heifers and fatten up steers more. Or sell yearlings and calves all at once.
4. “It’s just to say, flexible. In this day and age, people that stay written in stone, that’s what they’re going to end up being – a stone.”
5. Right. Last year’s steers heavier than ever. Worked out well for us, even with markets down. That’s obviously more grass vs. pounds and money. One of those things to think about early on.

6. Cross-fencing is useful for drought management. Aside from having to maintain them, you basically can't have too many fences. You can rotate cattle through faster. You can move them through quickly in the springtime when the grass is really growing just to hit each area lightly. Move them through again once grass is dormant. Therefore, intense pasture damage is avoided.
7. When we get to the point when we need to cull, we try to do a performance-based cull. Try to get rid of late-calvers. Try to get rid of the cows that produce the bottom 15% of your calf crop so that when you come out of the drought, your cows are more efficient. Have data gathered from good years, put some cows on "probation."
8. For us, one of the big things is being flexible with our grazing program. Never do the same thing year-in year-out. That gives us a lot of flexibility in terms of our pasture management. I haven't been there for a really bad drought, but that's our best tool.
9. Develop more water sources.

Michael Downey: Just consider the idea of alternatives for water supply given where things could potentially go. They're talking about dryer summers where we're probably going to get more of our precipitation in the wintertime. Maybe if you've got some very reliable springs, developing some alternative water sources like that in case of drought so you can still continue with your operation. If you wait until the springs go dry, it's too late.

10. We try to have more than one source of water in every area. It takes a long time to get as much water as you want established in every area.
11. If your water is sub-par, you can always throw a cross fence in. Temporary electric fencing is great. You can fence all you want, but you can't lose the water. That's the expensive part.

Mitch Lassa: Did you have any resources that you utilized when responding to these drought conditions? Things that were helpful or unhelpful?

12. We usually do our own thing. [Laughter]
13. We bought a 1,500 gallon water tank. Useful to have available just to have but also in case of fire. We had to use that tank for a few years before we had as many water sources as developed as we do. In 2007, there were two weeks of over 100 degree temperatures and we needed the tank because we hauled a lot of water. We also found different types of tanks so that we had on-site storage. Some are 4,000-5,000 gallons, repurposed tankers. We keep the tanks full until it freezes, just in case. A lot of the wells and springs have low flow rates, making it difficult to water everything at once without that storage. We are fortunate in that we have electricity, which allows us to pump water into these storage tanks.
14. Solar-powered pumps are up-and-coming.

Zach Brown: What about resources? Who do you get information from? Watching the weather? Doing your own research? Conservation districts?

15. We just pretty much watch our own – our little Costco weather station does a pretty good job. But, we live in an area where you could be completely dry and you’re only 7 or 8 miles from us.
16. “Our useable rainfall comes in such a little window that you really don’t have to be a scientist to figure out that you’re in trouble. If April’s dry and May is looking bad, you better start having a plan.”
17. All of those data products and things you guys have been talking about are nice and handy, but when you go to gather information from those, you typically have to go to four or five places to find everything. “It can be kind of a project to get all of that data synthesized. It would be nice if there was one place that had all of that data collection.”
18. And something that they could make it apply to you in a hurry.
19. I’m sure budget-constraints are a big part of this, but it’s not super user-friendly. Especially, the SNOTEL data can be pretty tough to decipher.

Michael Downey: But they can be really deceiving. I find that looking at a lot of that data is not straightforward. You’re absolutely right. It’s neither in one place nor is it easy to understand. I think that’s one of the things we’re working on with the Climate Office. I think it has gotten better just in the last four or five years. It’s still got a ways to go.

Mitch Lassa: That is a good point and I think it’s important to talk about those improvements that could be made and suggestions that you all might have for groups like the USDA or others that might help you out. Or things that you all would like to see as producers?

20. “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? It’s 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.

Michael Downey: Well, this year it came on pretty early.

21. It did. It came quicker this year than in a lot of years. So, it’s getting better.

Zach Brown: Why do you think that was, Michael?

Michael Downey: I think a lot of it is because of the Drought Monitor and the tools that are being used from the Drought Monitor. I think that technology has improved a lot. It used to be that USDA was tied to the Palmer Drought Severity Index, which was really developed for the Midwest. And of course, the Midwest is really different. When you get 30 inches of precipitation a year and you’re down 10%, it’s not a big deal. When you get 12 inches of precipitation and you’re down 10% or 15%, it’s a big deal. I think part of that is what’s helped.

22. What are your thoughts on these extra monitoring stations?

Michael Downey: I think we need them. The limiting factor on the Mesonet stations is the development of products that are helpful for you folks. Right now, you can download that data, but then what do you do with it? It's also going to take a few years to get a range of normal. In the weather data, we've got some long-term data. When it comes to soil moisture, not so much. With soil moisture, part of that is so dependent on soil type. It's complicated and it's going to take some time. But I think the main thing is, as a state, if you look at places like Oklahoma that have invested in this kind of technology and they're way ahead of the game, I think that's where Montana is now. We need to invest in the technology and the products that will give people the data that they need. Right now, having people go to those stations, download that data, and do the analysis for themselves, I just don't think that's realistic.

23. With the variety of landscapes here, you can't possibly compare the information from one station to the other. So when you put it all together, you have to have that many more categories, don't you?

Michael Downey: I think that as we develop some history, what you'll be able to do is correlate what's happening on your high flat with what's going on the bottom ground.

24. You'd have to have a station in both places.

Michael Downey: It's hard to do.

25. Well and knowing your soil types is one thing, but just a couple miles apart can make a huge difference.

Zach Brown: This year, the Mesonet will have as many, if not more, stations than in Oklahoma. But to your point, it's just different because they have more simple topography. And Montana, as you know better than I do, is just all over the place.

Michael Downey: In addition to the data, we need products. And that's what we don't have yet. That's really our next big hurdle.

26. I would think all that data would have to be downloaded and analyzed somewhere else. You'd have to go to a website to get the analysis.

Michael Downey: Well, hopefully it'll all take place in the same spot. That's the hope.

Zach Brown: What would some of you share with Winnett or Clyde Park? What do you think you do here at your operation or at the community level that might be helpful?

27. That's tough to say because everything changes so much. What works well for one of us is sometimes not applicable to someone else.

28. I agree.
29. Especially where things change so quickly here. Growing up, my family rented a lot of ranches and you could move fifty miles down the road and the management plan used on one place has absolutely no bearing on the place you're on now.
30. "There's one thing that's sure: it's gonna change."
31. Flexibility.
32. Plan ahead.
33. "Have a drought plan – good, bad, or indifferent – just have one. See how it works; change it for the next one."
34. Never overstock.
35. We've seen a lot of ranches go broke trying that. It's always the beginning of the end.
36. "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 are good for that, I think. To share ideas. And I think we probably need to do it more often than we do. I mean, it's like everything is a big secret. [Laughter]. Just ask your neighbor, he'll tell you what you need to do. You look at it through different eyes.

Michael Downey: Bill Milton's got this range working group. One of the things they've spent a lot of time discussing was the confidentiality of their data. So you're absolutely right that sometimes things are more secretive than they need to be.

37. I don't think it needs to be so secretive either. But see, I'm an outsider. [Laughter]. I've only been here 25 years. [Laughter]. I asked one of our good friends when do I get to become a Montanan? I really don't think she expected the question, but I'm still an outsider. [Laughter].
38. When we get another set of new neighbors, then you'll be a Montanan.
39. Right. [Laughter]
40. I think part of that is why it's easy for the environmentalists and the hunting groups to run over us. It calls an independent breed to the business. Our independence is why it's easy for everyone to run us over. It's so hard for us to agree and compile our data. The only reason they defeated that big airforce base in Colorado is that everybody came together, gathered their information, and did their own environmental impact studies. I can't imagine that any place I've lived. I tip my hat to the guy that got it going because I've never lived anywhere that you can get 100 ranchers in the same room and have them agree to have an environmental impact study. That's why it's easy to whip us because one-on-one, we can't do that stuff.
41. Fire management too compared to drought management. We had a fire in the Crazyes, but it was a relatively small fire compared to others, but it sure did get everybody's attention. "That's one thing we do pull together on is fire in these communities."
42. Where I grew up, in the sand hills of Nebraska, drought is normal. You're used to it. You just deal with it. People don't go around talking about drought. It's just something that happens and it happens quite often.
43. But that ground is so fragile that every rancher has a grazing plan. If you stub your toe one year, you can fix it. But if you stub it two years in a row, then it's a lifetime to

fix it. We're just more used to having a plan like that in place just because the country demands it.

Mitch Lassa: I'm sure you guys are already thinking about the year ahead and what 2018 might bring. Any final thoughts there?

44. We're ready for Winter to be over. [Laughter]
45. And it's only January.
46. The way it works, especially with our irrigating water, is to look up at the mountains and see what the snow drifts look like. With lots of snow up there, it's like having a big reservoir. When it comes time to irrigate, you have water. If we don't have a good Winter, then we usually have a dry Summer.
47. Of course one of the hardest things to find today is an irrigator – somebody to spread the water when you've got it.
48. That's probably why you're seeing more pivots.

Giant Post-It Notes

Strategies

- Dry year, dump yearlings.
- Flexibility
- Cross-fencing
 - Rapid rotation.
 - Quick and light grazing.
- Performance-based culls.
- Alternatives with water management/development.
 - Multiple water sources.
- Fill in coulees, trap water.
- Extra water tanks.
 - On-site storage eliminates need to haul water in.

Resources

- Local weather stations.

Improvements

- Multiple data sources make it cumbersome to search for weather info. Not centralized. Not locally applicable.
- Quicker drought declarations.

Advice

- Tough to give good advice because of drastic differences.
- Be able to adapt, be flexible, make plans.
- Meetings like this are helpful to bring people together.

Post-Breakout Session Discussions

Zach Brown: Any questions? Thoughts that came out of that? Jeff...Michael...Lee...? Anybody else?

Jeff Mosley: I'll throw out one I posed to our group. I don't have a good response to this so I'm looking for help. Like I said, it seems like Spring is coming about three weeks earlier and Winter is coming about three weeks later. One of the problems I've run into and I'm trying to help people with is when you come back to graze in the Fall, it used to be that the fields were dormant. Now, when you come back, it seems like you've still got a month of green. Grazing at that time, especially on alfalfa, is really hard on it. So, what do you do for that month or three weeks because dormancy is coming later? The only thing I've seen people do for that is just to have some tame pasture that you can go on specifically for that, more crested wheat, more Russian wild rice or something like that. I'm curious if anyone has figured out a way to handle that or has run into that problem. A lot of people are having to come out of the forests earlier because they've reached their grazing limit and with drought coming earlier, they've got nothing to come back to, except onto the hay ground and sometimes before it even gets cut. That's something I don't really have a good answer for.

Audience Member: There are some choices as to what you can plant. You can get away from alfalfa a little more, at least on part of your ground. We wrote a Forest Service permit in Wyoming. People that owned cattle dealt with that fairly regularly. Some of those guys went away from an alfalfa base hay crop to something that allowed them to graze. They said it was easier for them to bring in hay than it was to find someplace to graze. So they planted their hay ground more with an idea that at a certain point of time in the summer, as a group, they made a decision that you know what, we're short of feed on the mountain or water is starting to peter out, we're not going to hay 30% of our hay ground for Fall pasture. It was cheaper to go out and bring in alfalfa, bring in their Winter feed. With the cows sucking the calves, they hadn't found a good option. Obviously, you can't truck them. The freight's too high. The calves are too big. You put them on hay, that's not a viable option. They decided to take quite a bit of their hay ground out of alfalfa production and go to more of an orchard[? 42:02] grass base or grass-type base. Which, given the flexibility, they could still get a good tonnage hay crop out of it, but they had that option to leave the [? 42:12] and get cows in as needed.

Michael Downey: I think that one of the things we're seeing is that with that extended growing season, is that a lot of times when we get that moisture in September and October, in terms of a water balance and a water budget, it's not going as far and we're not seeing it pick up in the Spring where we might have in the past because our growing season is that much longer. Your soil moisture is going to get depleted a lot more quickly than what you might've seen in the past. It's kind of a double whammy.

Audience Member 2: One thing I noticed this year was that first snowfall went directly into the ground. I dug a bunch of postholes and it went all the way to the bottom. Normally, it's just concrete digging those holes. That might make a difference this Spring.

Zach Brown: Well, it's about 3 o'clock. If anyone has any final feedback or thoughts, my contact information is up on the screen, I'd love to hear what worked, what didn't work, assuming we'll be doing these into the future.

Audience Member 3: Thank you.

Zach Brown: Thank you. [Applause] I'd just like to thank Jeff, Lee, and Michael for all the travel and all of you for showing up.

Winnett

Winnett Methodist Church
January 25th, 2018
11:00am – 3:00pm

2017 Drought Reflections

Note: The drought reflections will be summarized by the transcriber. Each bullet point will represent a different audience member's comments.

Zach Brown: I'll introduce these three Big Sky Watershed Corps members for the next section. This is the part where we're hoping to get some feedback and perspectives on the ground on what this drought year was like for you all.

Mitch Lassa: While we're getting the notepads out, my name is Mitch and I am a part of the Big Sky Watershed Corps program. I work with Zach at One Montana and then also with Extension in Bozeman. What we're going to talk about, and we're really going to listen more than talk, is your experiences with the drought this year, some of the struggles or triumphs or things that went well or what was tough. I'll let these guys introduce themselves.

Andrew Horvath: Andrew Horvath. I probably met some of you guys the other day at the ACES meeting, but I'm working with Laura with the Musselshell Watershed Coalition and Rachel Frost with Missouri River Conservation District Council and also Petroleum County Conservation District. I'm relatively new to Montana. Before coming here, I lived in Bozeman for a year. Before that, I was in Austin, Texas. So, somewhat of a city slicker, but I did work with friends on ranches outside of Austin in the hill country....I'm here to hear what you guys have to say and how you've been resilient.

Colin McClure: My name is Colin McClure. I'm from Walla Walla, Washington. I've been out here for about seven or eight years now, in Bozeman, mostly. If someone wants to start us off?

1. We got some good Fall moisture and then into the Spring. It seemed like we got pretty good growth and that kind of carried us through May 1st.
2. Musselshell precipitation maps were pretty accurate. The upper end did pretty well. They were dry in 2016. And then they did well in the Fall and Spring. Diane measured daily precipitation and did a good job of that. She saw that we got precip on April 26th and then nothing again until July 26th. And then really not anything after that either.
3. My experience with the drought was that I fought fire from July 3rd to the first week of September. After that, there has been a strong interest in projects on private land relating to drought resilience.

4. Range management specialist. The drought made it tough because we couldn't do any of our normal inventorying. We didn't really want to be out there because of the threat of fire. Interested in helping people find more reliable water sources or working with people on grazing rotations so maybe they can rest a pasture and have something that they can go back onto in the event that there isn't much growth.
5. I'm a ranch specialist with the NRCS. My experience was just in being out and about and seeing different ranches and different management for grass resiliency during drought.
6. I work out of NRCS office. We're still working through fire projects from this year like the Lodgepole Complex fire.
7. Rancher. We didn't have that bad of a year. We were lucky and had no fires on us. It was because of the good moisture we had the previous Fall. Last Spring, if you were digging up fence posts or whatever, there was moisture in the ground. The early grasses did grow. We do a rest-rotation and it worked well. We irrigated early. Our hay crop was okay, not great, but okay. There just was no Spring or Summer moisture. We planted about 50 acres of a warm season cover crop in late May and it never saw any precipitation. There was maybe 15% germination. This year, we don't have the kind of soil moisture we had last Spring. If we don't get some moisture this Spring, it's going to be a different year for us.
8. Rancher for forty years. It was a tough year. "We can stand one drought, but it's the second year that kills us." Most of the time we have some grass left. You'll get by the first year of the drought. What happens this coming year is what will really affect us. If we don't get moisture, we're going to be in bad shape, I think. "The drought comes and it goes and you just have to accept it." In the '80s, the droughts, you had to accept it until you were tired of accepting it. But it finally broke and we had some great years in the '90s. I don't know what's going to happen in the next few years. It's challenging, but it's interesting. My grandparents raised me on the ranch. And I went from a teacher and a coach for fifteen years back to the ranch. When I was in school, in the wintertime, I wasn't on the ranch. So when I came back, I didn't know much about the ranch in the Winter. I didn't know an awful lot about the ranch when it came to calving time. But I sure learned in a hurry. So I survived for forty years.
9. I'm out of the NRCS office. My experience was learning the limitations of our positions in a drought. It's frustrating for ranchers to have to work with us and it's a really slow process. But it's frustrating for us because we can't get the process moving any faster.
10. I'm with Musselshell County. I'm a gardener and bee keeper. It was a drought year because there wasn't a flower for my bees anywhere. I had to constantly feed them and it was a chore because in previous years, they would quit feeding by mid-June because there was enough for them to forage on. The deer came by and ate things from my orchard I didn't even know deer ate because they were hungry too.
11. We have a ranch. We got hit hard. March and April the rainfall wasn't what it should have been. Temperatures were already peaking in the 80's. By April, we knew we had problems. "Our crested wheat and our alfalfa were coming up really well. By May, it was burning up." So, by June 5th we had 850 acres of hay gone. It had literally

burned up. The biggest thing we noticed was the wind and the heat just evaporated whatever we got. We were getting rain in tenths instead of half inch or inch. No matter how much you get, it just wasn't there. It was all evaporating. My son had a water project and he was digging six feet down. I looked at it several times and it was dry. Like everybody else here, we're worried what it's going to look like this year.

Zach Brown: Any other thoughts?

12. Another thing to add to what Michael was talking about is those Spring rains. We're measuring the snowpack. Last Spring, the snowpack was great, but it's not really a big deal unless the rains come. How do we change how we look at things? If we look at snowpack and realize that that plays into it, but the Spring moisture is the bigger deal.

Michael Downey: I think how we're looking at it is changing. We're supposed to send reports to the governor for drought and flooding on April 15th. We actually haven't made that day for a few years and part of that has been intentionally because April 15th, we don't know. Back in the '90s, when this statute was made, it made sense because we had a good idea from the snowpack. Now, our first frost-free days are three weeks earlier in the Spring and it's going three weeks later into the Fall. And things have changed. This year, we'll put out a water supply outlook report on April 15th and then we'll probably do a drought outlook on June 15th. It's a function of us recognizing that the landscape has changed a little bit and we need to adjust how we look at things. "Last year was a real wake-up call for everybody because things developed so quickly." Some of those metrics in the past are just really deceiving. I think it's just a function of us just getting better at how we look at that data.

Zach Brown: Thank you for that discussion.

Giant Post-It Notes

- Early moisture – pretty good growth.
- Musselshell precip. maps pretty accurate.
 - Good Fall and Spring.
 - Nothing between April and May in terms of precip.
- One drought okay – drought next year would be the most detrimental.
- Fire from July-Dec.
 - Strong interest in working with landowners for resilience – how to keep growing/green.
- Difficult to go out to inventory – fire – work on more reliable inventory.
- Emergency conservation work in Jordan.
 - Rotational grazing to help with resilience during drought.
- Lodgepole Complex fire and working with emergency.

- Previous Fall moisture helped with early grass.
 - But no Spring-Summer early moisture 2017 – unable to grow later in the year.
- Learn to accept and work with it – adapt.

Breakout Sessions

Note: The breakout sessions will not be transcribed word for word. Each discussion will be summarized by the transcriber.

Breakout Session 1

1. We talked about weaning early.
2. I rotated through my pastures quicker, until I ran out of water.
3. You both work for NRCS, what are some things you saw?
4. Things like that – culling and weaning earlier.
5. Sweet clover was a blessing, it helped buffer the effects of the drought.
6. Did anyone have to haul water?
7. We should have, but no, we didn't.
8. Not because of the drought, but just because of water system issues.
9. In the context of fire, how did all the national, state, and county programs work? It's all related to drought.
10. The Emergency Conservation Program got released. There is money available for improving water systems, drilling wells, things like that.
11. The only downfall was that by the time approval was given to the applicants, and money was allocated to those counties, those guys had already had to figure out something else. When they knew, they needed it now. By the time the money was available, they had already had to come up with another solution.
12. We bought hay with assistance money, probably FSA money.
13. According to the Drought Monitor and things like that?
14. Yeah. But we had insurance. How did we pay for our hay?
15. From what I was told, it had to do with the drought declarations, ex: D3, D4. I don't think it had to do with insurance.
16. Maybe with the forage loss program?
17. It was a good program. It didn't pay for all of my hay, but it certainly helped.

Zach Brown: Do you feel like those drought declarations came out earlier than in the past?

18. It did.
19. Do you think part of that was because of the Lodgepole fires, and people were responding to it better?
20. I think a lot of it was because of the spotlight that was on here because of the fires. In Musselshell County, it wasn't quite as bad, but it took two-three weeks longer for us.

21. Some clarity on how that stuff is actually calculated would be useful, because we had a lot of guys – not that we have anything to do with the Drought Monitor – but since it’s a USDA deal, we had a lot of guys that would come in and say “how is that calculated? How are they figuring that?”

Zach Brown: Even in Wheatland yesterday, they felt there was a quicker turn around on getting that designation turned into support services.

22. In the past, there have even been times where they promised and it didn’t come through. This is the best year I’ve seen.

Colin McClure: Have you experienced instances where, say, someone is in D3 drought and you’re in D2 but it is just as bad for you as them, what resources do you have to update them on what the drought designation should be?

23. Even within the county, there are certainly areas that get more moisture than others. So, where they put that drought declaration is key.

24. I think that Musselshell County didn’t have a NOAA reporting station until this Summer. For Musselshell County, that surprised me. It seems like a big chunk is missing. The Drought Monitor is the one that sets up those stations.

25. Our FSA people take moisture readings and high and low temperatures on a daily basis and I thought that was part of a NOAA deal.

26. So maybe there was nothing in the northern part.

Zach Brown: I wonder if you guys would have any insight on this: a lot of the aid services are coming from FSA eventually, but what role does the state and the governor’s committee have in advocating for people in that context? The point Michael made about reporting things on the Drought Impact Reporter website, is that a way for people to advocate for those drought designations and to speed things up? Is DNRC or the governor’s office that entity that is providing that advocacy role?

27. It seems like it to me. That’s a good role for the drought committee. Otherwise, what are they doing? They hear everyone say it’s dry, but they’re not doing anything to help with that.

Zach Brown: Well, at some point the governor declares emergency, right? Disaster designations that trigger certain things? I don’t know all the details of that. I know that started to happen in June this year.

28. I struggle with that. With the state drought plan being delayed and the situation this Summer, “I struggle with that connection of how the state drought plan affects producers.” So I’m open to anyone explaining it to me. If they’re going to go through the work to make a drought plan, than we should understand how we can use it.

29. Right, if they have a wonderful plan but we don’t know how to use it ourselves...?

Zach Brown: Has the storage on the Lower Musselshell helped in some of those respects? Like Deadman's storage.

30. I think this year they let out a little bit more. Last I looked at the report we get through NRCS, it was at about 58% capacity. We talked earlier about how the streamflows this year didn't really reflect what was going on on the ground. There were guys this year who were getting fourth cuttings this year who were never getting fourth cuttings. Granted, first harvest was in May, which is pretty unusual and they had water all the way through. It's going to be interesting this year, I know we're above snowpack now, but unless we get that recharge, I can see where irrigation is going to take a hit this year too.
31. We had irrigation water, but the crops didn't do as well. We had the same number of cuttings as before.
32. We had a late freeze here too.
33. We also had water in the creek a lot longer than we thought we would. I don't know where it was coming from, but it kept coming.
34. Do ranchers have any advice/lessons learned from the 2017 flash drought that they would provide a neighboring ranching community?
35. Get your wells and pipelines done now.
36. How did the ability to graze on the Breaks all go through? I didn't get to hear.
37. On the CMR, there were 8 or 9 producers who used that. It's rough and the cows aren't used to it. So I think it was met with varying success.
38. There were complications to it – not in a business-sense, but just in trying to keep cows in the area. You can usually just get a bunch of guys to gather them.
39. We talked about experimenting with some electric fencing, but it was so dry this year it didn't work out so well.
40. The cows just wouldn't stay where we wanted them.
41. I know it was mentioned, but the second year is always the big year, I think. My advice would be to rest some of the pastures a little to leave some hay out there so that it can regrow.
42. I don't want to get political, but the stories about wilderness study areas and how they contribute to fires are wide-ranging. But the ability to graze better in wilderness study areas could reduce the amount of material that is available to burn.
43. I was over in Oregon and there are a lot of guys who graze on BLM land. Their biggest complaint was that every 5-7 years, a big fire comes through there and they get burnt out of their leases and it's because they're only allowed to take so much. What they're doing is just building that fuel load for when the next fire comes through. Those limitations are kind of silly.
44. That is a tough question though: where is the point where you stop grazing?
45. Advice to the USDA on improving drought-related programs? It just seems like the county designation thing doesn't really work because it's just so different within the county.
46. I agree, especially when you've got a pretty good-sized county. The variation from the north to the south or the east to the west is huge. From the Drought Monitor

maps, if part of the county falls within the drought designation, the whole county gets it. Sometimes, most of the county is doing just fine and the assistance is not needed as severely as other counties who may not be getting represented. Like you said, I don't know what the answer is. My comment is that there was quicker turn-around with these types of programs. With the ECP, we had a well driller who was ready to go and drill some wells, but it wasn't until about a month and a half later that we finally got the go-ahead. And they informed us that they had already had to figure a solution out.

47. It seems like we talk a lot about government programs related to drought. What are your guys' thoughts on the role that producers play in knowing that drought is coming and being prepared? Some folks tend to forget the bad years when they have several good years. What do you think about having several contingency plans set up early in case of drought?
48. Knowing when you need to start implementing things.
49. That's the thing about ranching and farming is it's always a gamble. Not only is it important to track precipitation, but as they said in the talk, it has to do with soil moisture too.

Zach Brown: There was some talk yesterday in Two Dot about strategies for culling in dry or not-dry years. What do you guys think about that? One of the guys in Shields Valley said that he's culling every year. That has just become one of his strategies for how he manages for drought. In Two Dot yesterday, there was a guy who said he starts culling by performance instead of age. What are your thoughts on culling strategy?

50. I think it comes down to the same thing – that you don't know what's going to happen next. Most of us are culling cows every year.
51. I would've culled more this year, but I was on the wrong side of the corral.
[Laughter].
52. You bring up a very good point. There are things that we can do. It would be good to not be as reliant on the system's programs. But at the same time, they are there for good reason.
53. Monitoring things early and being mindful of triggers, I think people do that.
54. I think it's still all a gamble. People don't really have a set date at which they assess conditions and then proceed with some action.
55. I think those long-term predictions are so much less reliable than they were, maybe. The last couple years have not even been close to what they think is going to happen.
56. With climate change or whatever, it's really throwing off the graphs they normally use to make predictions. Things are changing on them.
57. Many of us are prepared to go through a dry year. But after that, the second year is what is tough.
58. Water development is a big drought resilient strategy.

Giant Post-It Notes

- Storage on lower Musselshell help?
 - Deadman's at 58% of capacity.
 - Some producers getting 4th cuttings.
 - Irrigation concerns this year...
 - Late freeze, hurt first cutting.
 - H₂O in creek despite [?]
- Grazing in CMR (Breaks) had complications, trouble keeping cows in area and pulling out of Breaks. One time use.
- 2nd year – biggest year after consecutive drought.
 - Need moisture, feed until May/June before turning out.
- Wilderness areas could reduce fuels for fires, something to consider.
- Reduce fuels – using grazing..?
- County designations difficult to work with.
- Quicker turn around with government programs and assistance.
 - On-the-ground needs vs. government requirements.
- Preparing for drought.
 - Preparedness vs. government assistance.
 - Contingency plans?
 - Know when to start planning.
 - Triggers.
 - Always a gamble.
 - Precip., soil moisture used as starting point.
 - Informed management decisions.
 - Gambling with weather.
- Culling strategies?
 - Cull according to age.
 - Don't know what'll happen next.
 - Cull more heading into the drought.
 - Try to be more self-reliant.
 - Monitor things early.
- Rest rotations in drought for one year.
 - Run out of soil moisture.
 - What do we do?
- Risk vs. reward with management strategies.
- Culled harder, not huge impact.
- Different placements, dependent upon next year.
- Weaned early.
- Faster rotations through pastures than normal.
- Sweet corn buffered effects – blessing.

Fire

- Emergency conservation program – addressed fire and water concerns.
- By the time money was allotted it was too late to make a difference, had to find other solutions.
- Purchased hay with assistance money (FSA).

- Forage loss program utilized.
- Lodgepole fire/other fires motivated support program response time.
- Mesonet could help with FSA support programs potentially.
- State drought plan – delayed response, how does that work?

Breakout Session 2

Mitch Lassa: Again, the purpose of these breakout discussions is that we want to learn from you as producers and people who have direct experience with the drought last year. We're really excited to hear some of the things that have worked for you or haven't worked and how those compare to folks in Clyde Park or Two Dot as well. To get the ball rolling, let's focus on this first question here: what management strategies have worked or haven't worked this last year with the drought individually or as a community.

1. We had hay leftover from last year. We always keep at least one year's worth of hay.
2. From an NRCS standpoint, what about changing season of use? Do you, as a producer, see benefits of changing season of use?
3. We've done a rest-rotation for a long time and now we're just talking about changing to a deferred rotation. Rather than having a pasture to rest, we'll graze all of it but for shorter periods of time. The fact that we've been doing that, I feel our range is in better shape than it was when I was younger. Because of that, when a drought comes, the range is in better condition. The first year of the drought seems to go by fairly easily because you've got pastures that are in good condition. Water development has been very critical over the years. That makes grazing more uniform if you have better water distribution.
4. What about condition of your cows? Do you think they look better due to higher protein content in your grass?
5. I think so, but when we have extended droughts you can see the condition of your cows deteriorate.
6. What did you notice on the stocking side?
7. For us, we were understocked last Spring, not intentionally. That probably helped. I tend to always be an optimist more than I should be this Fall. So we're starting this year closer to being full stocked. Some of this information – if I can find it for this area – may help me make a decision this Spring by the end of May or something.
8. That data is out there. We all know that there's only so much to Winter moisture. But where should you be ground moisture-wise by the end of February? Where should you theoretically be before it starts drying out? If you're used to having six inches of soil moisture, but you're only up to three, you're 50% less before even getting to the rain season. Flexible stocking rates is something they wanted to mention, but I think flexible is the wrong term. It needs to be more along the lines of "how can I decrease my stocking rate and still survive?" In reality, you're rarely expanding your stocking rate, unless you get more land. Your stocking rate is your stocking rate. Flexibility says you could maybe have more, but you can't.

9. With the cow-calf operation, it's harder to be flexible than with a yearling operation. It's pretty easy to market yearlings two months early or something like that.
10. Something they said at that Lodgepole Complex meeting was that in Winnett country, you need to have cows born on the land. You can't bring them in. They just don't travel as well out here. Bringing new cows in is not something that happens often here.
11. We also have a lack of available feed lots if you were to need to send your cows somewhere else to graze.
12. That's always a difficult deal because if I'm selling cows, probably my neighbors are too. So the market is going to be depressed.
13. The other thing is that the markets are going to play so much. This year was hot and windy and it didn't rain when it was supposed to, similar to 2012. And then 2013 was a normal year. After a year like this when you are in a hay deficit, you need to make that up somehow. You can't do that with perennials. You have to do that with an annual.
14. Even if you're putting in hay, you're taking away from your stocking rate.
15. I like the cover crop idea. We tried it out last year and it didn't work real well because we planted it and then never got any rain on it. But I still think we can do some smaller patches that could make a difference with yearling heifers.
16. Or do a perennial/annual mix. Graze it like you would, but it's got high protein plants.
17. That's another thing we'd like to do is earlier grazing. Especially in these bad years, if there is any way we can delay going out there and give that grass more time.
18. It's not overwintering because of this environment. The wildlife are going to take it before it makes it through the Winter. I think if you had a warmer season and let it go it would be okay.
19. The BLM put in 380 acres in one of our pastures and it didn't even germinate last year.
20. I saw more fields that hadn't germinated – alfalfa grass and cover crop – this year. That's expensive seed.
21. That's the problem with any of our mixes is they are pricy.
22. I think there was maybe a 15% germination. What sprouted looked good. If we'd have gotten an inch of rain and had more growth, it would've been better. But I'm enthused to try that again.

Mitch Lassa: So one thing I'm gathering and I'm trying to relate these to the questions we have, is that it's important to understand the resources we have available. I'm curious if in times of drought, you guys reach out to any people in particular for support or different types of data you access to help you make predictions?

23. We look at those automated weather stations, but that tells us what we already know. I think down the road some of the soil moisture tools could be more beneficial than if it's raining or not.
24. I think for an area that's so diversified, networking amongst producers and landowners is going to be a whole lot more beneficial. That's what happened in our

area. We knew early. I started questioning the Drought Monitor early. I started contacting people because I knew that the Drought Monitor didn't respond to Musselshell County as quickly as it should have. I do CoCoRaHS and I was watching ours and the county to the north of us. We were closer to the north county than we were to Roundup. There was nothing I could do about it. The banker knew it, Federal Crop knew it, FSA knew it. But we have no network, no numbers or data to back that up because my data wasn't recognized. They said I love your information but I can't move on it.

25. Why can't your data be counted? That's the disconnect I cannot figure out.

Mitch Lassa: That's interesting because we got some very similar feedback from Clyde Park and Two Dot that having these meetings and talking and hearing about experiences that everyone has been having is potentially more beneficial than another data network that adds to this technology influx that maybe isn't as personal or helpful.

26. I think it's also a disconnect with the process. I was getting a lot of angry phone calls about why I hadn't brought us into D3, as an Extension agent. I can talk until I'm blue in the face but nobody listens to me.

27. That's my question. Who in every county *is* responsible? I took that question to Mike and he said that some counties have drought committees. That's what he recommended.

28. With FSA, I'm a part of the emergency COC – not a drought committee but like an advisory board that we would have a monthly meeting and sit down. They would ask "is it dry?" and I would say "yes!" and they would say "well, the numbers don't say it's dry." It seems like what I say doesn't really matter. We can't beat the average numbers. That's the problem. We can't beat the Drought Monitor numbers.

29. That seems like a way more accurate depiction of each county. There's always this issue with government. It's the people who know. What is so hard about making that connection?

30. What Michael was talking about earlier – the governor can institute a drought and emergency but it doesn't mean that FSA has to enact it. They are dependent on two different structures.

31. We already have boards in our county and you can hardly get anyone to serve on them and it's always til-death-do-you-part when you get somebody on there. Do you think there would be a purpose for having a drought committee in your county?

32. What would they do? What would they be expected of them? What *could* they do?

33. They could be a recognized advisory board that just basically runs down to an opinion. If that committee brings that to the governor, that's all it is. Once again, I think the Mesonet could be good because it's got those hard numbers that I can shove in somebody's face and say "it's dry!" A committee is only as good as their work.

34. But we have a dozen CoCoRaHS stations and you'd be amazed at the diversity between them. Someone has to answer to it.

35. Drought is a disaster and it's an emergency. Maybe the DES coordinator could be a part of that. I was trying to think of a solution for the disconnect between the people

on the ground and the actual numbers. I just don't know if a group would be helpful or not.

36. They could be, but it would depend upon if other agencies wanted to recognize them as a credible source.
37. FSA will always rely on the Drought Monitor. We could never supercede that. FSA does not make those drought declarations. Someone in Nebraska calls Montana and says, "yes, you're in a drought."
38. It's almost like somehow the state has got to designate someone in the county to be responsible to facilitate those conversations between the people on the ground and the governor, FSA, or Drought Monitor folks. It's not just for farm and ranch programs, but this could affect fire departments and others. There's got to be that connection somewhere. Do the other counties you've talked to have committees?

Mitch Lassa: You know, I'm not sure exactly. We can definitely share with you everything that was said in Two Dot and Clyde Park to increase that collaboration and see if there are similar concerns there.

39. I think that drought should be considered more of an emergency and a disaster, especially if it's going to keep compounding. If the trend is going to be that way where we aren't getting our Spring rain, then we're going to have a long-term problem in this state. It also ties to fire. After the Lodgepole fire, I'm not sure who organized all the hay coming through.
40. It was just local folks.
41. We have a volunteer thing, but if we have an extended drought, that's what DES does as their logistics – getting those resources into your community and connecting those volunteer groups to make it happen. Hopefully, that is not what we have happening – that it is not a long-term trend. But I don't want to have to feed sugar water every year to my bees. [Laughter].
42. In Garfield County, we had ECP(?) water emergency and fire projects. I think we declared drought pretty early, but our funding was secured for those drought projects. But with ECP fire, with the hurricane that hit and fires in California, I had producers call and ask if we were doing anything about the fires here and we can only do so much.

Giant Post-It Notes

- Keep one year's worth (surplus) of hay.
- Change from rest rotation to deferred rotation.
 - Range is in better shape with rest rotation.
 - Compared to what it was years before.
- Being understocked somewhat helped with drought.
 - 10% under.
- Using historical precip. data (locally) may help.
 - Also on a 12-month basis instead of 3-month.

- Asking how I can decrease stocking rate while still surviving – adaptability?
- In a bad year – make up deficit with ag. crop which might affect stocking rate.
 - Perennial/annual mix with high protein and good grazing.
- Try and delay early grazing – maybe cool season crop.

Resources

- Down the road Mesonet – soil moisture stations could be useful.
 - For such a diverse area – networking with producers and landowners is extremely beneficial.
 - Regional cooperation to discuss what they are experiencing and talking about ways to assist.
 - Citizen science stations to see what was/is going on.
 - However CoCoRaHS did not use data from people on the ground.
 - Maybe have county drought committee advisory?
 - Need to make connection between government and people on the ground to relay information and make things happen.
 - Send formal reports and talk about what’s going on. Talk once a week compared to once a month.
 - DES should be involved since it is an emergency.
 - Ties to fire.
-
- Try to plan with/equip to prepare for drought/fire.

[END]