

STRATEGIC DROUGHT MANAGEMENT SCENARIO PLANNING

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Introduction

Those who have spent any time at all in Arizona are no strangers to drought. In wetter parts of the world, drought is an anomaly, a deviation from normal or average. Here in the southwestern US, it is a way of life. It gets hot here. There are more years with below than above average precipitation. Even so, many of us tend to manage for the “average year.” Also common knowledge in this part of the world is that when and where rain falls is at least as important, if not more important, than how much falls. In Arizona, “average” is not only difficult to describe, it may not actually happen very often. So, why plan for average? I’ve heard it said that *“the best time to plan for the next drought is while it is still raining.”* I also think the best time to plan for the next rain is while things are dry. Why not prepare to survive the hard times and, to take advantage of the good times?

Who are the most prepared people you know? Military units, law enforcement, first responders? These people don’t plan for averages. They plan for contingency: worst case, best case, and everything in between as if life depended on it. Often it does. Professional athletes and coaches prepare for competition as if their livelihood depends on it. Often, it does. What can we in animal agriculture and natural resource management learn from their example? A quarterback may call a play based on down and distance, field position, and time remaining in the half or the game. He may change that play at the line of scrimmage when he sees how the defense is set, the personnel in the game at that moment, or because he noticed a cornerback limping. He may also call a time out to re-set the situation if necessary. These split-second decisions may appear to be completely reactionary in real time. What we don’t see during the game are the years of experience and hours of training. Our quarterback has assembled a great deal of knowledge from a variety of sources that indicate what plays are likely to work in each situation. He has studied film, listened to coaches and other players. He has practiced. This preparation gives him the ability to adapt in the “heat of the moment,” to survive a blitz or maybe to throw a 40 yard touchdown pass.

Of course in addition to preparation, the quarterback also has to have some talent and ability to be successful. A little luck comes in handy as well. The same is true for ranching. Some of us are naturally good at it, some of us are not. But all of us can get better at whatever we are doing if we put in the effort. As far as luck goes, I like the old saying that *“chance favors the prepared.”* Which brings us right back to where we started. In case you are wondering what all of this has to do with drought, the purpose of this article is to discuss a scenario-based drought planning framework to inform adaptive management. We will start with large scale publicly available information to set the “down and distance,” bring in regional or local information to determine “time and field position” and then use our own experience and observations

to “analyze the defense” and run the play.

Time/Stress Wedge

Let’s start our preparation with a concept known as the Time/Stress Wedge (Figure 1). This is just a college professor word for the fact that you have more time right now to plan for a future event than you do at any other time. The flip side is that planning ahead is generally less stressful than waiting till the last minute. That is not to say the act of

planning isn’t stressful, it can be. That is one reason some of us don’t do it. But the example I use to illustrate this is: it is much easier to make a rational decision to cull ol’ Bessie if she comes up open again this year when we are doing our book-keeping at the kitchen table a few weeks before shipping, than it is at chute-side when the vet yells “open,” the cowboys are waiting to push another cow in, and you are looking ol’ Bessie in the eye. If the decision is that she is going to *“die on this place good, bad, or ugly”* that’s fine, but it is best to know that before she comes down the alley. Bottom line is that planning ahead under relatively calm conditions gives us the ability to make better informed “spur of the moment” decisions.

Developing Scenarios for Adaptive Management

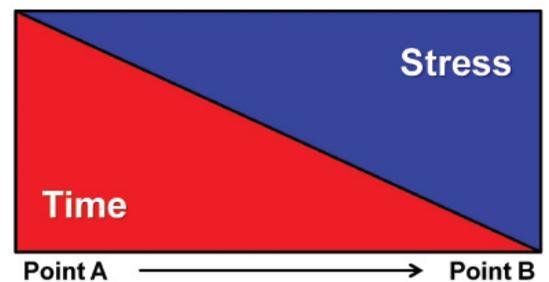
So if we have more time now to plan for the next drought or the next rain than we will next week, and if we are going to sit down at the table with a cup of coffee and our family or management team to make a plan when things are nice and calm, where do we start? First, let’s decide on if we are looking at a best case to worst case situation, or maybe just a suite of different alternatives. Either way, we will want to define those scenarios so that we can consider which management decisions are best under the conditions of each.

National Scale Public Information

A good place to start is with the big picture. National-scale publicly available information such as the US Drought Monitor (<http://droughtmonitor.unl.edu>), the Palmer Drought Index (<http://www.ncdc.noaa.gov/oa/climate/research/>)



Figure 1. Time/Stress Wedge



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prelim/drought/palmer.html), or the Standard Precipitation Index (http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/spi.html) are not only good for helping one see overall drought conditions, but their drought categories are useful in defining our basic scenarios (i.e. extremely moist to extreme drought). See Table 1 for an example.

Regional/Local Scale Public Information

Next we can either click on the maps from the US Drought Monitor to get detailed regional and state level information (Figure 2) or, go to more regional or local sources such as the University of Arizona's Climate Assessment for the Southwest (CLIMAS; http://www.climas.arizona.edu), or county flood control districts (i.e. Yavapai; http://weather.ycflood.com, Maricopa; http://www.fcd.maricopa.gov). These sites will help to quantify the conditions in our own backyard as well as provide some spatial and historical context. For instance, from the Arizona map and table (Figure 2) we can see numerically how much of the state is in what level of drought and how this compares to last week or last year. We can retrieve information from the flood control websites for weather stations close to our location and build our own comparisons. All of this information can be plugged into our table and will lead us to the next types of information for our scenario. The CLIMAS site also contains projections of temperature and precipitation along with some interpretations of the data from which the projections were derived.

Monitoring Data

Speaking of data, range monitoring data will also be applied in evaluating scenarios and developing management alternatives. Although monitoring per se is not the focus of this article, it is still important. Ecological trend, ground cover, and plant composition will help us know how we are doing in the longer-term, while characteristics such as utilization and standing crop will help inform short-term decision making. Any monitoring data is only useful if you use it, if we just collect it to comply with the terms of our permit it won't be worth as much.

Local Experience and Knowledge

Now to be honest, no matter how much national, regional, or state level data we retrieve and analyze, probably the most important information in our planning/decision making process is going to come from our own rain gauge, creek, dirt tank, soil, grass, and animals. Not that the other information isn't important, but we know that Arizona weather can be awfully erratic. It might be cold this week and hot the next. Rain might fall on one side of the ranch and not the other. Even when it falls it doesn't always have the same effect. I think the quote from E.J. Dyksterhuis back in 1951 says it best, *"The man who has a short pasture needs a rain much worse than his neighbor who has ample forage on the range; but when rain comes, it does the least good for the fellow who needs it most."* The large scale information helps set the stage, provide overall context, and lets us know if there might be pasture, feed or better markets elsewhere. The local information will ultimately determine what decisions need to be made and why.

Table 1. Example National Public Information Drought Indicator Sources.

Scenario	Palmer Drought Severity Index
"Best"	Extremely Moist
	Very Moist
	Moderately Moist
"Average"	Mid Range
	Moderate Drought
	Severe Drought
"Worst"	Extreme Drought

Monitoring data would be one example of local information, but that is not the only type of site specific information that can be recorded and used in planning. One of my favorite Ace Reid Cowpoke™ cartoons has a couple of ol' boys going down the road in a pickup when one of them says, *"It is going to be a good spring, the grass is already beer can high."* The grass is beer can high...what does that mean? What does it mean that Highline Tank is half full, the wheatgrass has already turned blue, or the cows are still bullin'? In each case it depends, but the point is that these statements mean something to the person who said them. Each is an example of the kind of on-the-ground knowledge and experience that come with living and working on a ranch and for our discussion, the type of knowledge that can be used in conjunction with scientific information to determine and evaluate drought scenarios and help make decisions. Recording this information also serves another purpose.

Management Alternatives

After all the information is assembled, scenarios are described, and we are on our second pot of coffee, it is time to actually propose what management decisions we would likely make in each scenario. Notice I said "likely." We've all heard that *"no plan survives contact with the enemy"* or

Figure 2.

