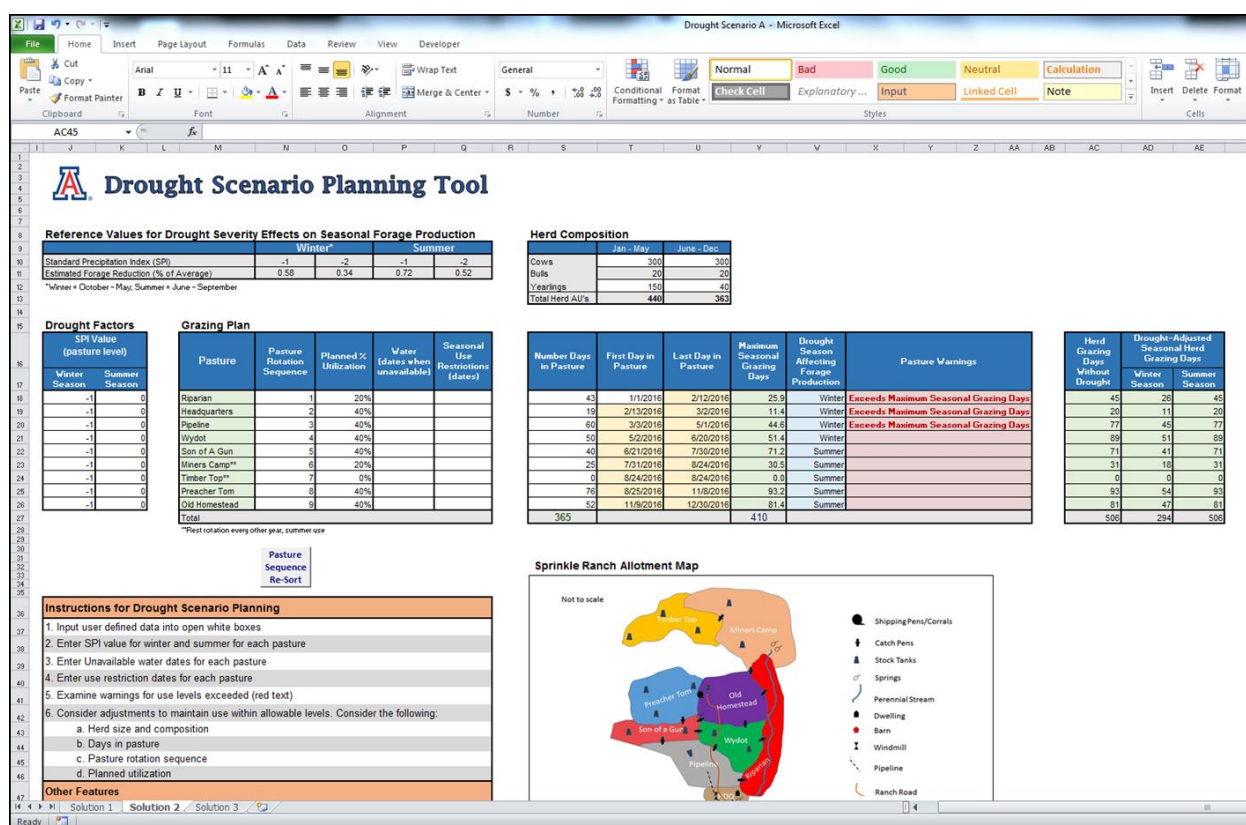


Guide to Using the Drought Scenario Planning Tool

Created at the University of Arizona by
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Downloading a Copy of the Tool:

A copy of the Drought Scenario Planning Tool can be downloaded from the following website:

<http://cals.arizona.edu/droughtandgrazing>

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I. Purpose of the Tool:

The Drought Scenario Planning Tool (hereafter referred to as “Tool”) was developed for use in the second of a series of three workshops organized by a team of researchers from the University of Arizona for a project funded by the National Oceanic and Atmospheric Administration (NOAA) titled *Using a Co-Development Process to Improve, Integrate, and Encourage the Use of Drought Information and Adaptive Management for Livestock Grazing on National Forests*. Range managers, District Rangers, and ranchers from the Tonto National Forest in Arizona (USFS Region 3, Southwest) were invited to participate in the co-development activities in these workshops.

The Tool was designed to facilitate interaction between ranchers and Forest Service managers (hereafter referred to as “Users”) in regards to drought planning and response for livestock grazing on national forest rangelands. The Tool uses a scenario planning approach to stimulate dialogue between Users to: 1) assess potential drought threats; 2) co-develop potential short-term livestock management actions for responding to the drought; 3) discuss any policy restrictions of those management actions; and 4) consider future actions needed for long-term drought planning and preparation. The Tool allows ranchers and Forest Service managers to work through drought scenario exercises together with the goal of improving understanding of drought information and drought related policy, increasing trust, and encouraging co-development of creative and adaptive solutions to real drought threats in the Southwest.

WARNING: It is important to note that the Tool was not intended to be used for making real-time management decisions because it lacks the dynamic capacity to fully represent complicated ecological principles, many of which have been oversimplified for the purposes of the Tool and its use in the workshop.

II. General description:

The Tool is computer-based and is interactive. It allows the Users to simulate possible drought conditions and policy-based use-restrictions on a hypothetical Sprinkle Ranch Allotment and to subsequently adjust management decisions in order to respond to the drought and reduce vulnerability.

The Tool also gives the Users the opportunity to consider integration of other management actions that may require Forest Service line officer approval, such as developing temporary or permanent range improvements or changing the utilization level in a particular pasture. The Tool particularly encourages Users to begin conversations about planning and preparing grazing allotments for future drought.

The Tool is also used in conjunction with a paper worksheet on which the Users can record their solutions, the objective of that solution, any Forest Service administrative approvals that would be needed to implement the solution, and any other issues that may arise.

III. Key Background Concepts

A. *Microsoft Office Excel® File*

The Tool is formatted in a Microsoft Office Excel® file, where information is stored in individual cells in a spreadsheet (Figure 1). The cells contain information that is either independent or dependent on other cells by use of coded formulas that automatically calculate adjustable values. In the Tool, cells with a background that is not white contain information that is either static or automatically updated and not intended for the Users to edit; cells with a white background (no color) contain information that is meant to be altered by the Users and includes variables related to either seasonal drought conditions or livestock management decisions.

WARNING: Most of the colored cells have formulas imbedded in them which calculate a particular value based on other information in the Tool. If Users accidentally type something directly into one of these cells, it will delete the formula and impair the functionality of the Tool. This can be easily corrected by simply clicking the “undo” arrow at the top left of the screen. It is possible to view the formulas in cells by clicking on the cell and looking at the contents of the formula bar (“fx”) towards the top of the screen.

Users may need to enable “macros” in their Excel® program in order for certain features of the Tool to be functional. Users should consult the Excel® Help feature to learn how to enable macros in their version of the program.

B. *Standardized Precipitation Index (SPI)*

The Tool uses the Standardized Precipitation Index (SPI) to represent drought conditions on the Sprinkle Ranch because the U.S. Forest Service Region 3 policy uses SPI as a trigger: “In the Southwestern Region, anytime the SPI reaches a value of minus 1.00 or less for the preceeding 12 month period, grazing allotments should be evaluated for existing drought conditions” (USFS 2015).

SPI is an indicator that can be calculated for a variety of time periods and for any spatial scale, including the pasture scale if pastures are equipped with rain gauges (Quiring 2009). An SPI value of zero (0) indicates average precipitation received, and values of -1 and -2 represent increasing level of drought severity, respectively.

The Tool uses SPI information specific to the Tonto National Forest. For the Tonto, an SPI value less than or equal to -1 has occurred about 16% of the time in the historic record (~ 1 in 6 years); whereas a value of less than or equal to -2 has occurred about 2.3 times in the historic record (~ 1 in 43 years).

An analysis of SPI values for the entire Tonto National Forest was used to determine seasonal reductions in average precipitation for both the winter (Oct-May) and summer (June-Sept) seasons. These values were used to represent drought conditions on the Sprinkle Ranch.

IV. Image of the Tool with Labeled Components (Figure 1)

A. Hidden Columns (A-H) Background Data

B. Reference Table: SPI relation to forage production

	Winter*	Summer
Standard Precipitation Index (SPI)	-1	-2
Estimated Forage Reduction (% Average)	0.58	0.34

*Winter = October - May, Summer = June - September

C. Drought Factors (SPI values)

SPI Value (pasture level)	Winter Season	Summer Season
-1	0	0
-1	0	0
-1	0	0
-1	0	0
-1	0	0
-1	0	0
-1	0	0
-1	0	0
-1	0	0
-1	0	0

D. Herd Composition

	Jan - May	June - Dec
Cows	200	200
Bulls	20	20
Yearlings	150	40
Total Herd AU's	440	360

E. Grazing Plan (part 2)

- Number of Days in Pasture
- First Day in Pasture
- Last Day in Pasture
- Maximum Seasonal Grazing Days
- Drought Season Affecting Forage Production
- Pasture Warnings

Number Days in Pasture	First Day in Pasture	Last Day in Pasture	Maximum Seasonal Grazing Days	Drought Season Affecting Forage Production	Pasture Warnings
43	1/1/2016	2/12/2016	25.9	Winter	Exceeds Maximum Seasonal Grazing Days
19	2/13/2016	3/2/2016	11.4	Winter	Exceeds Maximum Seasonal Grazing Days
60	3/3/2016	5/1/2016	44.8	Winter	Exceeds Maximum Seasonal Grazing Days
50	5/2/2016	6/20/2016	51.4	Winter	
40	6/21/2016	7/30/2016	71.2	Summer	
25	7/31/2016	8/24/2016	30.5	Summer	
0	8/24/2016	8/24/2016	0.0	Summer	
76	8/25/2016	11/6/2016	93.2	Summer	
52	11/9/2016	12/30/2016	81.4	Summer	
365			410		

F. Drought Adjusted Seasonal Herd Grazing Days

Herd Grazing Days Without Drought	Winter Season	Summer Season
45	26	45
20	11	20
77	45	77
89	51	89
71	41	71
31	18	31
0	0	0
93	54	93
81	47	81
506	294	506

G. Sprinkle Ranch Allotment Map

H. Grazing Plan (part 1)

- Water availability and seasonal use restrictions
- Planned % Utilization
- Pasture name and Rotation Sequence

I. Pasture Sequence Re-Sort button

J. Save Different Solutions

K. Instructions for Using Tool

1. Input user defined data into open white boxes
2. Enter SPI value for winter and summer for each pasture
3. Enter Unavailable water dates for each pasture
4. Enter use restriction dates for each pasture
5. Examine warnings for use levels exceeded (red text)
6. Consider adjustments to maintain use within allowable levels. Consider the following:
 - a. Herd size and composition
 - b. Days in pasture
 - c. Pasture rotation sequence
 - d. Planned utilization

Other Features

Solution 1 | Solution 2 | Solution 3

V. Components of the Drought Scenario Planning Tool

Reference Values for Drought Severity Effects on Seasonal Forage Production

	Winter*		Summer	
Standard Precipitation Index (SPI)	-1	-2	-1	-2
Estimated Forage Reduction (% of Average)	0.58	0.34	0.72	0.52

*Winter = October - May; Summer = June - September

- A. Reference Table: See Figure 1, Box B. This table displays the relationship between SPI values (-1 and -2) for winter and summer droughts and the amount of forage production. In other words, the table shows how different drought severities (defined by SPI -1 and -2) affect average forage production in the winter season (October – May) and the summer season (June – September) on the Tonto National Forest. The model assumes an oversimplified 1:1 relationship between precipitation and forage production. Thus, for example, a winter SPI value of -1 translates to about 58% of average precipitation received, and about 58% of average forage production. Winter forage production during drought is a smaller percentage of average because the total amount of precipitation received in the winter season is more variable from year to year than in the summer season.

Herd Composition

	Jan - May	June - Dec
Cows	300	300
Bulls	20	20
Yearlings	150	40
Total Herd AU's	440	363

- B. Herd Composition: See Figure 1, Box D. The cattle herd on the Sprinkle Ranch consists of cows (1.0 Animal Unit, “AU”), bulls (1.75 AU), and yearlings (0.7 AU). Yearling calves are traditionally carried over into the next year on many Tonto National Forest allotments until about the end of May. Yearlings are defined as an animal approximately one year of age, usually between 9 and 18 months (SRM 1998). The Tool allows the Users to change the herd size and composition at two times in a year: January–May and June–December.

Total Herd AUs are automatically calculated based on the User input for each class of livestock. This herd structure is simplified for the purposes of this Tool, although in reality the structure of a herd may change more frequently throughout a single grazing year, such as by adding or removing steers or other classes of livestock throughout the year. The number of bulls is automatically calculated as a ratio of 1 bull to 15 cows; however the Users may change the number of bulls manually.

Drought Factors

SPI Value (pasture level)	
Winter Season	Summer Season
-1	0
-1	0
-1	0
-1	0
-1	0
-1	0
-1	0
-1	0
-1	0
-1	0

- C. Drought Factors: See Figure 1, Box C. The Users can change the drought conditions (i.e. SPI value) in each individual pasture for the winter season (October – May) and summer season (June – September) separately (remember that drought is both spatially and temporally variable). The Tool is formatted to only accept SPI values of 0, -1, and -2. Applying a drought condition reduces the amount of forage available to the herd in that particular pasture and for that particular season (see section A above for forage reduction percentages). In essence, this section allows the Users to assess different levels of drought across space and time.

Grazing Plan

Pasture	Pasture Rotation Sequence	Planned % Utilization	Water (dates when unavailable)	Seasonal Use Restrictions (dates)
Riparian	1	20%		
Headquarters	2	40%		
Pipeline	3	40%		
Wydot	4	40%		
Son of A Gun	5	40%		
Miners Camp**	6	20%		
Timber Top**	7	0%		
Preacher Tom	8	40%		
Old Homestead	9	40%		
Total				

**Rest rotation every other year, summer use

Pasture
Sequence
Re-Sort

- D. Grazing Plan (part 1): See Figure 1, Box H. This section allows the Users to view and change information for each individual pasture, including:
- order of pasture rotation
 - planned forage utilization percentage
 - notes on water availability (e.g. if stock tanks are dry for a certain time of year)

- d. notes on seasonal use restrictions (e.g. time of year when the Forest Service does not allow grazing in a particular pasture due to endangered species, fire season, or another consideration).

The “Pasture Sequence Re-Sort” button (See Figure 1, Box I) can be clicked to re-arrange the sequence of pastures from first to last after the Users have manually changed the numbers in the “Pasture Rotation Sequence” column. Once clicked, the Users cannot “undo” the action of re-arranging the pastures; however, the Users can simply re-arrange the numbers of the pastures again until they are in the desired order, then click the button again to apply the new arrangement.

The two columns labeled “Water (dates when unavailable)” and “Seasonal Use Restrictions (dates)” are intended for the Users to keep notes for times of year when particular pastures may not be available, either for environmental (e.g. drought) or policy reasons. These cells are not dependent on the information in other cells, and the information in these cells does not affect the information in any other cells. The values in these cells are described in the scenario descriptions from the workshop activity, and represent additional challenges the Users may encounter when co-developing solutions to the scenarios.

Number Days in Pasture	First Day in Pasture	Last Day in Pasture	Maximum Seasonal Grazing Days	Drought Season Affecting Forage Production	Pasture Warnings
43	1/1/2016	2/12/2016	25.9	Winter	Exceeds Maximum Seasonal Grazing Days
19	2/13/2016	3/2/2016	11.4	Winter	Exceeds Maximum Seasonal Grazing Days
60	3/3/2016	5/1/2016	44.6	Winter	Exceeds Maximum Seasonal Grazing Days
50	5/2/2016	6/20/2016	51.4	Winter	
40	6/21/2016	7/30/2016	71.2	Summer	
25	7/31/2016	8/24/2016	30.5	Summer	
0	8/24/2016	8/24/2016	0.0	Summer	
76	8/25/2016	11/8/2016	93.2	Summer	
52	11/9/2016	12/30/2016	81.4	Summer	
365			410		

E. Grazing Plan (part 2): See Figure 1, Box E. This section also allows the Users to view and change information for each individual pasture:

- a. Number of Days in Pasture: Users can change the number of days the herd spends in each pasture. If the total number of days for all pastures exceeds 365, the Tool will display a warning in red that states “Exceeds 365 days in grazing year”.
- b. First/Last Days in Pasture: Users can set the first day in the rotation schedule by typing a date (mm/dd/yyyy) into the first pasture’s “in” date (white cell with no background color). The Tool will then automatically update the subsequent calendar dates for each pasture based on the values in the “Number of Days in Pasture” column.

Warning: Users should not attempt to alter the subsequent calendar dates by hand because it will impair the calculation formulas imbedded in the cells. At this time, the Tool will only recognize dates between 1/1/2015 and 12/31/2020. The start date for the rotation is by default set to 1/1/2016.

- c. Maximum Seasonal Grazing Days: This column displays the number of days of forage available in each pasture based on the herd size, percent utilization, and seasonal drought conditions. The total herd grazing days may sum to greater than 365 days if abundant forage is available, in which case the Users can use flexibility when planning the dates for pasture moves and the length of time spent in each pasture throughout the grazing year. If fewer than 365 days of forage are available, the Tool will display a warning to the Users in red to indicate that there is not sufficient forage to carry the herd through the calendar year.

The Maximum Seasonal Grazing Days are reduced if a drought is occurring in that pasture for that season (i.e. if the SPI value is -1 or -2), because of the relationship between precipitation and forage production (less rain = less available forage). Rearranging the order of the pastures in the rotation plan can change the season of use for some pastures and therefore the amount of forage available if drought is occurring during that season.

The reduction in grazing days due to drought is based on whether the pasture is being used during a time of year when winter drought affects forage production or when summer drought affects forage production. That is, pastures that experienced a summer drought will receive the summer-appropriate forage reduction (see reference table, section A) if the herd enters the pasture between June 1 and December 31 (the time of year where forage availability is affected by summer drought). Pastures that experience a winter drought will receive the winter-appropriate forage reduction if the herd enters the pasture between January 1 and May 31 (the time of year where forage availability is affected by winter drought).

The values for Maximum Seasonal Grazing Days are also calculated from other data inputs, such as herd size (smaller herd = more grazing days), utilization percent (more utilization = more grazing days), and average forage production for each pasture (more forage = more grazing days).

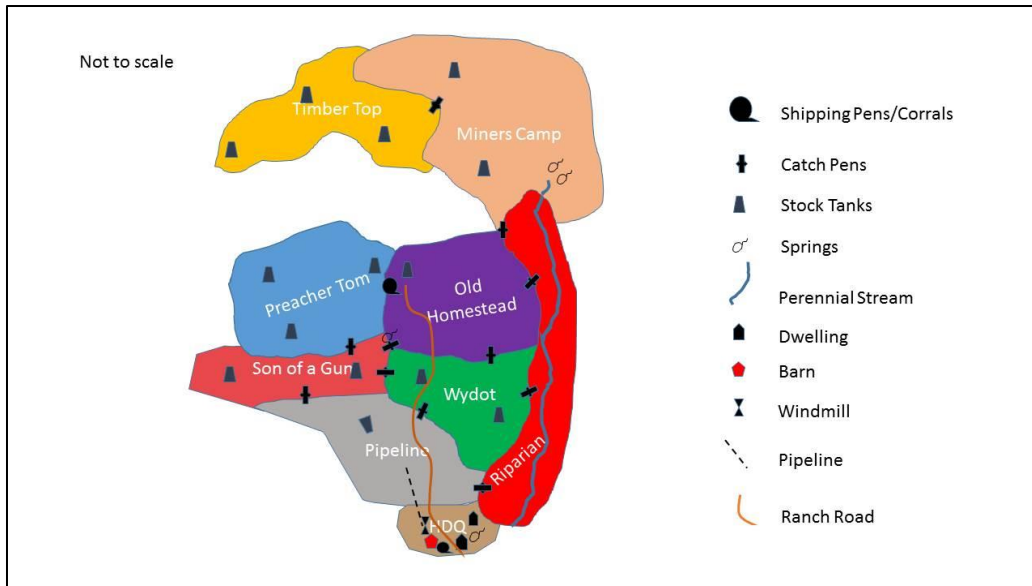
- d. Drought Season Affecting Forage Production: (see Section E.c above) summer droughts affect forage production from June 1 to December 31, and winter droughts affect forage production from January 1 to May 31. These reference cells are automatically updated based on the date in the “First Day in Pasture” column.
- e. Pasture Warnings: “Exceeds Maximum Seasonal Grazing Days” will be displayed for a pasture if the “Number of Days in Pasture” input by the Users exceeds the number in

the “Maximum Seasonal Grazing Days” column. This indicates that there is not sufficient forage to carry the herd through the number of Grazing Days identified in the column labeled “Number of Days in Pasture”.

Herd Grazing Days Without Drought	Drought-Adjusted Seasonal Herd Grazing Days	
	Winter Season	Summer Season
45	26	45
20	11	20
77	45	77
89	51	89
71	41	71
31	18	31
0	0	0
93	54	93
81	47	81
506	294	506

- F. Drought-Adjusted Seasonal Grazing Days: See Figure 1, Box F. This reference table calculates the number of days of available forage in each pasture during average conditions *without* drought (“Herd Grazing Days without Drought” column). The table also displays the drought-adjusted number of days of available forage if the pasture is experiencing a winter drought or summer drought (at either SPI -1 or -2). In the example above, all pastures are experiencing a winter drought represented by SPI -1 (forage production at 58% of average), but not a summer drought.

These values are the source for values that appear in the “Maximum Seasonal Grazing Days” column depending on 1) which season a pasture is used and 2) whether or not drought conditions are in effect (Section E above). Additionally, these values are also calculated from other data inputs, such as herd size, utilization percent, and average forage production for each pasture.



- G. Sprinkle Ranch Allotment Map: See Figure 1, Box G. Map of the Sprinkle Ranch Allotment, including pasture names and locations as well as range improvements. The empty white space between the higher elevation, summer-use pastures (Timber Top and Miners Camp) and the other pastures represents a barrier (e.g. steep cliffs or gorge) that is not passable for herd movements.

Instructions for Drought Scenario Planning	
1. Input user defined data into open white boxes	
2. Enter SPI value for winter and summer for each pasture	
3. Enter Unavailable water dates for each pasture	
4. Enter use restriction dates for each pasture	
5. Examine warnings for use levels exceeded (red text)	
6. Consider adjustments to maintain use within allowable levels. Consider the following:	
a. Herd size and composition	
b. Days in pasture	
c. Pasture rotation sequence	
d. Planned utilization	
Other Features	
1. "Pasture Sequence Re-Sort" button on the screen will re-arrange the pastures and dates according to the pasture rotation sequence you selected if you decide to make changes to the original sequence (cannot undo this action except by hand).	
2. <u>Saving Scenario Solutions</u> : Each of the spreadsheet tabs at the bottom of the screen, labeled "Solution 1", "Solution 2", etc., contains an identical copy of the tool. Use these separate spreadsheets to save and refer back to different solutions to the drought threat scenario.	
3. <u>Worksheet</u> : used in conjunction with this tool to identify solutions and determine whether they will need consultation and approval with updated AOI and deviation from AMP.	

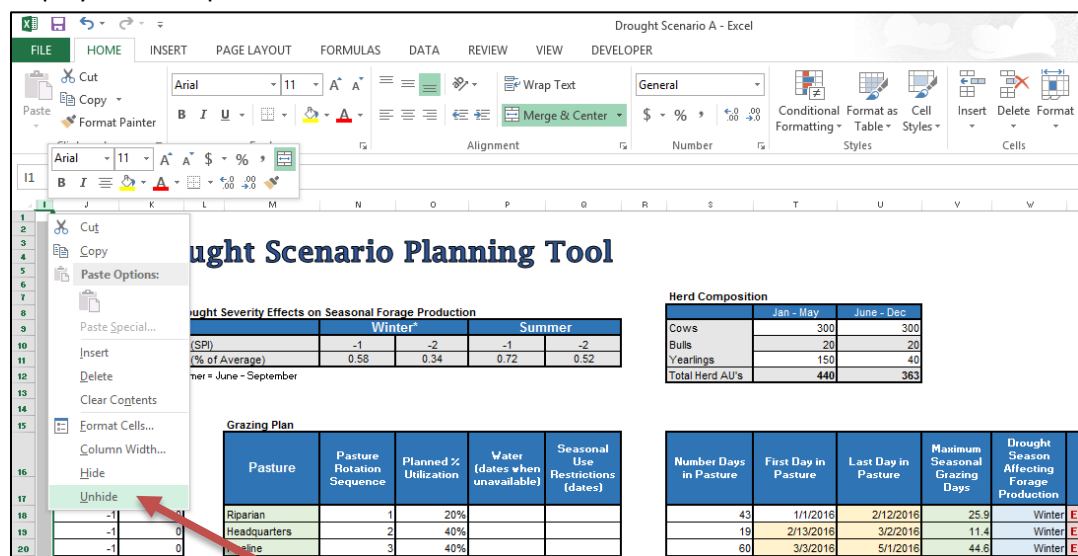
- H. Instructions for Drought Scenario Planning: See Figure 1, Box K. This table reminds the Users about the basic instructions for using the Tool in addition to special or supplemental features.

			% of average forage production, for SPI values -1, -2 in the winter and summer seasons			
			Winter		Summer	
			SPI -1	SPI -2	SPI -1	SPI -2
			58%	34%	72%	52%
Pasture Forage Production						
Pasture	Acreage	Average Forage Production (lbs/A)	SPI - 1 Forage Production (lbs/A)	SPI - 2 Forage Production (lbs/A)	SPI - 1 Forage Production (lbs/A)	SPI - 2 Forage Production (lbs/A)
Riparian	3000	850	493	289	612	442
Headquarters	800	700	406	238	504	364
Pipeline	4000	550	319	187	396	286
Wydots	3900	650	377	221	468	338
Son of A Gun	2800	600	348	204	432	312
Miners Camp*	4800	300	174	102	216	156
Timber Top*	3500	325	188.5	110.5	234	169
Preacher Tom	4000	550	319	187	396	286
Old Homestead	3200	600	348	204	432	312

- I. **Hidden Background Information:** See Figure 1, Box A. Columns A – H are by default hidden from the Users’ view, but contain important background information about the ranch which supports some of the automated calculations in the Tool. This section displays the acreage and average forage production (pounds per acre) for each pasture. Four additional columns display the reduced amount of forage available in each pasture (lbs/acre) in the event of a winter or summer drought, and at both the -1 and -2 SPI severity levels for each season. The Users can “unhide” columns A-H to display this information if desired.

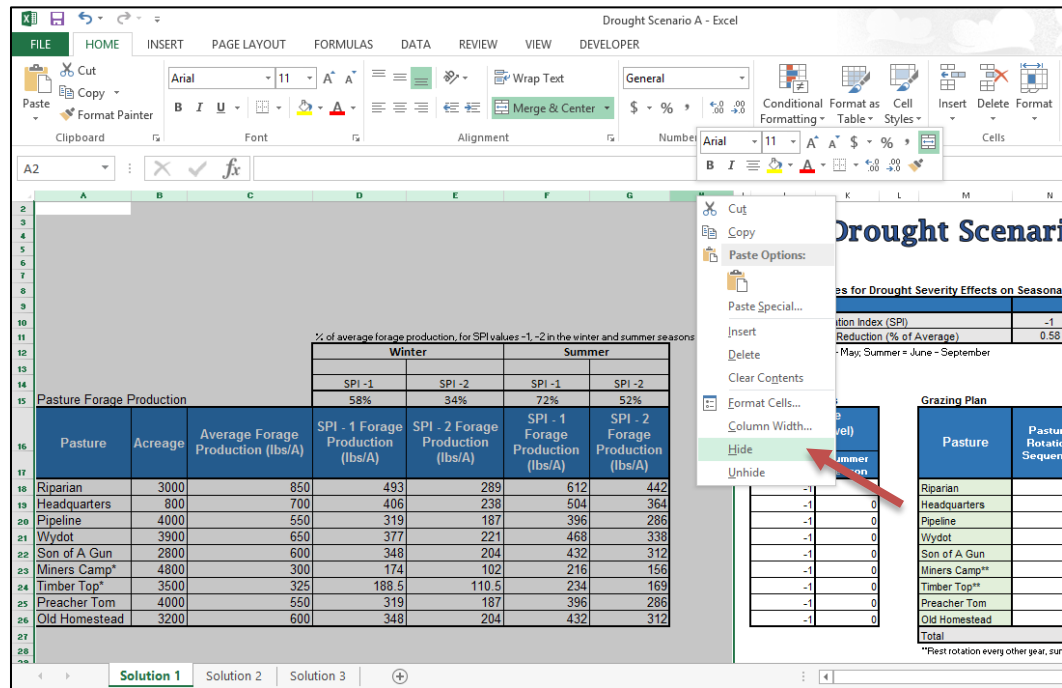
a. **How to “Unhide” Columns A-H:**

Click on the column header “I” to highlight that entire column, and with the mouse button held down, drag the mouse pointer to the left until the row numbers column also highlights. With those two columns highlighted (and in that order), right click to display a list of options. Click the word “Unhide” from the list.



b. *How to “Hide” Columns A-H:*

Highlight columns A-H together by clicking on the column header “A” and dragging the mouse pointer across to column header “H”. Right click in the highlighted area to display a list of options. Click the word “Hide” from the list.



VI. Saving Multiple Solutions to Drought Scenarios

There are an infinite number of solutions that Users can co-develop to resolve a drought scenario. Users are encouraged to explore different options for management actions, which ultimately increases flexibility of the livestock management on the allotment. Users can save their different solutions using 1) the different spreadsheet tabs that contain identical copies of the Tool, and 2) the paper worksheet. These features allow the Users to keep track of different solutions and refer back to them if needed.

A. *Solution Spreadsheet Tabs*

At the bottom of the screen are tabs that access different spreadsheets (aka worksheets) within the Excel® file (see Figure 1, Box J). By default, these are labeled as “Solution 1”, “Solution 2”, etc. Each of these spreadsheets contains an identical copy of the Tool. After making adjustments to the Tool in the Solution 1 spreadsheet, Users can then open Solution 2 spreadsheet and begin working with a clean copy of the Tool with its default settings to develop a new solution to the drought scenario. Users can use as many of the Solution tabs as needed; however, Users are not encouraged to simply copy and paste the contents of the Tool into a newly created spreadsheet tab because it will impair the functionality of the “Pasture Sequence Re-Sort Button” (see section below on Macros to learn how to overcome this problem).

B. Using the Worksheet with the Tool

The worksheet was designed to help Users keep track of solutions to a drought scenario and consider policy restrictions and degree of agency approvals required to implement any proposed management solution. The worksheet helps Users to begin thinking about long-term drought planning for the future and to initiate what can be a lengthy approval processes for management actions on allotments.

The worksheet allows the Users to 1) record the objectives for the solution (e.g. maintain herd size, minimize water hauling), which helps to define the shared goals of the Users, 2) record any adjustments made to the livestock management, whether it be changes in the herd structure, pasture rotation, forage utilization percent, or another negotiated action, and 3) record and discuss the types of agency approvals needed, whether it be a modification to the Annual Operating Instructions (AOI) with the rangeland specialist, line officer authorization for actions outside of the Allotment Management Plan (AMP), or full analysis for actions under the National Environmental Policy Act (NEPA).

Scenario #: _____							
Group #: _____							
		Management Decisions					
Solution #	Objective	Herd Size / Composition	Rotation Sequence	Utilization %	Days in Pasture	Other	Agency Approvals Needed (Circle)
		<u>Jan-May</u> Cows ____ Bulls ____ Yearlings ____	Riparian ____ Hdqrts ____ Pipeline ____ Wydot ____ Son of Gun ____ Miners C ____	Riparian ____ Hdqrts ____ Pipeline ____ Wydot ____ Son of Gun ____ Miners C ____	Riparian ____ Hdqrts ____ Pipeline ____ Wydot ____ Son of Gun ____ Miners C ____		None New AOI Emergency Outside AMP Other Comments:
		<u>Jun-Dec</u> Cows ____ Bulls ____ Yearlings ____	Timber T ____ Preach Tom ____ Old Homes ____	Timber T ____ Preach Tom ____ Old Homes ____	Timber T ____ Preach Tom ____ Old Homes ____		
What were the issues that came up?				How can you work through them?			

VII. Formulas and Macros

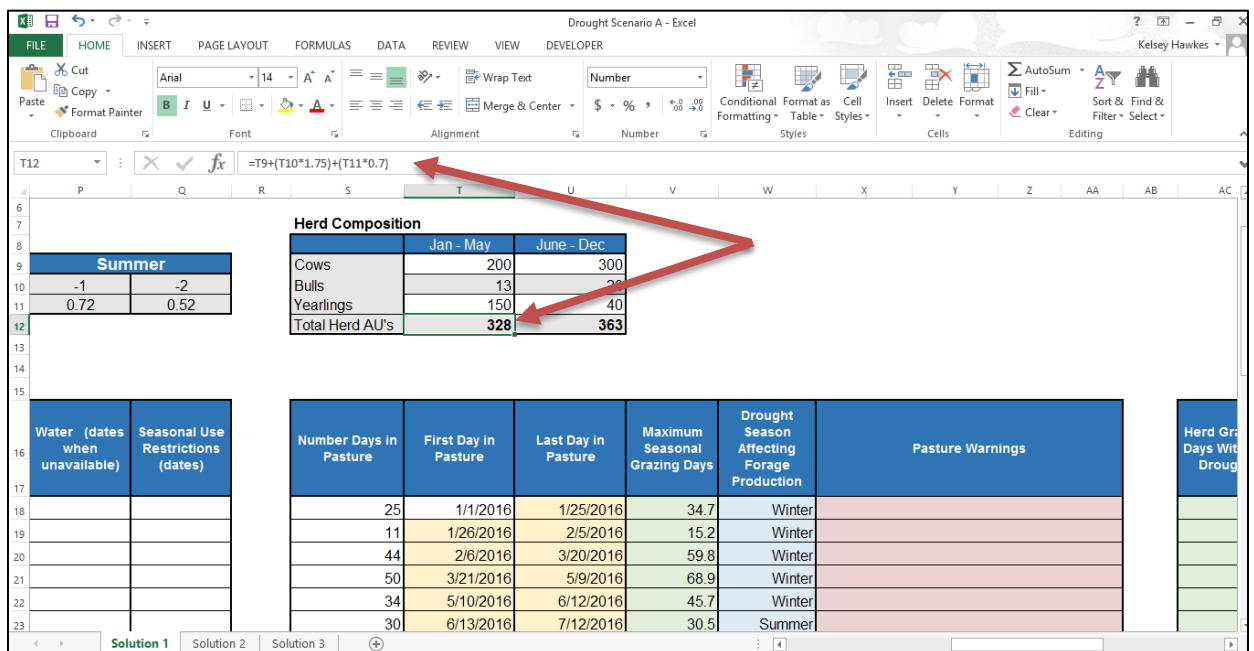
A. Formulas

The Tool automatically calculates values, such as those in the “Maximum Seasonal Grazing Days” column, by using formulas that are imbedded in the coding of those cells. When a cell is highlighted, the absolute value of that cell is displayed in the formula bar (fx) toward the top of

the screen; if a cell contains a formula, the details for the calculations of that formula will display in the formula bar, while the actual calculated value displays in the cell itself (see figure below).

WARNING: If a new value is typed directly into the cell, the formula will be erased and the functionality of the Tool will be impaired.

In the figure below, the value in highlighted cell T12, representing the Total Herd AUs for Jan-May is **328**, and the formula bar shows the details of the basic algebraic calculation that computed that value, dependent on the values in other cells. The formula uses the current values for the cows, bulls, and yearlings in cells T9, T10, and T11, respectively. The formula also uses the respective animal unit equivalents for cows (1.0), bulls (1.75), and yearlings (0.7) to calculate the Total Herd AUs. The formula reads as follows: $=T9+(T10*1.75)+(T11*0.7)$. In this case, the value for the number cows is 200, bulls is 13, and yearlings is 150. Therefore, $=200+(13*1.75)+(150*0.7) = 328$ total herd AUs for Jan-May.



B. Macros

The “Pasture Sequence Re-Sort” button operates using a special type of coding, called a “macro”. Users may need to enable macros in their Excel[®] program manually in order for this feature to be functional; Users should consult the Excel[®] Help feature to learn how to enable macros in their version of the program.

If a User wishes to make any major changes to the Tool, such as by adding or removing rows and columns or by substituting their own ranch information, the User will be required to “record” a new macro in order for the Pasture Sequence Re-Sort button to be functional. See Appendix A for instructions on how to record a macro.

VIII. Using Your Own Ranch Information to Customize the Tool

As a reminder to the Users, the Drought Scenario Planning Tool is not intended to be used to make real-time decisions for livestock management or as a prescription for management during drought. As described above, the Tool uses an oversimplified 1:1 relationship between the amount of average precipitation received and the amount of forage production, which may not be representative of local conditions. Additionally, the Tool simplifies the herd structure and limits the amount of time the herd size and composition can be changed to two times during the year. The Tool uses a hypothetical national forest grazing allotment to help Forest Service managers and ranchers practice conversations about drought information, management actions, policy restrictions, and future drought planning.

WARNING: Users who wish to substitute their own ranch information into the Tool must take precautions not to impair the functionality of the Tool and the automated calculations.

A. *Adjusting Pasture Details*

Pasture name, acreage and average forage production can easily be changed for each pasture by typing that information into the appropriate cells in Columns A-G and Column M.

B. *Adjusting Number of Pastures*

If fewer pastures are desired, the User should delete the extra rows *starting from the bottom of the pasture list* (bottom rows). This will ensure that the formulas for calculating dates in pastures will not be impaired.

- a. First, highlight the entire row you wish to delete by clicking on the row number.
- b. Then, right click and select “Delete”.
- c. If pasture rows are deleted from the top or within the list, then the “First Day in Pasture” and “Last Day in Pasture” dates will not calculate. Simply press the “undo” button at the top of the screen and proceed to delete rows starting from the bottom of the list.
- d. Do not delete the row that totals the above values.
- e. The last step is to re-record the macro that operates the “Pasture Sequence Re-Sort” button (see above section for instructions).

If more pastures are desired, the User should add rows *to the bottom of the list*. This will ensure that the formulas for calculating dates in pastures will not be impaired.

- a. First, highlight the entire row below the pasture names which totals the values above it by clicking on the row number (in this case, row 25).
- b. Then, right click and select “Insert” from the list of options. Once the new row(s) is added and the pasture name, acreage, and average production values are updated, the User will need to perform the following steps to ensure that the formulas carry to the added row:
 - 1) In the “Number of Days in Pasture” column, the Users will need to update the formula so that the total number of days includes those for the added pasture. Click on the cell at the bottom of this column that shows the total number of days. In the formula bar (*fx*), edit the text so that the added row is included. For example, if before the formula read “=SUM(S18:S26)” and only one row was added, the new text should read “=SUM(S18:S27)” to account for all cells from S18 down to S27.
 - 2) In the “First Day in Pasture” column, highlight all of the pre-existing cells that contain a value (in this case a date). Then hover the mouse pointer over the bottom right corner of the highlighted cells until the pointer turns into a black cross without arrows. Once the mouse pointer is in this position, click and drag the mouse pointer down until the new cell below populates with a date. This ensures that the formulas properly carry over to the added row(s).
 - 3) Repeat step two for the four hidden columns (see above for how to “unhide” columns A-H) labeled “SPI -1 Forage Production” and “SPI -2 Forage Production” for both the winter and summer seasons.
 - 4) Repeat step two for the columns labeled “Last Day in Pasture”, “Maximum Seasonal Grazing Days”, “Drought Season Affecting Forage Production”, “Pasture Warnings”, “Herd Grazing Days Without Drought”, and “Drought-Adjusted Seasonal Herd Grazing Days” for both the winter and summer columns.
 - 5) Re-record the macro that operates the “Pasture Sequence Re-Sort” button (see above section for instructions).

C. *Substituting the Allotment Map*

The User can substitute the Sprinkle Ranch Allotment Map for one of their own by first deleting the existing map and pasting an image of the new map directly into the Tool and re-positioning it to the desired location.

D. Other Considerations

As a reminder, in the Drought Factors section, the Tool only accepts values of 0, -1, or -2.

The Tool only accepts pasture grazing dates between 1/1/2015 and 12/31/2020 in the “First Day in Pasture” and “Last Day in Pasture” columns.

The User will need to repeat all of the above steps (A – C) for each of the solution spreadsheet tabs separately.

Users with advanced knowledge of Excel[®] may explore and update the formulas to their own preferences if desired, e.g. the ratio of bulls to cows.

IX. References

Quiring, Steven M. 2009. Monitoring Drought: An Evaluation of Meteorological Drought Indices. *Geography Compass* 3(1): 64–88.

[SRM] Society for Range Management. 1998. Glossary of terms used in range management, fourth edition. Edited by the Glossary Update Task Group, Thomas E. Bedell, Chairman. Used with permission. <https://globalrangelands.org/rangelandswest/glossary>

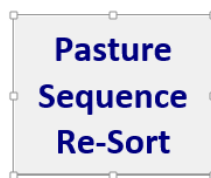
[USFS] United States Forest Service. 2015. Southwestern Region (Region 3) Grazing Permit Administration Handbook, Chapter 10 – Permits with Term Status, Supplement No. 2209.13-2015-1, Section 19.1. Effective February 23, 2015. United States Department of Agriculture.

Appendix A: How to Record a Macro

Users should consult the Help feature to learn how to record macros in their version of the program. In newer versions of Excel®, the Users will have to enable the “Developer” toolbar in the “Options” settings of the program in order to work with macros.

Before recording a new macro, first make sure to “unhide” columns A-H (see above for instructions) because these cells contain important pasture specific information that will need to be included when the pastures are re-sorted.

When ready to record the new macro, first highlight the Pasture Sequence Re-Sort button. One way to do this is to right click on the button and then left click elsewhere on the screen until the button looks like this with the dotted border:



Then, select the option in the toolbar at the top of the screen that allows you to start recording the macro (in newer versions of Excel®, “Record Macro” can be found in the Developer Tab of the toolbar).

Once the recording has started, the User must then perform the action that they wish the macro to perform when the “Pasture Sequence Re-Sort” button is pressed. First, highlight all of the cells that correspond with a pasture name between column A (pasture name) to column S (number of days in pasture). See below outlined in red:

Pasture	Acreage	Average Forage Production (lbs/A)	SPI - 1 Forage Production (lbs/A)	SPI - 2 Forage Production (lbs/A)	SPI - 1 Forage Production (lbs/A)	SPI - 2 Forage Production (lbs/A)
Headquarters	800	700	406	238	504	364
Pipeline	4000	550	319	187	396	286
Wydot	3900	650	377	221	468	338
Son of A Gun	2800	600	348	204	432	312
Miners Camp	4800	300	174	102	216	156
Timber Top	3500	325	188.5	110.5	234	169
Preacher Tom	4000	550	319	187	396	286
Old Homestead	3200	600	348	204	432	312
Riparian	3000	850	493	289	612	442

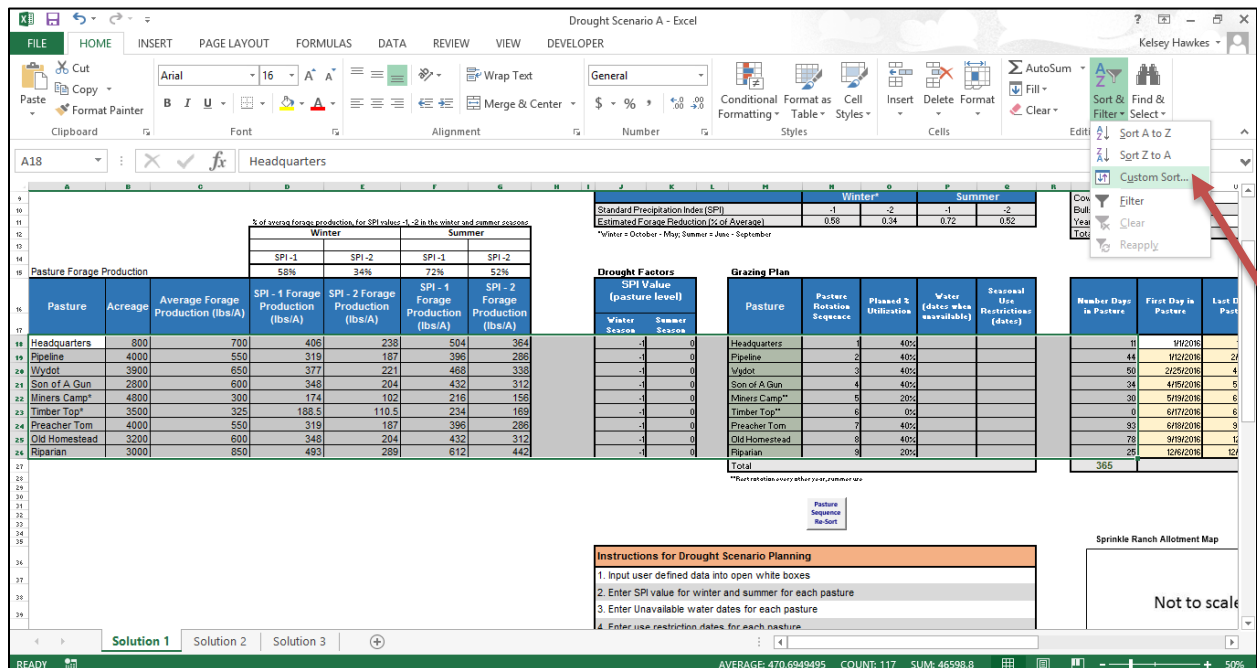
Pasture	Pasture Rotation Sequence	Planned % Utilization	Water (dates when unavailable)	Seasonal Use Restrictions (dates)
Headquarters	1	40%		
Pipeline	2	40%		
Wydot	3	40%		
Son of A Gun	4	40%		
Miners Camp	5	20%		
Timber Top	6	0%		
Preacher Tom	7	40%		
Old Homestead	8	40%		
Riparian	9	20%		

Number Days in Pasture	First Day in Pasture	Last Day in Pasture
11	1/1/2018	
44	1/12/2018	2/1
50	2/25/2018	4
24	4/15/2018	5
30	5/19/2018	6
0	6/17/2018	6
33	6/18/2018	9
78	9/19/2018	12
25	12/6/2018	12

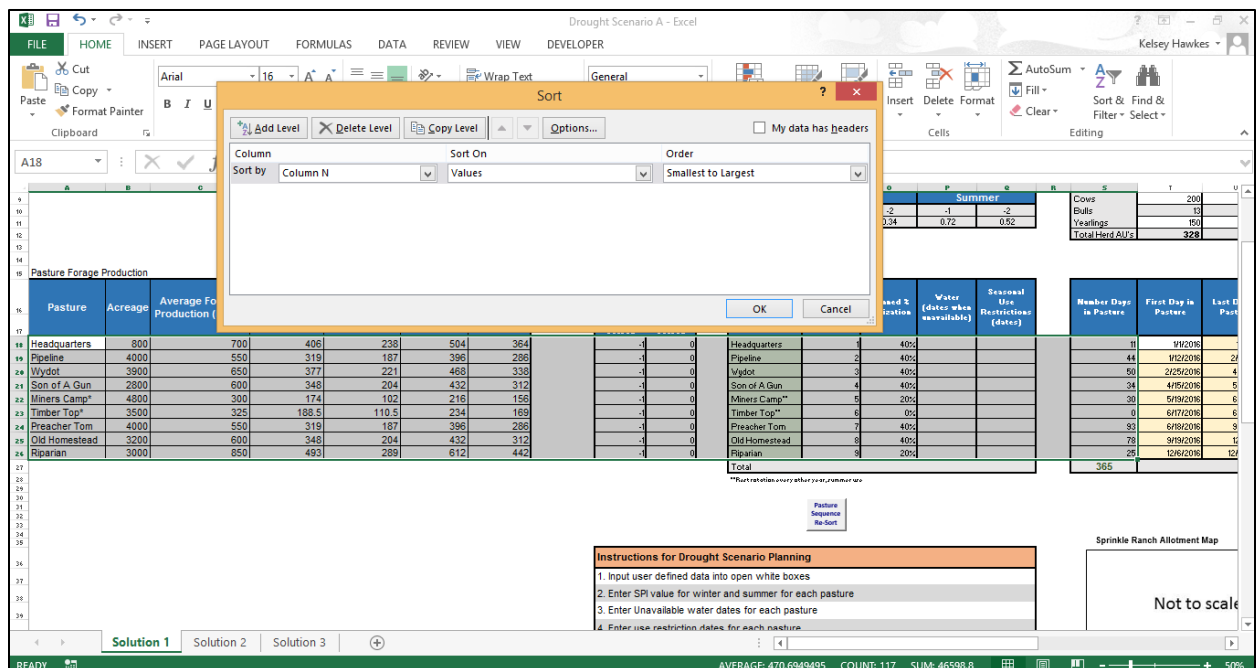
Instructions for Drought Scenario Planning

1. Input user defined data into open white boxes
2. Enter SPI value for winter and summer for each pasture
3. Enter Unavailable water dates for each pasture
4. Enter use restriction dates for each pasture

Once those cells are highlighted, in the “Home” tab of the upper toolbar, select “Sort and Filter” then “Custom Sort”. See below:



In the dialogue box that appears make sure that the check box for “My data has headers” is *unchecked*. Then, sort by the column in which the “Pasture Rotation Sequence” values exist, in this case it is “Column N”. Then select Sort On “Values”, and Order “Smallest to Largest”. Select “OK” to apply the setting for sorting the pastures. See below:



The final step is to “Stop Recording” the macro by returning to the Developer toolbar and pressing the corresponding button. These steps should complete the process for recording the macro that operates

the Pasture Sequence Re-Sort button. Test the button by changing the order of the numbers in the Pasture Rotation Sequence column then pressing the Pasture Sequence Re-Sort button. The pasture rows should re-arrange themselves according to the order selected and should include all pasture specific information from Column A to Column S (number of days in pasture). That is, once the pastures are re-arranged, all information pertinent to that specific pasture should be re-arranged to stay in the same row as the pasture name. A final optional step is to re-“Hide” the background information in columns A-H so it is out of the way.