USDA NRCS Natural Resources Conservation Service

NEBRASKA NRCS-USDA

CONSUMPTIVE USE CALCULATOR

EVAPO-TRANSPIRATION CALCULATIONS FOR COVER TYPES IN A NON-STRESSED ENVIRONMENT

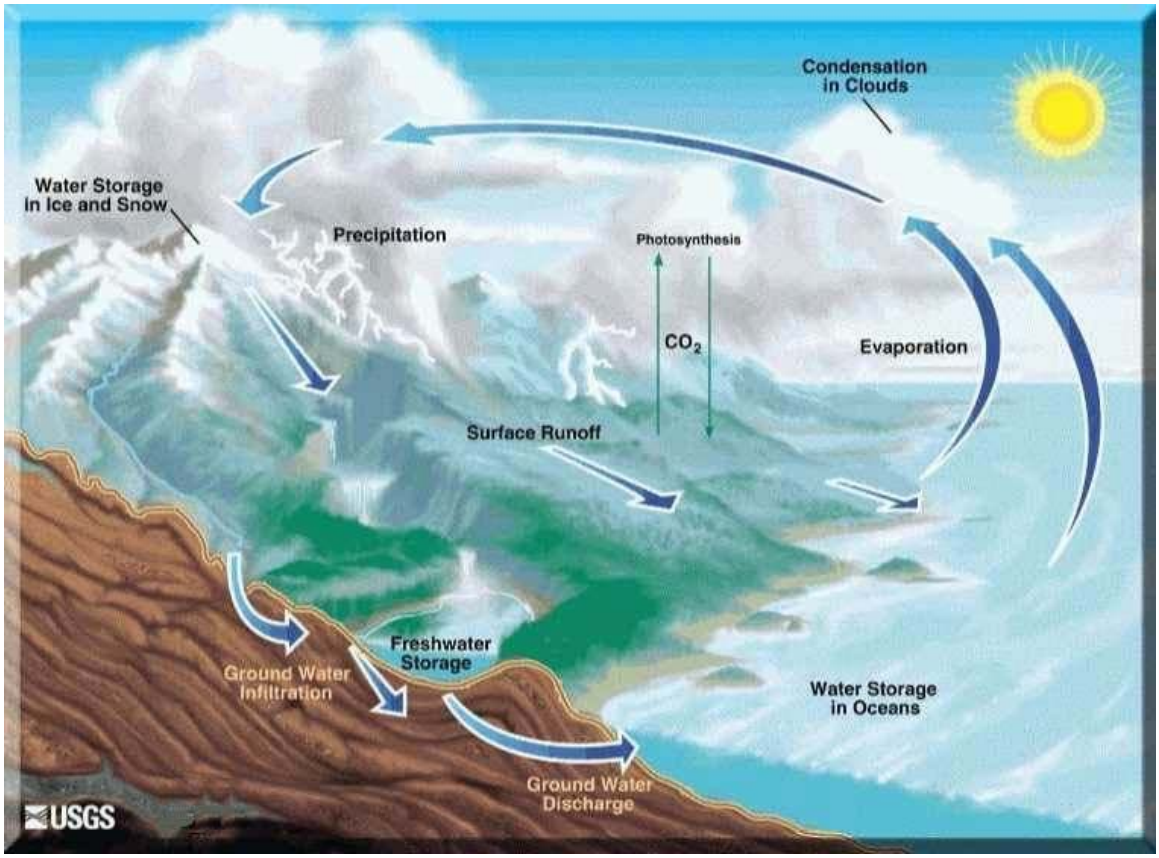


TABLE OF CONTENTS

USING THE SPREADSHEET

THE INS AND OUTS

BACKGROUND: WHAT IS ACCOMPLISHED AND BY WHAT MEANS

The methodology used is that of the NRCS National Engineering Handbook Part 623 Chapter 2 for unstressed cover (crop) types. This consists of determining two curves: the adjusted Basal Coefficient curve and the reference evapo-transpiration curve. The basal curve is computed using characteristics of the crop's growing season and development in the area in relation to a reference crop, the associated water use for each stage of crop development, wetting intervals of the crop and soil surface, the soil texture, heat capacity of water bodies, and residue on the soil. The reference evapo-transpiration curve is based on the Food and Agricultural Organization's (FAO) temperature method. Using climatic and geographical data a curve associated with a reference crop is produced. This curve is than multiplied by the adjusted Basal curve to estimate the cover types evapo-transpiration at that location.

The spreadsheet (referred to in Appendix 6 from the Platte River Report) calculates the adjusted basil curve using easily adjusted parameters. The reference evapo-transpiration was calculated using an external program, IWR 3.0 (Irrigation Water Requirements), written by Jon Dalton that follows the NEH Part 623 Chapter 2.

THE SHEETS: WHAT IS FOUND WHERE AND WHAT DOES IT MEAN

The spreadsheet consists of multiple sheets each representing a different factor used in determining the adjusted basal curve and a sheet consisting of reference evapo-transpiration data. This should make the spreadsheet adjustable for different cover types, areas, or data.

THE CALCULATOR PAGE

The calculation page is the input and output page for using the spreadsheet. This is where all of the calculations occur. It is color coded for possible entry fields and protected fields. Descriptions of each of the fields are found in the Using the Calculator Page Section.

ET_o PAGE

The ET_o Page is the location for all of the reference evapo-transpiration data. This consists of a grass reference crop evapo-transpiration (ET_o) value for each month in each of the eight areas of the Platte River Watershed in Nebraska. This data is only held on this page, so changing the ET_o here will change all calculations with ET_o throughout the program.

K_C VALUES PAGE

The data here is the unaltered basal coefficients for each cover type for each month. The cover types must be listed alphabetically from left to right. There are two different cover type names for the crops and wetlands. This is due to different planting, harvesting, and growing seasons for these cover types for different parts of Nebraska. The CSE crops are located in Area 8 with C crops located in Areas 1 through 7. The WetEast wetland cover types are located in Areas 7 and 8 with

Wet wetland cover types in Areas 1 through 6. To alter K_c data this is the only page requiring changes, though additions or deletions of cover types may require changing other data pages and the calculator page.

RESIDUE PAGE

The residue page has two functions: show the default residue amount for the cover type as a percentage of ground cover and the growing season. The growing season is used to determine which days a bare soil K_c is used and which days the cover type K_c is used. For months with a number greater than zero, a bare soil cover type is used illustrating the crop not in an active stage. Cover types that are covered by water throughout the year do not have any days using a bare soil cover type and are therefore zero throughout the year. Conifer's K_c curve is a constant throughout the year and has no days modeled as bare soil. Winter wheat has its non-growing season in the middle of the year due to its non-typical growing season. Residues and changes of growing seasons need only be changed here.

WETTING INTERVALS PAGE

The wetting interval page has two sets of data. The first columns represent the historic average interval between precipitation events for the eight areas for each month. The next column is a little more complicated. Due to the importance of wetting events to the bare soil evapo-transpiration calculations additional data was necessary. It was found that minor wetting events greatly overestimated bare soil evapo-transpiration. More water was evaporated than would have been due to effective rainfall and overland flow. The average historic precipitation events were compared to the potential evaporation of bare silt loam soil. This was than used to calculate the K_w (explained in Using the Calculator Page) for bare soil. Silt loam was used, as it was the most prevalent soil type, accounting for over 90% of the practices installed. This page can be altered to account for irrigation in addition to precipitation events or for different precipitation intervals.

WET SOIL FACTOR PAGE

The wet soil factor page is used for the K_w of the cover type (explained in Using the Calculator Page). The evapo-transpiration component of a cover type during its growing season is calculated using these parameters. This is the only time that selecting a different soil type changes anything. The data is from the NEH Part 623 Chapter 2 where it is called the Average Wet Soil Evaporation Factor. It is used exactly as explained within the NEH Part 623 Chapter 2.

MONTHS PAGE

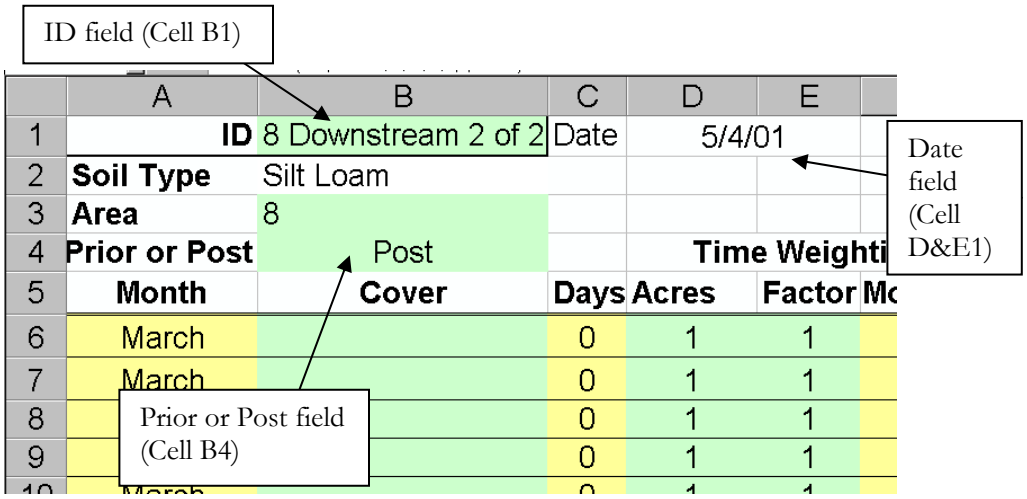
Easily explained, this page has the number of the month for March through November and the corresponding number of days in each month. Change this page to account for additional months considered in warmer climates or for leap year. To account for additional months the Calculator page must be extended to show these moths.

USING THE CALCULATOR PAGE

This section will explain each field: what to enter, its use, what data is used if any, and the calculations performed if any.

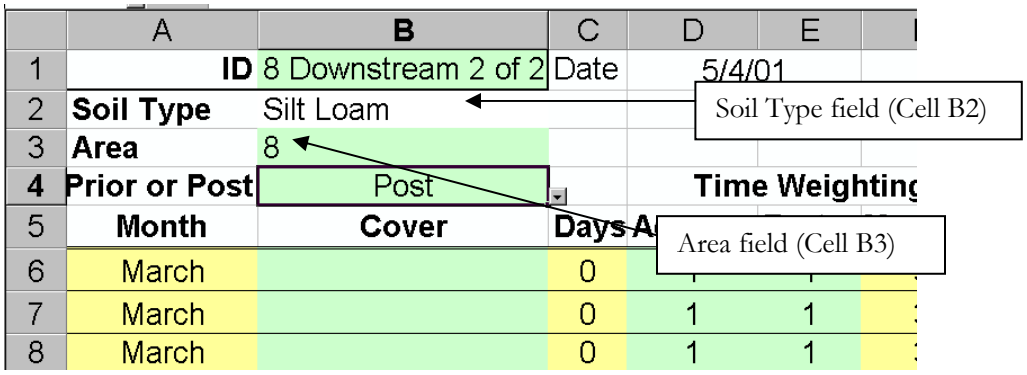
ID, DATE, AND PRIOR OR POST FIELDS

The ID, Date and Prior or Post fields are used only as references for further identification. The ID field can be any tag. The Date field is automatically updated with the computers current date. The Prior or Post field must either be "Prior" or "Post" and is accessed by a pull down list.



SOIL TYPE FIELD

The soil type is selected by a pull down menu. The choices are: clay, clay loam, loamy sand, sand, sandy loam, and silt loam. The data in this field is used to get the Wet Soil Factor Page. It is used for determining the wet soil K_w value during the growing season. This field has a validation requirement so that only those soil textures are possible. The validations for this field are found in cells X6 to X11.

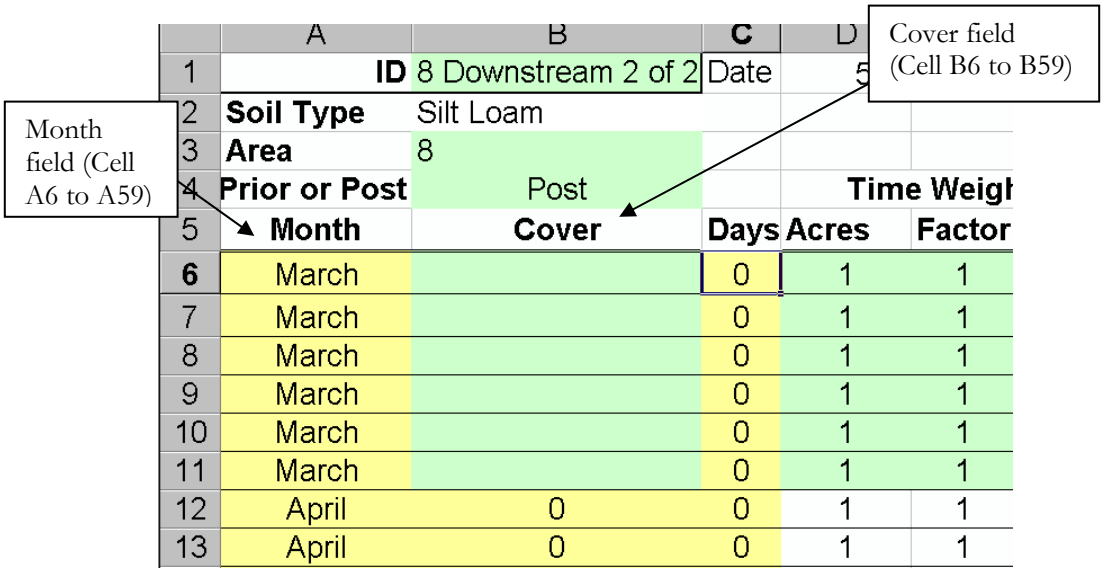


AREA FIELD

The area field is used for multiple calculations. It is selected with a pull down menu. It has validations found in cells V6 through V13. It is used to determine which area is relevant for: Wetting Intervals Page for the wetting interval, K_w Soil field which is used to find the right K_w on the Wetting Interval Page, and the ET_o field to find the right value on the ET_o Values Page.

MONTH FIELD

The month field is used multiple places indirectly, but directly in the Days field, the Month # field, and in the Wet Int. field. An assumption of the study was that the months of January, February, and December did not have an impact on consumptive use for Nebraska and were therefore left off. The months are preset and protected.



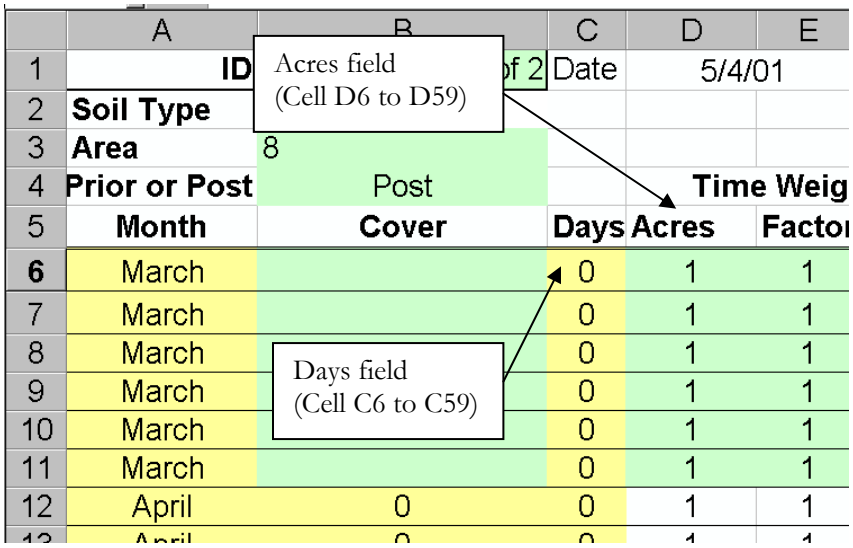
	A	B	C	D	
1	**ID**	8 Downstream 2 of 2	Date	5	
2	**Soil Type**	Silt Loam			
3	**Area**	8			
4	**Prior or Post**	Post			**Time Weigh**
5	**Month**	**Cover**	**Days**	**Acres**	**Factor**
6	March		0	1	1
7	March		0	1	1
8	March		0	1	1
9	March		0	1	1
10	March		0	1	1
11	March		0	1	1
12	April	0	0	1	1
13	April	0	0	1	1

COVER FIELD

The cover field is a validated pull down menu. The validations on found at cells W6 through W51. This field will need to be used. Six spaces allow entry, cells B6 through B11, with the rest of the column using these values. If more cover types are needed the spreadsheet must be used multiple times and results added. The data from this field is used to find the default residue in the Residue % field from the Residue Page. It is also used to lookup the Days Residue field from the Residue Page. The last field it is used for is the K_{cb} field to determine the cover type from the K_c Values Page. If it is left blank it also sets several fields to zero.

DAYS FIELD

The Days field is used for determining the ET_c from K_a and ET_o data and somewhat for weighting adjustments to create the K_a value. All of the K type data is a daily, monthly averaged value and thus, needs to be multiplied by the number of days in the month. The data for this filed is found on the Months page.



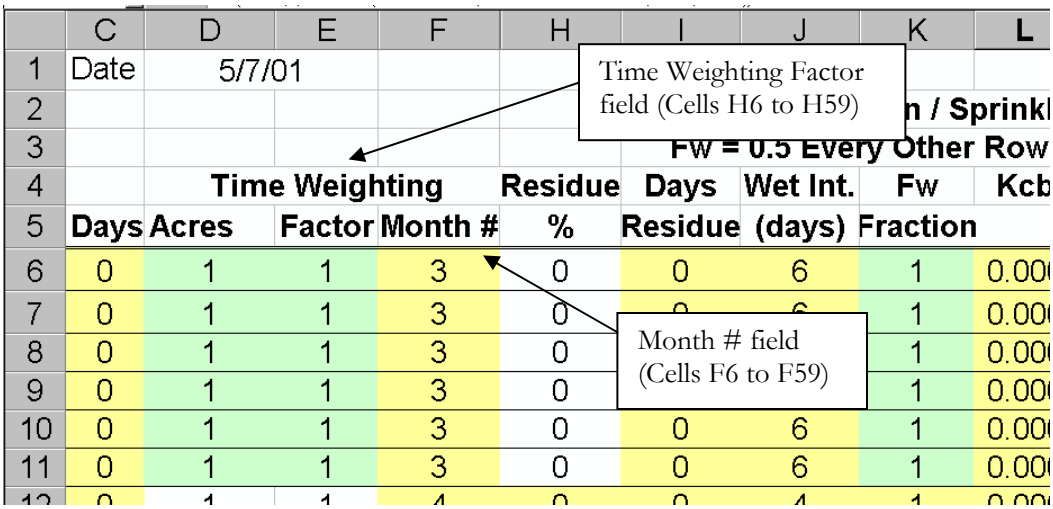
	A	B	C	D	E
1	ID	of 2	Date	5/4/01	
2	Soil Type				
3	Area	8			
4	Prior or Post	Post			Time Weig
5	Month	Cover	Days	Acres	Factor
6	March		0	1	1
7	March		0	1	1
8	March		0	1	1
9	March		0	1	1
10	March		0	1	1
11	March		0	1	1
12	April	0	0	1	1

ACRES FIELD

This field is for multiplying the ET_c, which is a flux, to get an evaporation, volume, per month. This is the only use it serves. The cells from 12 to 59 are copies of cells 6 to 11 unless altered. To revive the former state, simply press on the reset button.

TIME WEIGHTING FACTOR

This is an option to altering the days or acres field. It is used only in the ET_c to Evaporation calculation. A value less than one would represent a decrease in the acreage or length of cover type that month than shown in the Acres or Days fields. Cells 12 to 59 are copies of cells 6 to 11 as in the Acres field and are also revived by pressing the Reset button.



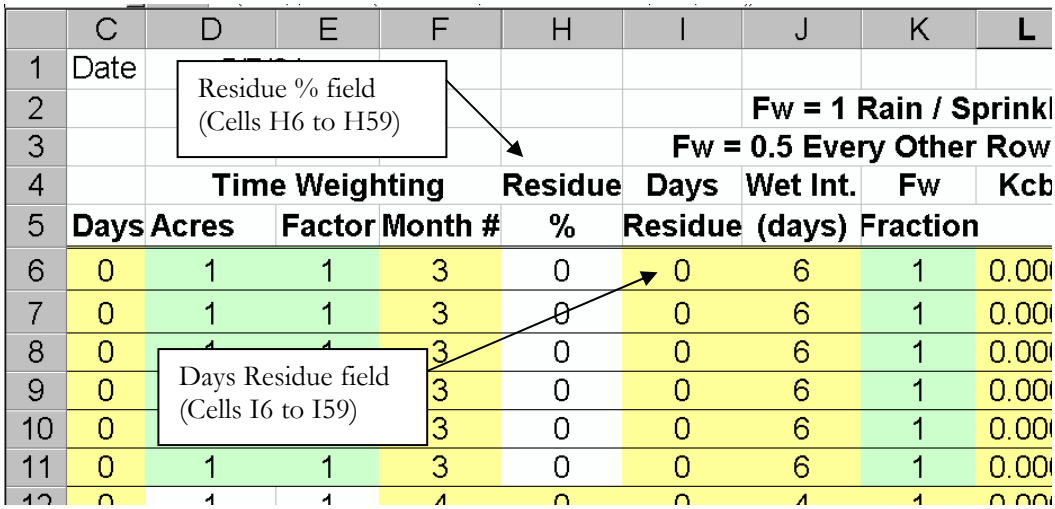
	C	D	E	F	H	I	J	K	L
1	Date	5/7/01							
2									n / Sprinkl
3									Fw = 0.5 Every Other Row
4		Time Weighting			Residue	Days	Wet Int.	Fw	Kcb
5	Days	Acres	Factor	Month #	%	Residue	(days)	Fraction	
6	0	1	1	3	0	0	6	1	0.00
7	0	1	1	3	0			1	0.00
8	0	1	1	3	0			1	0.00
9	0	1	1	3	0			1	0.00
10	0	1	1	3	0	0	6	1	0.00
11	0	1	1	3	0	0	6	1	0.00

MONTH # FIELD

The Month # field is used to help locate the correct K_c, Days Residue, Wetting Interval, K_{soil}, and $K_{w\ soil}$ values from the other pages in the spreadsheet. It is determined by the Month column and the Months Page.

RESIDUE % FIELD

The Residue % field has default values for each cover type that are changed on the Residue Page. The residue percentage can be changed in cells 6 to 11 where it is carried down through the rest of the year. To return to default values simply press the Reset button. This value is the amount of residue on the area from the end of the growing season until the start of the growing season. It is used to account for the decrease in the percent of evaporation due to an increased ground cover.

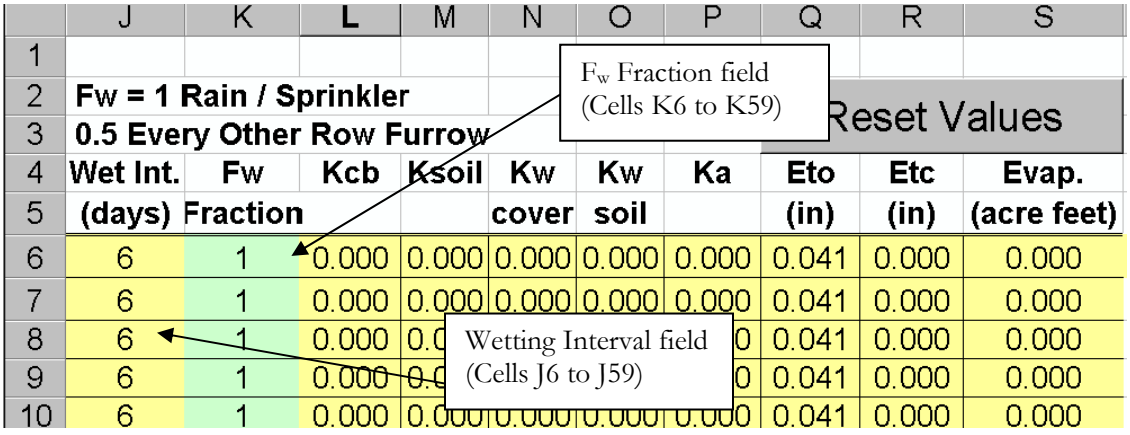


DAYS RESIDUE FIELD

The Days Residue field also retrieves its data from the Residue page. It determines if bare soil with residue is used and how long.

WETTING INTERVAL FIELD

The wetting interval field is based on the Wetting Intervals Page. It is used to account for increased evaporation due to a wet soil surface. It would need to be altered in the case of a different area than listed or for increased wetting events such as irrigation. To alter it the protection would need to be turned off.

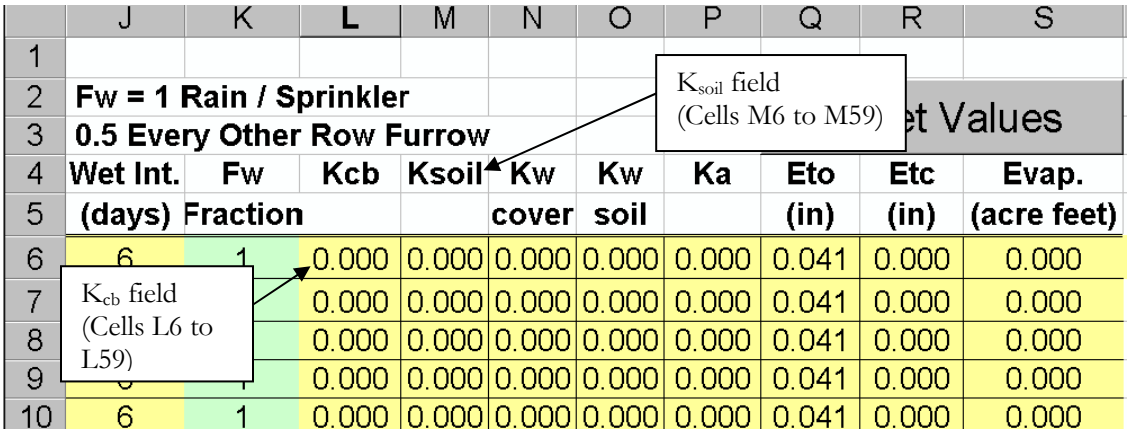


F_W FRACTION FIELD

This field is a factor when calculating the effect of a wet soil surface. It is determined by the amount of the soil surface wetted by a watering event, such as rain or irrigation. Rain covers the entire surface so a 1.0 is used as compared to every other row furrow irrigation that has a value of 0.5. This column can be altered and reset using the reset button.

K_{CB} FIELD

The K_{cb} field is the unaltered basal coefficient for the cover type. It is found on the K_c values page. It is used in the K_a field to create a monthly averaged, daily basal coefficient.



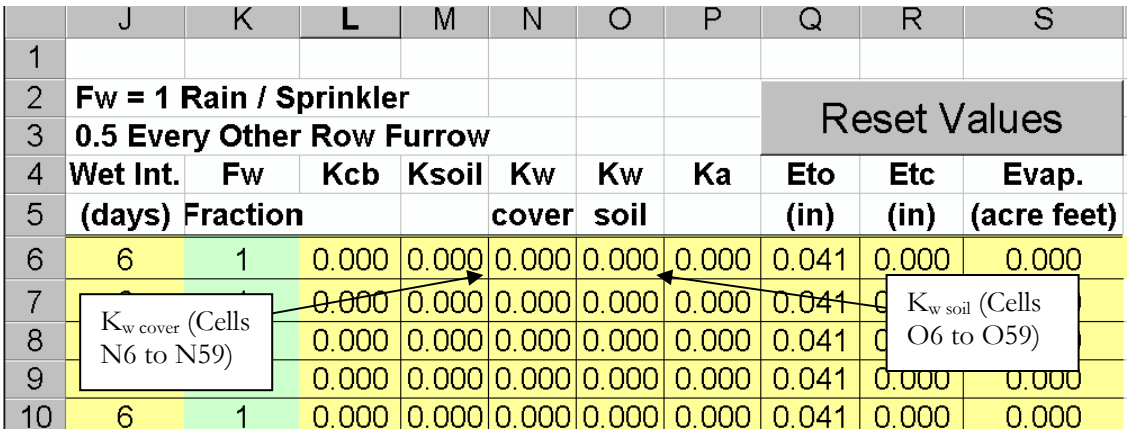
	J	K	L	M	N	O	P	Q	R	S
1										
2	Fw = 1 Rain / Sprinkler									
3	0.5 Every Other Row Furrow									
4	Wet Int.	Fw	Kcb	Ksoil	Kw	Kw	Ka	Eto	Etc	Evap.
5	(days)	Fraction			cover	soil		(in)	(in)	(acre feet)
6	6	1	0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.000
7			0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.000
8			0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.000
9			0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.000
10	6	1	0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.000

K_{SOIL} FIELD

The K_{soil} field is the basal curve value for bare soil not considering other factors such as wetting or residue. It is used similar to the K_{cb} value for the non-growing days in the K_a field. It too is found on the K_c Values page.

$K_{W\ COVER}$ FIELD

The $K_{w\ cover}$ is the increase in evaporation expected for the cover type due to the Wetting Intervals field. It is altered by the amount of residue and is also dependent on the soil type selected. It is used in the K_a field.



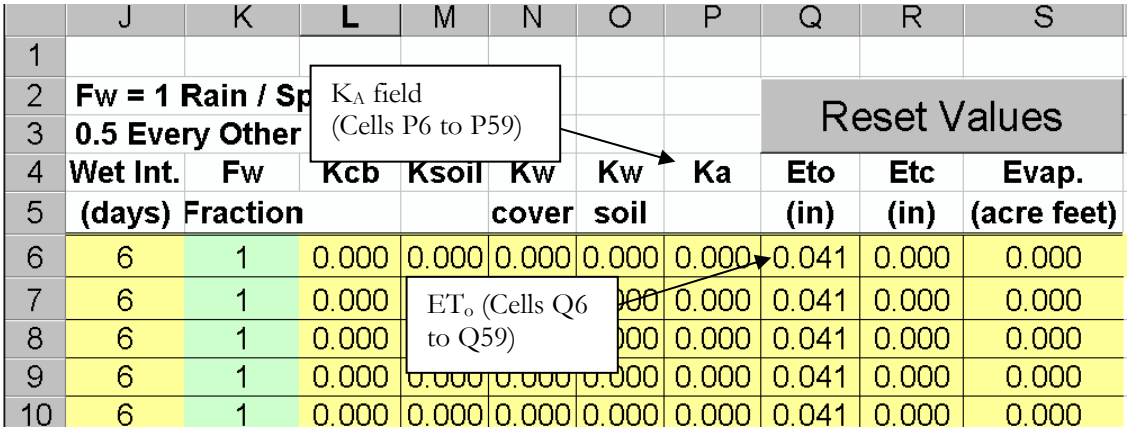
	J	K	L	M	N	O	P	Q	R	S
1										
2	Fw = 1 Rain / Sprinkler							Reset Values		
3	0.5 Every Other Row Furrow									
4	Wet Int.	Fw	Kcb	Ksoil	Kw	Kw	Ka	Eto	Etc	Evap.
5	(days)	Fraction			cover	soil		(in)	(in)	(acre feet)
6	6	1	0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.000
7			0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.000
8			0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.000
9			0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.000
10	6	1	0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.000

$K_{W\ SOIL}$ FIELD

$K_{w\ soil}$ field is the same as the $K_{w\ cover}$ field for a bare soil type and is only used when there are non-growing days. The soil type does not affect it, as it is only for silt loam soil. The difference for altering soil types should be minimal.

K_A FIELD

The K_a field is the climax before the finale. It represents the cover type, including non-growing days, in relation to the reference crop. It includes wetting effects, residue, and growing season. It does not include the area or the time weighting factor. It does add all the K values with weighting for the number of days of growing season or not. It also runs checks so that wetting effects and residue effects are only included when valid (see NEH Part 623 Chapter 2). It is used only in the ET_c field calculation.



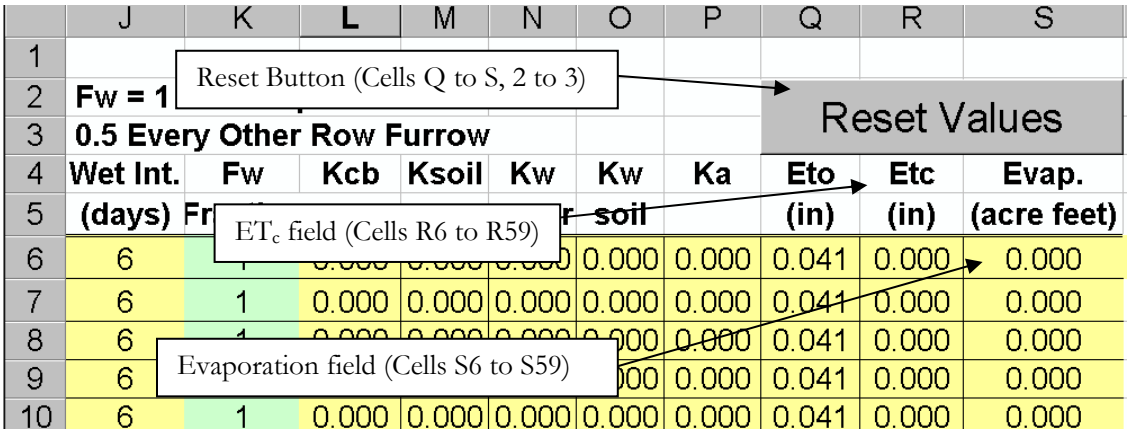
	J	K	L	M	N	O	P	Q	R	S
1										
2	Fw = 1 Rain / Sp							Reset Values		
3	0.5 Every Other									
4	Wet Int.	Fw	Kcb	Ksoil	Kw	Kw	Ka	Eto	Etc	Evap.
5	(days)	Fraction			cover	soil		(in)	(in)	(acre feet)
6	6	1	0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.000
7	6	1	0.000				0.000	0.041	0.000	0.000
8	6	1	0.000				0.000	0.041	0.000	0.000
9	6	1	0.000				0.000	0.041	0.000	0.000
10	6	1	0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.000

ET_O FIELD

Simply, the ET_o for the reference crop for the month and the area. The value comes from the ET_o Values page. It is used with the K_a value to generate the ET_c value.

ET_C FIELD

This is the ET_o value multiplied by the K_a value. It represents the consumptive use flux for the month, not including the Time Weighting Factor field.



	J	K	L	M	N	O	P	Q	R	S
1										
2	Fw = 1							Reset Values		
3	0.5 Every Other Row Furrow									
4	Wet Int.	Fw	Kcb	Ksoil	Kw	Kw	Ka	Eto	Etc	Evap.
5	(days)	Fr			r	soil		(in)	(in)	(acre feet)
6	6					0.000	0.000	0.041	0.000	0.000
7	6	1	0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.000
8	6					000	0.000	0.041	0.000	0.000
9	6					000	0.000	0.041	0.000	0.000
10	6	1	0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.000

EVAPORATION FIELD

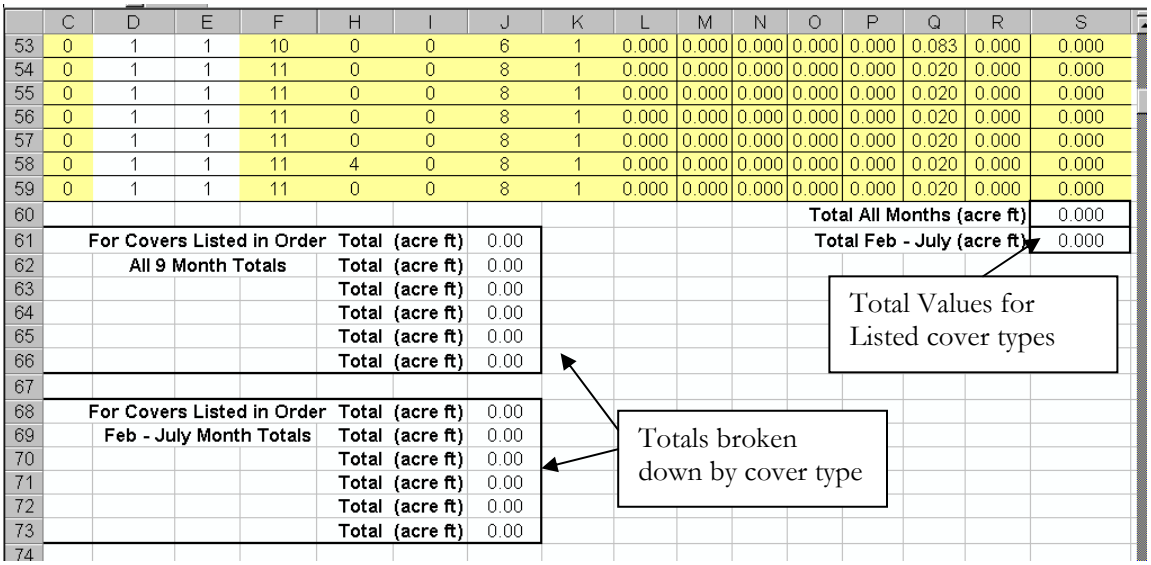
This is the end all field for the cover type and the month. It includes the Area field and the Time Weighting field to find the consumptive use of the cover type for the month in acre-feet.

RESET BUTTON

This button resets several fields after they have been altered for a new calculation.

OUTPUTS

Located at the bottom of the Calculation page are the results. The results have the total consumptive use for all cover types for all year and for just the month of February through July. Also, the total consumptive use is broken down by cover type for all year and for February through July.



	C	D	E	F	H	I	J	K	L	M	N	O	P	Q	R	S
53	0	1	1	10	0	0	6	1	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000
54	0	1	1	11	0	0	8	1	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.000
55	0	1	1	11	0	0	8	1	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.000
56	0	1	1	11	0	0	8	1	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.000
57	0	1	1	11	0	0	8	1	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.000
58	0	1	1	11	4	0	8	1	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.000
59	0	1	1	11	0	0	8	1	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.000
60														Total All Months (acre ft)		0.000
61		For Covers Listed in Order			Total (acre ft)		0.00							Total Feb - July (acre ft)		0.000
62		All 9 Month Totals			Total (acre ft)		0.00									
63					Total (acre ft)		0.00									
64					Total (acre ft)		0.00									
65					Total (acre ft)		0.00									
66					Total (acre ft)		0.00									
67																
68		For Covers Listed in Order			Total (acre ft)		0.00									
69		Feb - July Month Totals			Total (acre ft)		0.00									
70					Total (acre ft)		0.00									
71					Total (acre ft)		0.00									
72					Total (acre ft)		0.00									
73					Total (acre ft)		0.00									
74																

RUNNING A CALCULATION

Let us now run a case sample. The site consists of 2 acres of brome (Grass Cool Tall), 1 acre of switchgrass (Grass Warm Tall), and 1.1 acres of water less than 3.0 feet deep (Water Shallow). The site is located in Hall county (Area 5) on a Horde silt loam (Silt Loam).

ID	Example	Date	5/9/01														
Soil Type	Silt Loam																
Area	5			Time													
Prior or Post	Prior			Weighting		Residue %	Days Residue	Wet Int. (days)	Fw Fraction	Kcb	Ksoil	Kw cover	Kw Soil	Ka	Eto (in)	Etc (in)	Evap. (acre feet)
Month	Cover	Days	Acres	Factor	Month #												
March	Grass Cool Tall	31	2	1	3	95	31	10	1	0.000	0.131	0.000	0.221	0.353	0.046	0.503	0.084
March	Grass Warm Tall	31	1	1	3	85	31	10	1	0.000	0.144	0.000	0.243	0.386	0.046	0.551	0.046
March	Water Shallow	31	1.1	1	3	0	0	10	1	1.050	0.000	0.000	0.000	1.050	0.046	1.497	0.137
March		0	1	1	3	0	0	10	1	0.000	0.000	0.000	0.000	0.000	0.046	0.000	0.000
March		0	1	1	3	0	0	10	1	0.000	0.000	0.000	0.000	0.000	0.046	0.000	0.000
March		0	1	1	3	0	0	10	1	0.000	0.000	0.000	0.000	0.000	0.046	0.000	0.000
April	Grass Cool Tall	30	2	1	4	95	10	6	1	0.350	0.131	0.128	0.209	0.363	0.116	1.264	0.211
April	Grass Warm Tall	30	1	1	4	85	30	6	1	0.000	0.144	0.000	0.229	0.372	0.116	1.296	0.108
April	Water Shallow	30	1.1	1	4	0	0	6	1	1.050	0.000	0.000	0.000	1.050	0.116	3.654	0.335
April	0	0	1	1	4	0	0	6	1	0.000	0.000	0.000	0.000	0.000	0.116	0.000	0.000
April	0	0	1	1	4	4	0	6	1	0.000	0.000	0.000	0.000	0.000	0.116	0.000	0.000
April	0	0	1	1	4	0	0	6	1	0.000	0.000	0.000	0.000	0.000	0.116	0.000	0.000
May	Grass Cool Tall	31	2	1	5	95	0	5	1	0.982	0.000	0.004	0.000	0.984	0.161	4.910	0.818
May	Grass Warm Tall	31	1	1	5	85	0	5	1	0.534	0.000	0.121	0.000	0.588	0.161	2.937	0.245
May	Water Shallow	31	1.1	1	5	0	0	5	1	1.050	0.000	0.000	0.000	1.050	0.161	5.241	0.480
May	0	0	1	1	5	0	0	5	1	0.000	0.000	0.000	0.000	0.000	0.161	0.000	0.000
May	0	0	1	1	5	4	0	5	1	0.000	0.000	0.000	0.000	0.000	0.161	0.000	0.000
May	0	0	1	1	5	0	0	5	1	0.000	0.000	0.000	0.000	0.000	0.161	0.000	0.000
June	Grass Cool Tall	30	2	1	6	95	0	6	1	1.050	0.000	0.000	0.000	1.050	0.225	7.088	1.181
June	Grass Warm Tall	30	1	1	6	85	0	6	1	1.050	0.000	0.000	0.000	1.050	0.225	7.088	0.591
June	Water Shallow	30	1.1	1	6	0	0	6	1	1.050	0.000	0.000	0.000	1.050	0.225	7.088	0.650
June	0	0	1	1	6	0	0	6	1	0.000	0.000	0.000	0.000	0.000	0.225	0.000	0.000
June	0	0	1	1	6	4	0	6	1	0.000	0.000	0.000	0.000	0.000	0.225	0.000	0.000
June	0	0	1	1	6	0	0	6	1	0.000	0.000	0.000	0.000	0.000	0.225	0.000	0.000
July	Grass Cool Tall	31	2	1	7	95	0	6	1	1.050	0.000	0.000	0.000	1.050	0.218	7.096	1.183
July	Grass Warm Tall	31	1	1	7	85	0	6	1	1.050	0.000	0.000	0.000	1.050	0.218	7.096	0.591
July	Water Shallow	31	1.1	1	7	0	0	6	1	1.050	0.000	0.000	0.000	1.050	0.218	7.096	0.650
July	0	0	1	1	7	0	0	6	1	0.000	0.000	0.000	0.000	0.000	0.218	0.000	0.000
July	0	0	1	1	7	4	0	6	1	0.000	0.000	0.000	0.000	0.000	0.218	0.000	0.000
July	0	0	1	1	7	0	0	6	1	0.000	0.000	0.000	0.000	0.000	0.218	0.000	0.000
August	Grass Cool Tall	31	2	1	8	95	0	8	1	1.050	0.000	0.000	0.000	1.050	0.187	6.087	1.014
August	Grass Warm Tall	31	1	1	8	85	0	8	1	1.050	0.000	0.000	0.000	1.050	0.187	6.085	0.507
August	Water Shallow	31	1.1	1	8	0	0	8	1	1.050	0.000	0.000	0.000	1.050	0.187	6.087	0.558
August	0	0	1	1	8	0	0	8	1	0.000	0.000	0.000	0.000	0.000	0.187	0.000	0.000
August	0	0	1	1	8	4	0	8	1	0.000	0.000	0.000	0.000	0.000	0.187	0.000	0.000
August	0	0	1	1	8	0	0	8	1	0.000	0.000	0.000	0.000	0.000	0.187	0.000	0.000
September	Grass Cool Tall	30	2	1	9	95	0	8	1	1.036	0.000	0.000	0.000	1.036	0.139	4.319	0.720
September	Grass Warm Tall	30	1	1	9	85	15	8	1	0.944	0.144	0.009	0.162	0.625	0.139	2.608	0.217
September	Water Shallow	30	1.1	1	9	0	0	8	1	1.050	0.000	0.000	0.000	1.050	0.139	4.379	0.401
September	0	0	1	1	9	0	0	8	1	0.000	0.000	0.000	0.000	0.000	0.139	0.000	0.000
September	0	0	1	1	9	4	0	8	1	0.000	0.000	0.000	0.000	0.000	0.139	0.000	0.000
September	0	0	1	1	9	0	0	8	1	0.000	0.000	0.000	0.000	0.000	0.139	0.000	0.000
October	Grass Cool Tall	31	2	1	10	95	16	10	1	0.973	0.131	0.003	0.133	0.606	0.092	1.730	0.288
October	Grass Warm Tall	31	1	1	10	85	31	10	1	0.000	0.144	0.000	0.146	0.289	0.092	0.825	0.069
October	Water Shallow	31	1.1	1	10	0	0	10	1	1.050	0.000	0.000	0.000	1.050	0.092	2.995	0.275
October	0	0	1	1	10	0	0	10	1	0.000	0.000	0.000	0.000	0.000	0.092	0.000	0.000
October	0	0	1	1	10	4	0	10	1	0.000	0.000	0.000	0.000	0.000	0.092	0.000	0.000
October	0	0	1	1	10	0	0	10	1	0.000	0.000	0.000	0.000	0.000	0.092	0.000	0.000
November	Grass Cool Tall	30	2	1	11	95	30	15	1	0.000	0.131	0.000	0.174	0.305	0.021	0.192	0.032
November	Grass Warm Tall	30	1	1	11	85	30	15	1	0.000	0.144	0.000	0.190	0.334	0.021	0.210	0.018
November	Water Shallow	30	1.1	1	11	0	0	15	1	1.050	0.000	0.000	0.000	1.050	0.021	0.662	0.061
November	0	0	1	1	11	0	0	15	1	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.000
November	0	0	1	1	11	4	0	15	1	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.000
November	0	0	1	1	11	0	0	15	1	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.000
															Total All Months (acre ft)		11.470
				For Covers Listed in Order				5.53							Total Feb - July (acre ft)		7.310
				All 9 Month Totals				2.39									
				Total (acre ft)				3.55									
				Total (acre ft)				0.00									
				Total (acre ft)				0.00									
				Total (acre ft)				0.00									
				For Covers Listed in Order				3.48									
				Feb - July Month Totals				1.58									
				Total (acre ft)				2.25									
				Total (acre ft)				0.00									
				Total (acre ft)				0.00									
				Total (acre ft)				0.00									

APPENDIX 5 FROM PLATTE RIVER REPORT - COVER TYPE NOTES

To determine the cover types needed for evaluation, first, what was actually found on the sites was identified. All the collected field data was based on the predominant plant(s) existing on the sites. Knowing the actual plant species that covered the sites, the appropriate cover types were determined and plants with a similar evapotranspiration (ET) rate were grouped together.

Cover type acres were measured to the nearest tenth of an acre in the field. Acre values in Tables 1 through 4 go beyond a tenth because of weighting the percentage of each month for cover types.

Water/Bare Soil and Water/Weed Mix shown in Tables 1 through 4 represents a cover type where the water level fluctuates on the site. Parts of a month or some months of the year have water while the rest of the time the site is bare soil or annual weeds. The evaporation/ET for Water, Bare Soil and Weeds was evaluated separately for these sites and averaged for the year using the Excel spreadsheet.

Bare Soil:

- Includes non-vegetated soil and contains a wetting cycle from likely storm events related to local climatic conditions. This gave bare soil a higher evaporative rate compared to dry soil.
- Areas identified as gravel and farmstead were included in this cover type. Areas of concrete and blacktop were given a water use value of zero for the purposes of this evaluation.
- Many structures were identified as being bare soil for a couple years after construction and until they held water and vegetated for the remainder of the practice life span (15 years for grade stabilization structures and 20 years for ponds). Given this situation, bare soil was not evaluated for periods of four years or less. The site was instead considered to be water and/or vegetation as identified for the majority of the practice life.

Cropland cover types of Corn, Millet, Sorghum, Soybeans, Sudan, Sunflower and Winter Wheat have a higher ET than what the plant uses during the growing season. Included with these crops ET's is a factor accounting for soil evaporation with varying residue amounts for the non-growing season of the year. Residue amounts used for crops came off the field data form based on field conditions.

Cropland cover types of Alfalfa and Clover contain a cutting cycle that is accounted for using an assumption of three cuttings per year. A 55% residue amount during the non-growing season was used to calculate ET.

Wild sunflowers were not evaluated using the ET values for sunflower as a crop. Instead, wild sunflowers were placed in the Weeds Tall cover type.

Grass Cool Short:
- Includes cool season grasses less than 3 inches tall.
- ET calculated using 55% residue for the non-growing season.
- No sites were evaluated for this report using this cover type.

Grass Cool Mid:
- Includes cool season grasses 3 to 5 inches tall.
- ET calculated using 95% residue for the non-growing season.
- No sites were evaluated for this report using this cover type.

Grass Cool Tall:
- Includes cool season grasses over 5 inches tall.
- ET calculated using 95% residue for the non-growing season.
- Includes smooth brome, redtop, fescues, bluegrass, wild oats, western wheatgrass, intermediate wheatgrass, FAC grasses, FACU grasses, and what was simply called grass, cool season and grasses tall.
- Includes sites where mixes of warm and cool season grasses were identified together.

Grass Warm Short:
- Includes warm season grasses less than 3 inches tall.
- ET calculated using 55% residue for the non-growing season.
- No sites were evaluated for this report using this cover type.

Grass Warm Mid:
- Includes warm season grasses 3 to 5 inches tall.
- ET calculated using 85% residue for the non-growing season.
- Includes buffalograss.

Grass Warm Tall:
- Includes warm season grasses over 5 inches tall.
- ET calculated using 85% residue for the non-growing season.
- Includes little bluestem, big bluestem, sand bluestem, switchgrass, blue grama, Indiangrass, tall dropseed, sand dropseed, sand paspalum, and what was simply called warm native, native grasses and warm season.

Trees, Conifers:
- Includes pines and cedar.
- ET calculated using 50% residue for the non-growing season.

Trees, Cottonwood:

- Includes cottonwood trees and what was identified as riparian area along creek.
- ET calculated using 50% residue for the non-growing season.

Trees, NonRiparian:

- Includes upland woody species such as ash, hackberry, elm, buckbrush, and what was identified as woody vegetation, woody brush, trees and brush.
- ET calculated using 50% residue for the non-growing season.

Trees, Willow:

- Includes willow species.
- ET calculated using 50% residue for the non-growing season.

Water < 1 meter (approximately 3 feet) in depth:

- Includes shallow water bodies that hold water less than one meter in depth.
- Includes water bodies that hold water for only part of the year and go dry despite during the period of holding water the depth may be over a meter.
- Includes water bodies that hold water all year at a depth greater than one meter, but draw down to within a meter of the bottom at any time in the year.

Water > 1 meter (approximately 3 feet) in depth:

- For water bodies having a depth greater than one meter for the entire year, the deep water (>1 meter) portion is the pool area that maintains a depth greater than one meter (e.g. the shore area would be considered shallow water).
- See example in Appendix 6 for determining the deep water area of water bodies.

Weeds Short:

- Less than 3 feet tall and over 20% canopy cover.
- ET calculated using 50% residue for the non-growing season.
- Includes kochia/fireweed, pigweed, curly dock, buffalobur and what was identified as weeds and annual weeds.

Weeds Short Sparse:

- Less than 3 feet tall and 20% canopy cover or less.
- ET calculated using 20% residue for the non-growing season.
- Includes kochia/fireweed, pigweed, curly dock, and buffalobur.

Weeds Tall:

- 3 feet and taller and over 20% canopy cover.
- ET calculated using 70% residue for the non-growing season.
- Includes cocklebur, ironweed and wild sunflower.

Weeds Tall Sparse:
- 3 feet and taller and 20% canopy cover or less.
- ET calculated using 40% residue for the non-growing season.
- Includes cocklebur, ironweed and wild sunflower.

Wet Cattail/Bulrush Moist:
- No standing water on the soil surface.
- ET calculated using 95% residue for non–growing season.
- ET calculated using a killing frost.
- Includes cattail, bulrush, OBL wetland plants, prairie cordgrass and smartweed.

Wet Cattail/Bulrush Standing Water:
- Standing water on the soil surface.
- ET calculated using 95% residue for non-growing season.
- ET calculated using a killing frost.
- No sites were evaluated for this report using this cover type.

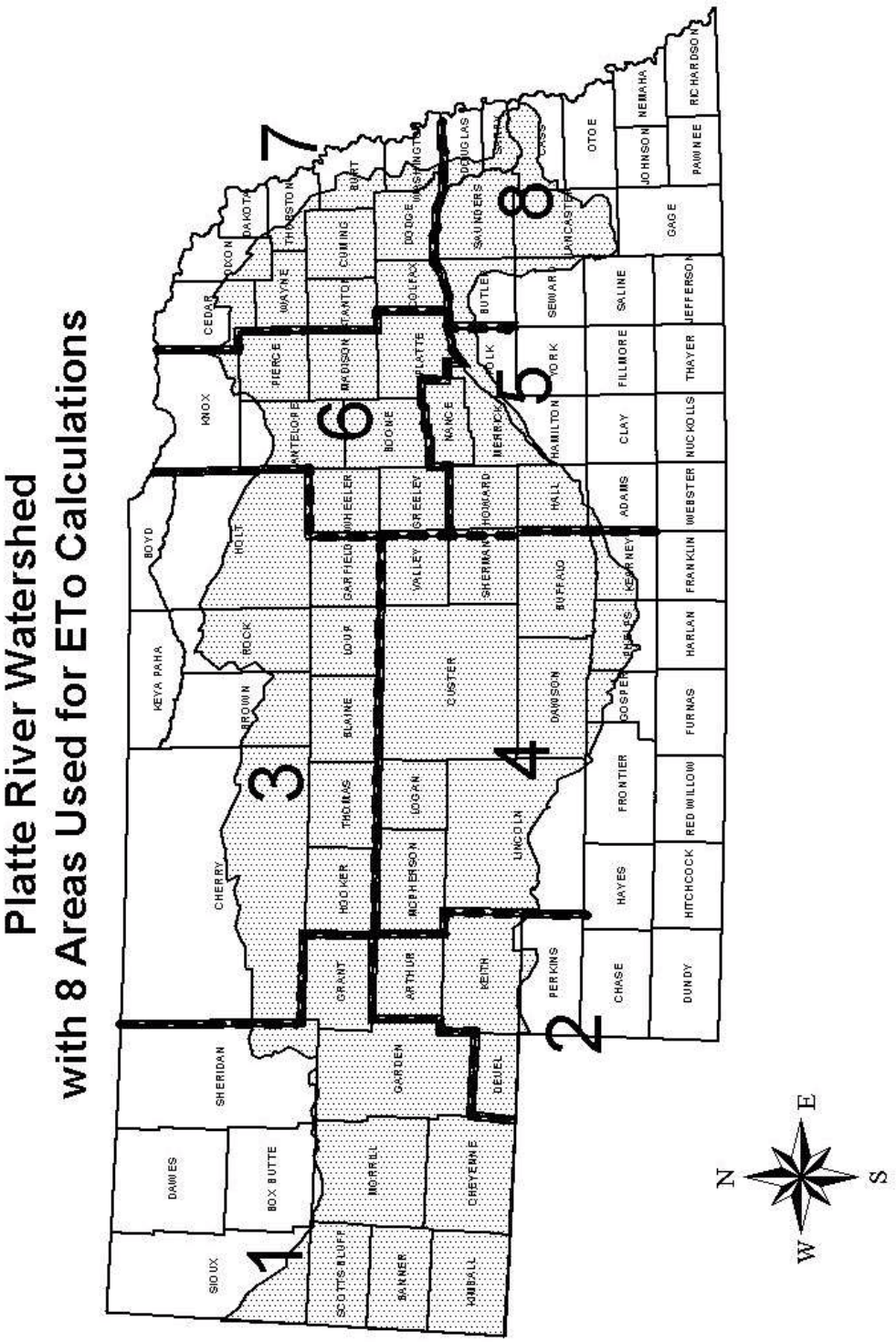
Wet Linear:
- For narrow linear wetlands.
- ET calculated using 95% residue for non–growing season.
- ET calculated using a killing frost.
- No sites were evaluated for this report using this cover type.

Wet Short Veg Moist:
- No standing water on the soil surface.
- ET calculated using 95% residue for non-growing season.
- ET calculated using a killing frost.
- Includes sedge, rush, saltgrass and FACW plants.

Wet Short Veg Standing Water:
- Standing water on the soil surface.
- ET calculated using 95% residue for non-growing season.
- ET calculated using a killing frost.
- No sites were evaluated for this report using this cover type.

Wet Tall Grasses:
- No standing water on the soil surface.
- ET calculated using 95% residue for non-growing season.
- ET calculated using a killing frost.
- Includes reed canarygrass.

APPENDIX 4 FROM PLATTE RIVER REPORT - MAP OF NEBRASKA DIVIDED INTO AREAS



Appendix 5 from Platte River Report - Yearly Consumptive Use Values

Evapotranspiration Flux in Inches

Location :	Area 1		Area 2		Area 3		Area 4		Area 5		Area 6		Area 7		Area 8		Range of Values For All Year	
Duration:	All Year	Feb-July	All Year	Feb-July	All Year	Feb-July	All Year	Feb-July	All Year	Feb-July	All Year	Feb-July	All Year	Feb-July	All Year	Feb-July		
Cover Type																		
Bare Soil	19.9	13.4	18.9	12.7	17.4	11.4	19.5	13.1	20.4	13.3	16.3	11.1	18.1	11.9	19.9	13.1	16.3	20.4
C Alfalfa	39.1	26.8	37.4	25.7	33.0	22.6	33.7	23.4	33.9	23.5	31.3	21.8	31.6	22.1	33.0	22.9	31.3	39.1
C Clover	34.7	23.7	33.2	22.7	29.3	20.0	30.0	20.6	30.2	20.8	28.0	19.3	28.3	19.5	29.7	20.4	28.0	34.7
C Corn	33.8	18.2	32.5	17.6	28.6	15.5	29.3	16.2	29.2	16.1	27.0	15.0	27.2	15.3	29.3	16.9	27.0	33.8
C Millet	28.1	18.0	27.1	17.4	24.0	15.3	24.6	15.9	24.9	16.0	22.7	14.8	23.0	14.9			22.7	28.1
C Sorghum	32.2	18.8	31.0	18.2	27.4	16.0	27.9	16.6	28.0	16.6	25.8	15.5	26.1	15.7	27.6	16.6	25.8	32.2
C Soybeans	34.0	19.1	32.7	18.5	28.8	16.3	29.4	16.9	29.3	16.9	27.1	15.7	27.3	15.9	29.3	17.4	27.1	34.0
C Sudan	27.4	19.5	26.3	18.9	23.6	16.6	24.2	17.1	24.7	17.3	22.1	16.0	22.7	16.1	24.1	17.0	22.1	27.4
C Sunflower	29.7	14.0	28.8	13.9	25.2	12.1	26.0	12.9	26.2	13.0	23.9	11.9	24.1	12.1	26.1	13.5	23.9	29.7
C WinterWheat	23.7	18.4	23.1	17.9	20.0	15.2	22.0	16.9	22.5	16.9	19.7	15.3	20.6	15.6	22.2	16.6	19.7	23.7
Grass Cool Mid	36.9	22.8	35.1	21.7	31.2	19.4	31.7	19.8	31.8	20.0	29.4	18.5	29.6	18.8	30.7	19.5	29.4	36.9
Grass Cool Short	36.2	22.5	34.5	21.3	30.5	19.0	31.2	19.6	31.5	19.8	28.9	18.3	29.2	18.6	30.5	19.4	28.9	36.2
Grass Cool Tall	38.6	23.9	36.7	22.7	32.6	20.3	33.1	20.7	33.2	20.9	30.7	19.4	30.9	19.7	32.0	20.3	30.7	38.6
Grass Pasture Good	35.5	22.1	33.9	21.0	30.0	18.7	30.6	19.2	30.7	19.4	28.4	18.0	28.6	18.2	29.7	18.9	28.4	35.5
Grass Pasture Poor	39.3	24.6	37.4	23.3	33.1	20.8	33.8	21.4	34.1	21.7	31.3	20.0	31.6	20.3	32.8	21.0	31.3	39.3
Grass Warm Mid	31.9	20.8	30.3	19.8	27.2	17.7	27.5	18.1	27.6	18.2	25.4	16.9	25.8	17.2	26.8	17.8	25.4	31.9
Grass Warm Short	29.5	19.2	28.2	18.4	25.2	16.4	25.8	17.0	26.1	17.1	23.9	15.9	24.3	16.1	25.6	16.9	23.9	29.5
Grass Warm Tall	33.2	21.7	31.6	20.6	28.3	18.5	28.6	18.9	28.7	19.0	26.5	17.6	26.9	17.9	27.8	18.5	26.5	33.2
Trees,Conifers	44.3	27.6	42.4	26.4	36.8	23.1	38.1	24.0	38.3	24.2	35.1	22.3	35.2	22.5	36.7	23.3	35.1	44.3
Trees,Cottonwood	61.3	38.5	58.4	36.5	52.0	32.8	52.4	33.3	52.4	33.4	48.6	31.2	49.1	31.6	50.7	32.6	48.6	61.3
Trees,NonRiparian	36.4	22.2	34.7	21.1	30.8	18.9	31.4	19.5	31.6	19.6	29.1	18.2	29.4	18.5	30.6	19.2	29.1	36.4
Trees,Willow	58.9	38.0	56.0	36.0	49.8	32.2	50.4	32.9	50.4	33.1	46.8	30.8	47.2	31.3	48.9	32.3	46.8	58.9
Water < 1 m Depth	44.7	28.0	42.8	26.8	37.2	23.4	38.4	24.3	38.7	24.6	35.4	22.6	35.5	22.8	37.1	23.7	35.4	44.7
Water > 1 m Depth	35.1	20.0	33.7	19.1	29.1	16.7	30.3	17.4	30.6	17.6	27.8	16.1	27.8	16.3	29.2	16.9	27.8	35.1
Weeds Short	43.3	26.3	41.2	25.0	36.6	22.3	37.2	22.8	37.4	23.1	34.4	21.4	34.7	21.7	36.1	22.5	34.4	43.3
Weeds Short Sparse	34.9	21.6	33.3	20.6	29.5	18.4	30.3	19.0	30.7	19.3	28.2	17.8	28.5	18.1	30.1	19.1	28.2	34.9
Weeds Tall	27.8	12.7	27.0	12.6	23.6	11.0	24.2	11.5	24.2	11.6	22.3	10.7	22.4	10.8	23.7	11.7	22.3	27.8
Weeds Tall Sparse	25.1	13.3	24.6	13.3	21.5	11.5	22.4	12.3	22.7	12.5	20.8	11.5	20.9	11.6	22.6	12.7	20.8	25.1
Wet Cattail/Bulrush Moist	41.8	25.9	39.8	24.5	35.4	22.0	35.8	22.4	35.8	22.5	33.2	21.0	34.8	21.4	36.0	22.1	33.2	41.8
Wet Cattail/Bulrush Standing Water	49.1	30.7	47.0	29.3	40.9	25.7	42.1	26.6	42.3	26.8	38.9	24.7	39.3	25.0	40.9	25.9	38.9	49.1
Wet Linear	55.6	34.7	53.2	33.1	46.5	29.1	47.7	30.0	47.8	30.2	44.0	28.0	44.7	28.3	46.5	29.3	44.0	55.6
Wet Short Veg Moist	38.9	23.9	37.0	22.7	32.9	20.3	33.3	20.7	33.4	20.8	30.9	19.4	32.3	19.8	33.5	20.5	30.9	38.9
Wet Short Veg Standing Water	46.6	29.2	44.6	27.8	38.8	24.4	40.1	25.3	40.3	25.5	36.9	23.5	36.9	23.6	38.6	24.5	36.9	46.6
Wet Tall Grasses	41.0	24.9	39.0	23.6	34.6	21.1	35.1	21.5	35.2	21.6	32.6	20.2	34.1	20.6	35.3	21.3	32.6	41.0

ID		Date	11/9/2009
Soil Type	Silt Loam		
Area	8		
Prior or Post			

Fw = 1 Rain / Sprinkler
Fw = 0.5 Every Other Row Furrow

Month	Cover	Days	Acres	Time Weighting Factor	Month #	Residue %	Days Residue	Wet Int. (days)	Fw Fraction	Kcb	Ksoil	Kw cover	Kw soil	Ka	Eto (in)	Etc (in)	Evap. (acre feet)
March		0	1	1	3	0	0	6	1	0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.000
March		0	1	1	3	0	0	6	1	0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.000
March		0	1	1	3	0	0	6	1	0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.000
March		0	1	1	3	0	0	6	1	0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.000
March		0	1	1	3	0	0	6	1	0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.000
March		0	1	1	3	0	0	6	1	0.000	0.000	0.000	0.000	0.000	0.041	0.000	0.000
April	0	0	1	1	4	0	0	4	1	0.000	0.000	0.000	0.000	0.000	0.107	0.000	0.000
April	0	0	1	1	4	0	0	4	1	0.000	0.000	0.000	0.000	0.000	0.107	0.000	0.000
April	0	0	1	1	4	0	0	4	1	0.000	0.000	0.000	0.000	0.000	0.107	0.000	0.000
April	0	0	1	1	4	0	0	4	1	0.000	0.000	0.000	0.000	0.000	0.107	0.000	0.000
April	0	0	1	1	4	0	0	4	1	0.000	0.000	0.000	0.000	0.000	0.107	0.000	0.000
April	0	0	1	1	4	0	0	4	1	0.000	0.000	0.000	0.000	0.000	0.107	0.000	0.000
May	0	0	1	1	5	0	0	3	1	0.000	0.000	0.000	0.000	0.000	0.155	0.000	0.000
May	0	0	1	1	5	0	0	3	1	0.000	0.000	0.000	0.000	0.000	0.155	0.000	0.000
May	0	0	1	1	5	0	0	3	1	0.000	0.000	0.000	0.000	0.000	0.155	0.000	0.000
May	0	0	1	1	5	0	0	3	1	0.000	0.000	0.000	0.000	0.000	0.155	0.000	0.000
May	0	0	1	1	5	0	0	3	1	0.000	0.000	0.000	0.000	0.000	0.155	0.000	0.000
May	0	0	1	1	5	0	0	3	1	0.000	0.000	0.000	0.000	0.000	0.155	0.000	0.000
June	0	0	1	1	6	0	0	4	1	0.000	0.000	0.000	0.000	0.000	0.217	0.000	0.000
June	0	0	1	1	6	0	0	4	1	0.000	0.000	0.000	0.000	0.000	0.217	0.000	0.000
June	0	0	1	1	6	0	0	4	1	0.000	0.000	0.000	0.000	0.000	0.217	0.000	0.000
June	0	0	1	1	6	0	0	4	1	0.000	0.000	0.000	0.000	0.000	0.217	0.000	0.000
June	0	0	1	1	6	0	0	4	1	0.000	0.000	0.000	0.000	0.000	0.217	0.000	0.000
June	0	0	1	1	6	0	0	4	1	0.000	0.000	0.000	0.000	0.000	0.217	0.000	0.000
July	0	0	1	1	7	0	0	5	1	0.000	0.000	0.000	0.000	0.000	0.218	0.000	0.000
July	0	0	1	1	7	0	0	5	1	0.000	0.000	0.000	0.000	0.000	0.218	0.000	0.000
July	0	0	1	1	7	0	0	5	1	0.000	0.000	0.000	0.000	0.000	0.218	0.000	0.000
July	0	0	1	1	7	0	0	5	1	0.000	0.000	0.000	0.000	0.000	0.218	0.000	0.000
July	0	0	1	1	7	0	0	5	1	0.000	0.000	0.000	0.000	0.000	0.218	0.000	0.000
July	0	0	1	1	7	0	0	5	1	0.000	0.000	0.000	0.000	0.000	0.218	0.000	0.000
August	0	0	1	1	8	0	0	5	1	0.000	0.000	0.000	0.000	0.000	0.181	0.000	0.000
August	0	0	1	1	8	0	0	5	1	0.000	0.000	0.000	0.000	0.000	0.181	0.000	0.000
August	0	0	1	1	8	0	0	5	1	0.000	0.000	0.000	0.000	0.000	0.181	0.000	0.000
August	0	0	1	1	8	0	0	5	1	0.000	0.000	0.000	0.000	0.000	0.181	0.000	0.000
August	0	0	1	1	8	0	0	5	1	0.000	0.000	0.000	0.000	0.000	0.181	0.000	0.000
August	0	0	1	1	8	0	0	5	1	0.000	0.000	0.000	0.000	0.000	0.181	0.000	0.000
September	0	0	1	1	9	0	0	5	1	0.000	0.000	0.000	0.000	0.000	0.133	0.000	0.000
September	0	0	1	1	9	0	0	5	1	0.000	0.000	0.000	0.000	0.000	0.133	0.000	0.000
September	0	0	1	1	9	0	0	5	1	0.000	0.000	0.000	0.000	0.000	0.133	0.000	0.000
September	0	0	1	1	9	0	0	5	1	0.000	0.000	0.000	0.000	0.000	0.133	0.000	0.000
September	0	0	1	1	9	0	0	5	1	0.000	0.000	0.000	0.000	0.000	0.133	0.000	0.000
September	0	0	1	1	9	0	0	5	1	0.000	0.000	0.000	0.000	0.000	0.133	0.000	0.000
October	0	0	1	1	10	0	0	6	1	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000
October	0	0	1	1	10	0	0	6	1	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000
October	0	0	1	1	10	0	0	6	1	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000
October	0	0	1	1	10	0	0	6	1	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000
October	0	0	1	1	10	0	0	6	1	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000
October	0	0	1	1	10	0	0	6	1	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000
November	0	0	1	1	11	0	0	8	1	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.000
November	0	0	1	1	11	0	0	8	1	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.000
November	0	0	1	1	11	0	0	8	1	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.000
November	0	0	1	1	11	0	0	8	1	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.000
November	0	0	1	1	11	0	0	8	1	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.000
November	0	0	1	1	11	0	0	8	1	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.000
																Total All Months (acre ft)	0.000
																Total Feb - July (acre ft)	0.000

For Covers Listed in Order	**Total (acre ft)**	0.00
All 9 Month Totals	**Total (acre ft)**	0.00
	Total (acre ft)	0.00
	Total (acre ft)	0.00
	Total (acre ft)	0.00
	Total (acre ft)	0.00

For Covers Listed in Order	**Total (acre ft)**	0.00
Feb - July Month Totals	**Total (acre ft)**	0.00
	Total (acre ft)	0.00
	Total (acre ft)	0.00
	Total (acre ft)	0.00
	Total (acre ft)	0.00

Validations

1	Bare Soil	Clay	Post
2	C Alfalfa	Clay Loam	Prior
3	C Clover	Loamy Sand	
4	C Corn	Sand	
5	C Millet	Sandy Loam	
6	C Sorghum	Silt Loam	
7	C Soybeans		
8	C Sudan		
	C Sunflower		
	C WinterWheat		
	CSE Corn		
	CSE Sorghum		
	CSE Soybeans		
	CSE Sudan		
	CSE Sunflower		
	CSE WinterWheat		
	Grass Cool Mid		
	Grass Cool Short		
	Grass Cool Tall		
	Grass Pasture Good		
	Grass Pasture Poor		
	Grass Warm Mid		
	Grass Warm Short		
	Grass Warm Tall		
	Trees,Conifers		
	Trees,Cottonwood		
	Trees,NonRiparian		
	Trees,Willow		
	Water Deep		
	Water Shallow		
	Weeds Short		
	Weeds Short Sparse		
	Weeds Tall		
	Weeds Tall Sparse		
	Wet Cattail/Bulrush Moist		
	Wet Cattail/Bulrush Standing Water		
	Wet Linear		
	Wet Short Veg Moist		
	Wet Short Veg Standing Water		
	Wet Tall Grasses		
	WetEast Cattail/Bulrush Moist		
	WetEast Cattail/Bulrush Standing Water		
	WetEast Linear		
	WetEast Short Veg Moist		
	WetEast Short Veg Standing Water		
	WetEast Tall Grasses		

Month	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8
January	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
February	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
March	0.053	0.048	0.034	0.041	0.046	0.032	0.031	0.041
April	0.115	0.116	0.093	0.109	0.116	0.101	0.100	0.107
May	0.175	0.164	0.146	0.156	0.161	0.148	0.151	0.155
June	0.245	0.231	0.209	0.220	0.225	0.213	0.213	0.217
July	0.285	0.275	0.247	0.232	0.218	0.210	0.215	0.218
August	0.242	0.230	0.206	0.195	0.187	0.178	0.178	0.181
September	0.160	0.155	0.134	0.139	0.139	0.128	0.127	0.133
October	0.094	0.091	0.074	0.088	0.092	0.079	0.076	0.083
November	0.022	0.022	0.013	0.016	0.021	0.013	0.014	0.020
December	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

	Bare Soil	Hay		Crops Areas 1-7							Crops Area 8			
	Bare Soil	***C Alfalfa***	***C Clover***	***C Corn***	***C Millet***	***C Sorghum***	***C Soybeans***	***C Sudan***	***C Sunflower***	***C WinterWheat***	***CSE Corn***	***CSE Sorghum***	***CSE Soybeans***	***CSE Sudan***
January	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.098	0.000	0.000	0.000	0.000
Februar	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.150	0.000	0.000	0.000	0.000
March	0.250	0.465	0.438	0.000	0.000	0.000	0.000	0.000	0.000	1.150	0.000	0.000	0.000	0.000
April	0.250	0.853	0.654	0.000	0.000	0.000	0.000	0.000	0.000	1.135	0.000	0.000	0.000	0.000
May	0.250	1.199	1.012	0.253	0.000	0.253	0.253	0.000	0.000	0.859	0.256	0.253	0.253	0.000
June	0.250	0.879	0.798	0.493	0.394	0.526	0.525	0.494	0.256	0.495	0.563	0.526	0.610	0.494
July	0.250	1.139	1.024	1.033	1.073	1.081	1.118	1.184	0.667	0.280	1.068	1.081	1.137	1.184
August	0.250	0.941	0.759	1.150	0.950	1.100	1.150	1.060	1.139	0.000	1.150	1.100	1.150	1.060
Septem	0.250	0.801	0.791	1.051	0.425	0.798	0.996	0.000	1.111	0.253	1.043	0.798	0.986	0.000
October	0.250	0.403	0.403	0.694	0.000	0.388	0.594	0.000	0.618	0.271	0.691	0.388	0.591	0.000
Novemb	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.610	0.000	0.000	0.000	0.000
Decemb	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.047	0.000	0.000	0.000	0.000

		Grasses and Pasture						
CSE Sunflower	***CSE WinterWheat***	**Grass Cool Mid**	**Grass Cool Short**	**Grass Cool Tall**	**Grass Pasture Good**	**Grass Pasture Poor**	**Grass Warm Mid**	**Grass Warm Short**
0.000	1.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	1.150	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	1.150	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	1.141	0.344	0.337	0.350	0.429	0.442	0.000	0.000
0.000	0.860	0.937	0.891	0.982	0.904	0.995	0.516	0.463
0.265	0.464	1.000	0.950	1.050	0.950	1.050	1.000	0.850
0.736	0.256	1.000	0.950	1.050	0.950	1.050	1.000	0.850
1.148	0.000	1.000	0.950	1.050	0.950	1.050	1.000	0.850
1.103	0.000	0.993	0.950	1.036	0.950	1.011	0.920	0.850
0.609	0.253	0.961	0.950	0.973	0.950	0.958	0.000	0.000
0.000	0.381	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.867	0.000	0.000	0.000	0.000	0.000	0.000	0.000

	Trees					Water		Weeds		
Grass Warm Tall	**Trees,Conifers**	***Trees,Cottonwood***	***Trees,NonRiparian***	***Trees,Willow***	***Water Deep***	**Water Shallow**	**Weeds Short**	**Weeds Short Sparse**	**Weeds Tall**
0.000	1.000	0.000	0.000	0.000	0.750	1.050	0.000	0.000	0.000
0.000	1.000	0.000	0.000	0.000	0.750	1.050	0.000	0.000	0.000
0.000	1.000	0.000	0.000	0.000	0.750	1.050	0.000	0.000	0.000
0.000	1.003	0.253	0.000	0.421	0.750	1.050	0.274	0.267	0.000
0.534	1.025	1.376	0.472	1.645	0.750	1.050	0.884	0.684	0.000
1.050	1.047	1.800	1.050	1.650	0.750	1.050	1.200	0.900	0.258
1.050	1.050	1.800	1.050	1.650	0.750	1.050	1.200	0.900	0.713
1.050	1.050	1.800	1.050	1.650	0.790	1.050	1.200	0.900	1.148
0.944	1.050	1.574	0.973	1.416	1.000	1.050	1.192	0.896	1.066
0.000	1.050	0.793	0.666	0.753	1.220	1.050	1.135	0.878	0.556
0.000	1.050	0.000	0.000	0.000	1.250	1.050	0.000	0.000	0.000
0.000	1.050	0.000	0.000	0.000	1.250	1.050	0.000	0.000	0.000

Wetland Areas 1-6

Weeds Tall Sparse	Wet Cattail/Bulrush Moist	Wet Cattail/Bulrush Standing Water	Wet Linear	Wet Short Veg Moist	Wet Short Veg Standing Water	Wet Tall Grasses
0.000	0.000	1.000	1.000	0.000	1.050	0.000
0.000	0.000	1.000	1.000	0.000	1.050	0.000
0.000	0.000	1.000	1.000	0.000	1.050	0.000
0.000	0.285	1.005	1.009	0.282	1.060	0.283
0.000	0.924	1.138	1.275	0.853	1.100	0.888
0.259	1.200	1.200	1.400	1.100	1.100	1.150
0.561	1.200	1.200	1.400	1.100	1.100	1.150
0.849	1.200	1.200	1.400	1.100	1.100	1.150
0.798	1.180	1.193	1.387	1.088	1.100	1.145
0.481	0.628	1.032	1.065	0.771	1.100	1.088
0.000	0.000	1.000	1.000	0.000	1.100	0.000
0.000	0.000	1.000	1.000	0.000	1.100	0.000

Wetlands Areas 7-8

WetEast Cattail/Bulrush Moist	WetEast Cattail/Bulrush Standing Water	WetEast Linear	WetEast Short Veg Moist	WetEast Short Veg Standing Water	WetEast Tall Grasses
0.000	1.000	1.000	0.000	1.050	0.000
0.000	1.000	1.000	0.000	1.050	0.000
0.000	1.000	1.000	0.000	1.050	0.000
0.308	1.009	1.018	0.302	1.052	0.305
0.950	1.143	1.286	0.877	1.086	0.914
1.200	1.200	1.400	1.100	1.100	1.150
1.200	1.200	1.400	1.100	1.100	1.150
1.200	1.200	1.400	1.100	1.100	1.150
1.200	1.200	1.400	1.100	1.100	1.150
0.875	1.123	1.245	0.913	1.100	1.113
0.000	1.000	1.000	0.000	1.100	0.000
0.000	1.000	1.000	0.000	1.100	0.000

Cover	Amount Residue	March	April	May	June	July	August	September	October	November
Bare Soil	0	31	30	31	30	31	31	30	31	30
C Alfalfa	55	25	0	0	0	0	0	0	11	30
C Clover	55	25	0	0	0	0	0	0	11	30
C Corn	40	31	30	5	0	0	0	0	11	30
C Millet	40	31	30	31	0	0	0	20	31	30
C Sorghum	40	31	30	15	0	0	0	0	21	30
C Soybeans	40	31	30	15	0	0	0	0	21	30
C Sudan	40	31	30	31	0	0	16	30	31	30
C Sunflower	40	31	30	31	5	0	0	0	11	30
C WinterWheat	40	0	0	0	0	26	31	15	0	0
CSE Corn	40	31	30	0	0	0	0	0	11	30
CSE Sorghum	40	31	30	15	0	0	0	0	21	30
CSE Soybeans	40	31	30	10	0	0	0	0	21	30
CSE Sudan	40	31	30	31	0	0	16	30	31	30
CSE Sunflower	40	31	30	31	0	0	0	0	11	30
CSE WinterWheat	40	0	0	0	0	31	31	30	5	0
Grass Cool Mid	95	31	10	0	0	0	0	0	16	30
Grass Cool Short	55	31	10	0	0	0	0	0	16	30
Grass Cool Tall	95	31	10	0	0	0	0	0	16	30
Grass Pasture Good	95	31	10	0	0	0	0	0	16	30
Grass Pasture Poor	55	31	10	0	0	0	0	0	16	30
Grass Warm Mid	85	31	30	0	0	0	0	15	31	30
Grass Warm Short	55	31	30	0	0	0	0	15	31	30
Grass Warm Tall	85	31	30	0	0	0	0	15	31	30
Trees,Conifers	50	0	0	0	0	0	0	0	0	0
Trees,Cottonwood	50	31	15	0	0	0	0	0	16	30
Trees,NonRiparian	50	31	30	0	0	0	0	0	16	30
Trees,Willow	50	31	0	0	0	0	0	0	16	30
Water Deep	0	0	0	0	0	0	0	0	0	0
Water Shallow	0	0	0	0	0	0	0	0	0	0
Weeds Short	50	31	15	0	0	0	0	0	16	30
Weeds Short Sparse	20	31	15	0	0	0	0	0	16	30
Weeds Tall	70	31	30	31	0	0	0	0	16	30
Weeds Tall Sparse	40	31	30	31	0	0	0	0	16	30
Wet Cattail/Bulrush Moist	95	31	15	0	0	0	0	0	16	30
Wet Cattail/Bulrush Standing Water	95	0	0	0	0	0	0	0	0	0
Wet Linear	95	0	0	0	0	0	0	0	0	0
Wet Short Veg Moist	95	31	15	0	0	0	0	0	16	30
Wet Short Veg Standing Water	95	0	0	0	0	0	0	0	0	0
Wet Tall Grasses	95	31	15	0	0	0	0	0	16	30
WetEast Cattail/Bulrush Moist	95	31	11	0	0	0	0	0	0	30
WetEast Cattail/Bulrush Standing Water	95	0	0	0	0	0	0	0	0	0
WetEast Linear	95	0	0	0	0	0	0	0	0	0
WetEast Short Veg Moist	95	31	11	0	0	0	0	0	0	30
WetEast Short Veg Standing Water	95	0	0	0	0	0	0	0	0	0
WetEast Tall Grasses	95	31	11	0	0	0	0	0	0	30

res	kcb	percent =	
95	0.35	0.99545	0.348408
95	0.35	(1-IF(k>=1,0,IF(k<0.25,1,1.333333*(1-k)))*r/200)	
95	0.35	0.619048	0.247083
95	0.35	0.619048	
		k*(1-r/200*(1-(k-0.25)/.75/k))	
		0	

Month	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8
January	30	30	30	30	30	30	30	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
February	30	30	30	30	15	30	15	15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
March	15	10	15	10	10	10	8	6	0.280	0.239	0.245	0.301	0.422	0.231	0.345	0.330
April	8	10	8	8	6	6	6	4	0.252	0.238	0.314	0.312	0.398	0.338	0.347	0.352
May	5	5	5	4	5	4	4	3	0.315	0.335	0.316	0.360	0.388	0.387	0.338	0.386
June	6	5	6	5	6	5	5	4	0.276	0.255	0.270	0.324	0.275	0.212	0.306	0.345
July	8	6	6	6	6	6	6	5	0.191	0.201	0.207	0.277	0.242	0.201	0.241	0.263
August	10	10	8	8	8	6	6	5	0.146	0.166	0.217	0.244	0.289	0.159	0.259	0.307
September	10	10	8	8	8	6	6	5	0.178	0.157	0.225	0.234	0.282	0.209	0.283	0.295
October	15	15	15	15	10	10	8	6	0.145	0.131	0.175	0.190	0.253	0.183	0.221	0.238
November	30	30	15	30	15	15	15	8	0.158	0.155	0.160	0.174	0.331	0.161	0.198	0.237
December	30	30	30	30	15	30	15	10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Wet Interval	Clay	Clay Loam	Loamy Sand	Sand	Sandy Loam	Silt Loam
1	1.000	1.000	1.000	1.000	1.000	1.000
2	0.842	0.811	0.711	0.646	0.750	0.776
3	0.746	0.696	0.535	0.431	0.598	0.640
4	0.672	0.608	0.402	0.323	0.482	0.536
5	0.611	0.535	0.321	0.259	0.385	0.450
6	0.558	0.472	0.268	0.215	0.321	0.375
7	0.551	0.415	0.229	0.185	0.275	0.322
8	0.467	0.363	0.201	0.162	0.241	0.281
9	0.427	0.323	0.178	0.144	0.214	0.250
10	0.389	0.291	0.161	0.129	0.193	0.225
11	0.354	0.264	0.146	0.118	0.175	0.205
12	0.325	0.242	0.134	0.108	0.161	0.188
13	0.300	0.224	0.124	0.099	0.148	0.173
14	0.278	0.208	0.115	0.092	0.138	0.161
15	0.260	0.194	0.107	0.086	0.128	0.150
16	0.243	0.182	0.100	0.081	0.120	0.141
17	0.229	0.171	0.094	0.076	0.113	0.132
18	0.216	0.161	0.089	0.072	0.107	0.125
19	0.205	0.153	0.085	0.068	0.101	0.118
20	0.195	0.145	0.080	0.065	0.096	0.113
21	0.185	0.138	0.076	0.062	0.092	0.107
22	0.177	0.132	0.073	0.059	0.088	0.102
23	0.169	0.126	0.070	0.056	0.084	0.098
24	0.162	0.121	0.067	0.054	0.080	0.094
25	0.156	0.116	0.064	0.050	0.077	0.090
26	1.500	0.112	0.062	0.050	0.074	0.087
27	0.144	0.108	0.059	0.048	0.071	0.083
28	0.139	0.104	0.057	0.046	0.069	0.080
29	0.134	0.100	0.055	0.045	0.066	0.078
30	0.130	0.097	0.054	0.043	0.064	0.075

March	3	31
April	4	30
May	5	31
June	6	30
July	7	31
August	8	31
September	9	30
October	10	31
November	11	30