

TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE

STATE OF OKLAHOMA

NATURAL RESOURCES CONSERVATION SERVICE

RANGE TECHNICAL NOTE OK-18

June 2, 2014

TO: All Offices

FROM: Steven J. Glasgow
State Resource Conservationist

RE: Fencing Guidelines for Conservation Priorities.

For many years the effectiveness of fencing on animal movement is well acknowledged by some and questioned by others in the grazing lands community.

In a variety of publications and resources the use of rotational grazing and the cross fences that facilitate that grazing method have been touted for many years. Rotational grazing advocates state that an improvement in the forage production leads to more profitable agricultural businesses and conservation objectives at the same time.

This same effectiveness of fence on conservation objectives as well as profitability has then been questioned by many in the science community. They contend that research based scientific experiments do not show any improvement between rotational systems as compared to continuously grazed landscapes. This research leads them to contend that installation of fence may be used incorrectly in many situations.

Grazing land resource concerns can be solved with differing management activities and many potential grazing strategies exist to complete that purpose. The effectiveness is typically based less on the type of system used and more based in the management of the system once it is installed. The goal of this technical note is to provide NRCS planners guidance on how to best deliver alternatives to land users during the planning process that treat resource concerns, and when fencing may be viewed as one of those alternatives.

Conservation Priorities of Fence Planning and Design



General

The first question that should be asked when evaluating a fencing project is; what is the purpose of the fence being planned? Fence as a conservation practice is to be used to facilitate a grazing management plan, and as such proper inventorying of the entire grazing resource is essential in the planning process. While this practice may be applied to a landscape once a resource concern has been identified, the evaluation of multiple alternatives allows a **land owner** the choice of action for the identified resource concern. If the control of livestock or wildlife is needed to solve the identified resource concern, minor management changes by use of mineral placement or location of water may be adopted first before planning fencing. Oklahoma Technical Note Range – OK-14 outlines the use of patch burning as another viable and cost effective way to manage the landscape with a shifting mosaic of fire and grazing. Evaluating multiple alternatives to resource concerns is the job of a planner but understanding that land users are ultimately the decision maker in the process will drive the conservation plan.

Forage Budgeting

Fencing design depends most on whole farm forage budgeting that will match animal demand to the amount of forage that can be produced on the operation. Stocking rates are the key to successful livestock production and should be based on a good forage inventory. There is no other single important action that can be taken to improve livestock production or wildlife habitat other than implementation of a proper stocking rate. A prescribed grazing plan should achieve acceptable livestock production on the land unit involved while maintaining a healthy and functioning ecosystem. The principal agent for manipulation of forage on the operation is the grazing animal and should be used as such. Additional practices are applied when the control of those animals cannot effectively change the vegetation toward the objectives of the producer.

Facilitating Practice : Fence

Fencing should facilitate the allocation of forage resources when a resource concern has been identified and should be done with a direct purpose when determining placement of fence and the type of materials to be used for construction. Fences may divide diverse native landscapes where production is variable and/or overuse of an area is causing a shift in the plant community that is unable or unwilling to be managed by another facilitating practice (e.g. Water development or Prescribed Burning). Fences can protect sensitive areas from grazing animals and can control access to problematic areas where livestock grazing is not recommended. Planning of fences should consider soil properties, topography, management, and watering facilities just to name a few. The purposes and the design of a fence should

be well thought out especially when permanent fences are being constructed.

Some common resource concerns where fence can facilitate grazing management and the tools used to document the resource concern(s)..

1. Degraded Plant Condition : Undesirable plant productivity and health
 - a. *Rangeland – Similarity Index of less than 60 for desired plant community and has a negative trend or range health rating of slight to moderate or less for the biotic integrity rating.*
 - b. *Pasture – Pasture condition score of less than 30*

Some common uses for fence use include:

1. Introduced forages that grow in different seasons
2. Pasture has terrain that restricts use
3. Area of pasture to be converted to hay land for harvest
4. Remove access from a sensitive area.
5. Native grasslands have diversity in production and or plant communities (e.g. riparian areas vs. uplands)

Fencing Materials

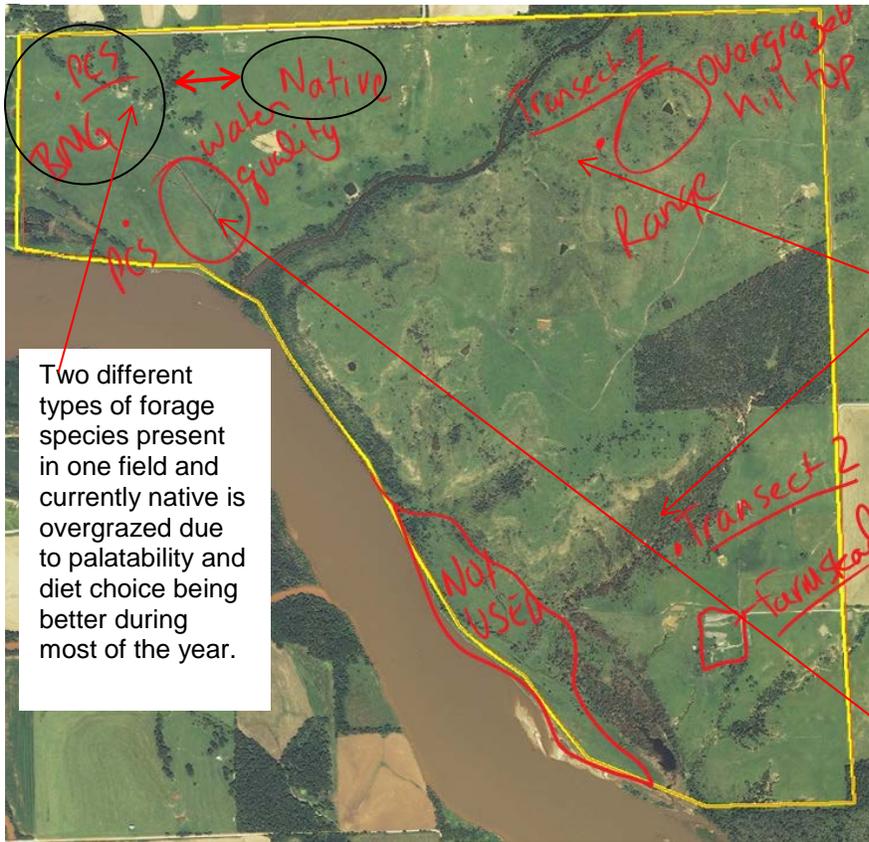
Fencing can be done with a variety of materials and typically should be done with the least cost solution that is needed to treat the resource concern. This is due to the large initial investment and long term maintenance associated with fence construction and the recuperation of that investment by the producer. Below is short description of some common fencing materials.

- Barbed Wire Fences- Typical fences are made of 4 or more wires that are stretched and attached to posts that are typically spaced between 15 and 25 feet apart. Standard barbed wired fences can be a costly up front cost although they are typically seen as a long term investment lasting 20 to 50 years.
- Woven Wire Fences – Typical fences are used because of the size of livestock in question where a greater security is needed to ensure that the animals in questions cannot escape the pasture. It should be noted that these fences come in a variety of spacing sizes and may impede and or deter some wildlife movement.
- Electric – Typically used in place of the previous two fences where pasture division is wanted but done at a lower initial investment. These fences typically require less initial labor for construction but regular maintenance to insure that electric is operating properly can be a downfall for some producers.

Conservation Effects of Fence

From NRCS guidelines most effects of fence construction are seen at best as a neutral effect on solving a resource concern. The following pages contain an example of planning where fencing may be used as a potential solution to a resource concern. In this example we review forage types, ecological sites of native forage sources, and topography that may all be limiting grazing and affecting plant condition negatively.

Planning unit is along a water course with multiple water features within it. Land unit currently has no fences and is being over utilized in some areas due to different forage types, ecological sites with different production rates and varied topography.



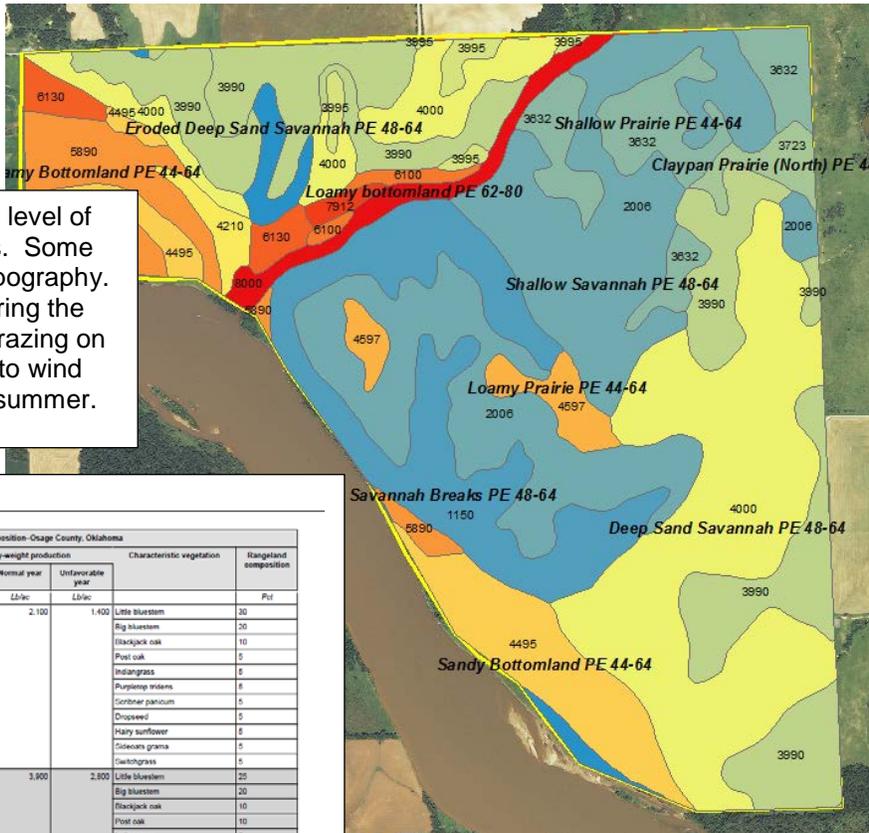
Two different types of forage species present in one field and currently native is overgrazed due to palatability and diet choice being better during most of the year.

Degraded Plant condition:
Undesirable health and vigor.
 Revealed by the information collected in Transects 1 and 2 and input Rangeland Health Matrixes: Biotic integrity rating of Moderate

Water Quality:
 Documented with Pasture Condition Score of 3 on Livestock Concentration Areas.. Concentration areas are <5% but more than one area within the field and drains into it unbuffered

Pasture Condition Score Sheet - Standard Grass/Legume Mixed Pasture								
Cooperator	Date							
Conservationist	Pasture number(s)							
Forage Suitability Group(s)	Above Normal							
Evaluate the site and rate each indicator based upon your observations. Scores for each indicator may range from 1 to 5. Multiply the points x the								
Indicator/Weight	1 Point	2 Point	3 Point	4 Point	5 Point	Points	Wt.	Wtd. Pts.
Live Plant Cover (Live stems and green leaf cover of all species at adjusted 3-4" height) / 15%	Canopy <50%. Photographic area is very low. Very little plant cover to see or step on.	Canopy 50-70%. Photographic area is low. Rainfall is fast due to low plant cover.	Canopy 70-90%. Most forages are green close, with little leaf area to enter range. Rainfall is moderate due to moderate canopy.	Canopy 90-95%. Spot grazed so there is some loss of photosynthetic potential. Rainfall is low due to good canopy.	Canopy 95-100%. Forages are maintained in leafy condition for best photosynthetic activity. Canopy is very thick. Rainfall is moderate.	2.0	1.0	2.0
Plant Diversity (Evaluate as a complete system) / 10%	(1) 75% of DM wt. (forage species) from one functional group with differing growth habits. Not evenly grazed; poorly distributed (e.g. <i>Andropogon scoparius</i>).	One dominant (1) 75% of DM wt. (forage species) (2) one or two sub-dominant functional groups (all <20%) from one dominant functional group, not evenly grazed; poorly distributed.	20% DM wt. from one functional group. (1) 75% of DM wt. from one functional group. At least one avoided by livestock permitting presence of mature seed heads.	20% DM wt. from one functional group. None avoided. One forage species each from two functional groups, both present.	Species with at least one being a legume (e.g. 20% of DM wt. and/or 1.75% of DM wt.). Well intermixed, compatible growth habit.	3.0	1.0	3.0
Plant Residue / 5%	Identifiable residue is present on soil surface. Or heavy thatch is evident (1) <i>Andropogon scoparius</i> or other grasses are present. More than 50% of plants are pale yellow or brown, or permanently wilted, or lost due to insects or disease. Yields are regularly more than 20% below site potential; there is lodged, dark green cover.	Ground cover: 10-20% is covered with dead leaves or stems. Or there is slight thatch buildup but <0.5 inch.	Ground cover: 20-30% is covered with dead leaves or stems but there is no thatch buildup.	Ground cover: 30-50% is covered with dead leaves or stems but there is no thatch buildup.	Ground cover: 50-70% is covered with dead leaves or stems, but there is no thatch buildup.	5.0	1.0	5.0
Plant Vigor / 5%	Plants are pale yellow or brown, or permanently wilted, or lost due to insects or disease. Yields are regularly more than 20% below site potential; there is lodged, dark green cover.	Plants are pale yellow or brown, or permanently wilted, or lost due to insects or disease. Yields are regularly more than 20% below site potential; there is lodged, dark green cover.	Plants are pale yellow or brown, or permanently wilted, or lost due to insects or disease. Yields are regularly more than 20% below site potential; there is lodged, dark green cover.	Plants are pale yellow or brown, or permanently wilted, or lost due to insects or disease. Yields are regularly more than 20% below site potential; there is lodged, dark green cover.	Plants are pale yellow or brown, or permanently wilted, or lost due to insects or disease. Yields are regularly more than 20% below site potential; there is lodged, dark green cover.	3.0	1.0	3.0
Percent Legume / 5%	Legume are <10% DM wt. Or greater than 60% blowing legumes.	Or 40-60% spreading legume with pastures.	10-20% legumes.	20-30% legumes.	30 - 60% legumes by weight.	1.0	1.0	1.0
Uniformity of Use / 5%	Over 50% of the pasture. Most are pattern found throughout pasture or identifiable areas of pasture avoided.	No more than 20-30% of the pasture spot grazed either in a mosaic pattern or obvious portion is not requested. Line and drag patches are avoided.	No more than 20-30% of the pasture spot grazed either in a mosaic pattern or obvious portion is not requested. Line and drag patches are avoided.	No more than 10-20% of the pasture spot grazed. Little and drag patches are avoided.	No more than 10% of the pasture spot grazed. Little and drag patches are avoided.	3.0	1.0	3.0
Livestock Concentration Areas / 10%	Cover 1/3 of the pasture, or concentrated areas of cowpings contaminated runoff directly into water channels.	Livestock some areas and trails cover 5-10% of pasture, most close to water. Concentrated areas are unbuffered.	Isolated livestock, concentrated areas and trails cover 5-10% of area.	Some livestock trail and one or two small concentration areas cover <5% of the pasture. Scatter areas are between concentrated areas and water channels.	No untreated livestock concentration areas in the pasture. (B) Goat pastures around waters, possibly at gates, no evidence of trails (by pasture).	3.0	1.0	3.0
Soil Compaction / 10%	Unable to push survey flag into soil. Infiltration capacity and surface runoff severely affected by heavy compaction. Concentrate livestock trampling plants cover wide areas.	Hard to push survey flag into soil. Infiltration capacity is lowered and surface runoff increased due to large areas of bare ground and dense compaction layer at surface.	Soil resistant to surveying one or more depths within soil depth. Infiltration capacity lowered and surface runoff increased due to plant cover loss and soil compaction by livestock hooves.	Survey flag enters soil easily except at rocks. There are prominent signs of livestock trails and hoof prints, cowpings to loose or small, wet areas.	Survey flag pushes easily into ground except for rocks. Soil is friable, earthworm and dung beetle activity should be evident, especially around manure piles.	5.0	1.0	5.0
Erosion / 15%	Throughout pasture, rills are 3/8 inch deep at close intervals and/or gully rills are spaced with some slope change. Active gullies are present causing livestock	Most erosion is confined to steep or near vertical soil, and debris rills are 0.5-1 inch deep at close intervals and/or gully rills are present. Trails are evident causing concentrated erosion.	Most erosion is confined to steep or near vertical soil, and debris rills are 0.5-1 inch deep. Debris fans are found at downhill slope. Livestock trampling is evident.	No current formation of rills. There is some evidence of past rill formation, but they are grassed. Scattered debris fans of litter are occasionally present.	No evidence of current or past formation of sheet flow or rills.	3.0	1.0	3.0
Overall Pasture Condition Score	Management Change Suggested				Overall Pasture Condition Score = 31.0			
40 to 50	No changes in management needed at this time.							
35 to 45	Minor changes in management.							
30 to 35	Improvements would benefit productivity and/or environment.							
25 to 30	Needs immediate management changes, high return flag.							
20 to 25	More strict related to time, management and expense.							
Comments/Notes								

Rangeland Health Evaluation Sheet																			
Cooperator:	Jon Client	Conservationist:	Ima Planner																
Ecological Site:	Deep Sand Savannah	Date:	12/32/2012																
Reference Plant Community:	Historic	Location:	See Map - Transect #2																
Departure from Expected	Code	Instructions for Evaluation Sheet																	
None to Slight	N-S	(1) Assign 11 indicator ratings. If indicator not present, rate None to Slight.																	
Slight to Moderate	S-M	(2) In the three grids below, write the indicator number in the appropriate column for each indicator that is applicable to the attribute.																	
Moderate	M	(3) Assign overall rating for each attribute based on preponderance of evidence.																	
Moderate to Extreme	M-E	(4) Justify each attribute rating in writing.																	
Extreme to Total	E-T																		
Indicator	Rating	Comments																	
1. Rills	S H	None observed																	
2. Water-Flow Patterns	S H	Some observed																	
3. Pedestals and/or terraces	S H	None observed																	
4. Bare ground 5-10 %	N-S	<5%																	
5. Gullies	S H	None observed																	
6. Wind-scoured, blowouts, and/or deposition areas	N-S	None Observed																	
7. Litter movement	S H	Slightly more than historic >12", low amount of residual biomass above ground																	
8. Soil surface resistance to erosion	S H B	Stability score was 5 or greater																	
9. Soil surface loss or degradation	S H B	A horizon was less than 3 inches																	
10. Plant community composition and distribution relative to infiltration and runoff	H M-E	Trees > Midgrasses > Tallgrasses. Low productivity is expected to restrict infiltration.																	
11. Compaction layer	S H B	No Compaction, sandy soil																	
12. Functional / structural groups	B	Trees > Midgrasses > Forbs > Tallgrasses																	
13. Plant mortality / decadence	B	None observed																	
14. Litter amount	H B	Litter is < 75% and typically is less than 1" thick, overgrazing is impacting residual forage.																	
15. Annual production	B	Transect clippings were 40% lower than normal range																	
16. Invasive plants	B	Sericea present at 18% of production, scattered Eastern Red Cedar																	
17. Reproductive capability of perennial plants	B	Plants that are there are reproducing but not to potential.																	
<table border="1"> <tr> <th>Attribute Rating Justification</th> <th>Soil Site Stability</th> <th>Hydrologic Function</th> <th>Biotic Integrity</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>E-T M-E M-S M-N-S</td> <td>E-T M-E M-S M-N-S</td> <td>E-T M-E M-S M-N-S</td> <td>E-T M-E M-S M-N-S</td> </tr> <tr> <td>S (10 indicators): Soil & Site Stability Rating: N-S</td> <td>H (10 indicators): Hydrologic Function Rating: S-M</td> <td>B (9 indicators): Biotic Integrity Rating: M</td> <td>B (9 indicators): Biotic Integrity Rating: M</td> </tr> </table>				Attribute Rating Justification	Soil Site Stability	Hydrologic Function	Biotic Integrity					E-T M-E M-S M-N-S	S (10 indicators): Soil & Site Stability Rating: N-S	H (10 indicators): Hydrologic Function Rating: S-M	B (9 indicators): Biotic Integrity Rating: M	B (9 indicators): Biotic Integrity Rating: M			
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Ecological Sites have a varied level of production within grazing units. Some areas are overgrazed due to topography. Some areas are overused during the summer months due to cattle grazing on hilltops where they can get into wind during the hottest parts of the summer.

Rangeland Productivity and Plant Composition—Osage County, Oklahoma

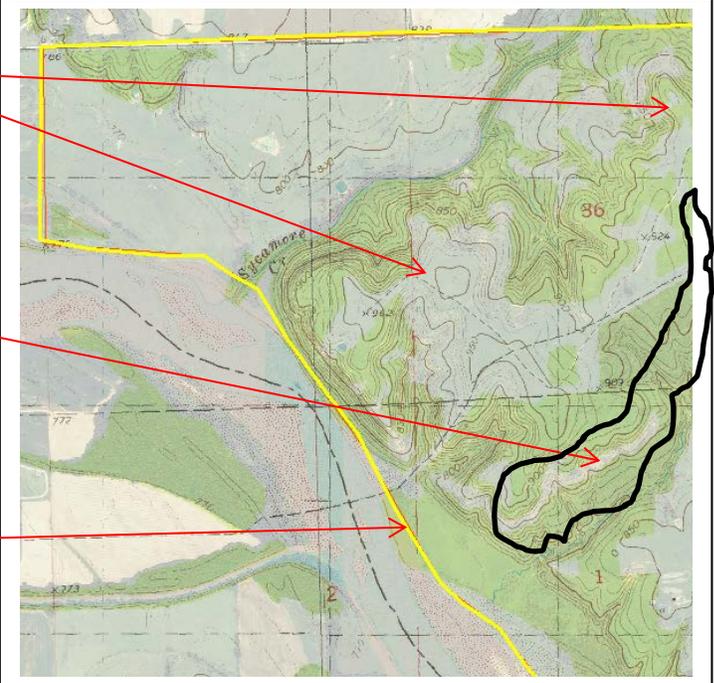
Map unit symbol and soil name	Ecological site	Total dry-weight production			Characteristic vegetation	Rangeland composition Pct
		Favorable year	Normal year	Unfavorable year		
		Lb/acre	Lb/acre	Lb/acre		
Brighton	Shallow Savannah	2,800	2,100	1,400	Little bluestem	30
					Big bluestem	20
					Blackjack oak	10
					Post oak	5
					Indiangrass	5
					Purging spirea	5
					Carbonyl panicum	5
					Chicweed	5
					Hairy soursage	5
					Sideoats grama	5
Switchgrass	5					
Bartlesville	Sandy Savannah	5,000	3,900	2,800	Little bluestem	25
					Big bluestem	20
					Blackjack oak	10
					Post oak	10
					Indiangrass	5
					Sand lovegrass	5
					Purple lovegrass	5
					Miscellaneous perennial forbs	5
					Miscellaneous shrubs	5
					Scribner panicum	5
Switchgrass	5					
Nottaw	Sandy Savannah	1,000	1,100	500	Little bluestem	20
					Miscellaneous perennial grasses	10

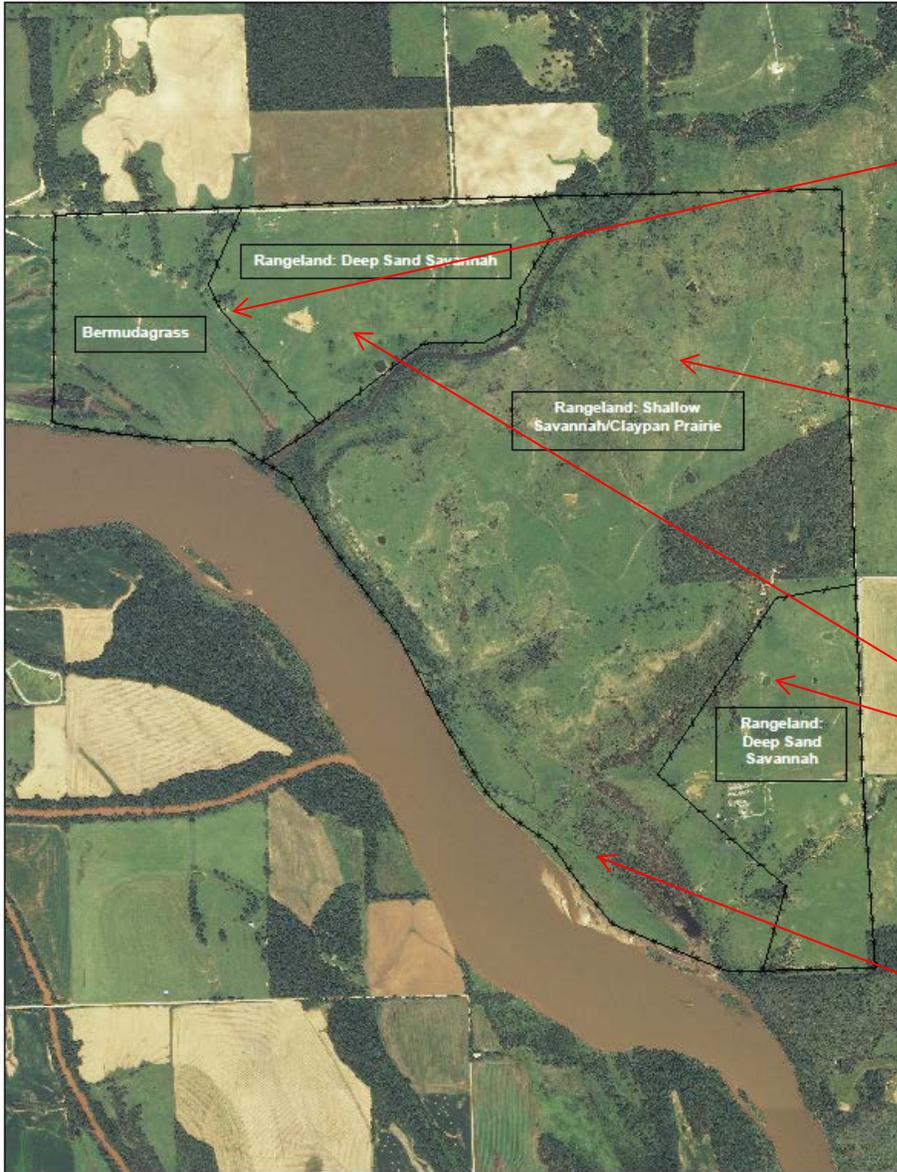
Natural Resources Conservation Service Web Soil Survey National Cooperative Soil Survey 3/10/2014 Page 10 of 12

Large flat open areas that allow animals to get into the wind on hot summer days can be overgrazed because of loafing areas

The large field with a steep drain running through it may also be causing enough restraint to deter animals from grazing areas closer to the house or during the dormant season if animals are fed close to the house may be causing areas further to the west to not be used.

Topography can provide a grazing restraint that deters animals from crossing steep boundaries. The field notes from above documented that an area along the river is not being used. The steep topography along the river may be a cause of this.





In this situation the fences were constructed in a way where there was no need for additional water but in many situations planners may need to evaluate this and additional watering facilities planned to facilitate the grazing plan.

Cross Fence installation to control grazing on two separate forage types while at the same time provide options for removing grazing animals during times of the year when water is high and animals are causing water quality concerns.

Even though this larger field could be cross fenced into smaller units in this example the production is not significantly different and other management activities can be used to facilitate good grazing management. (ex. Mineral placement throughout the year)

Fencing facilitates grazing management of different ecological sites that produce significantly different amounts of forage. Shallow Savannahs and Claypan produce approximately 2450 lbs on average while Deep Sand Savannahs are 4000 lbs/ac

No fence installed in this area due to terrain being a barrier for the grazing animals. This may make a good hay field due to terrain.

Managing grazing along Riparian areas to maintain adequate vegetative cover is required by the standard and states that continuous grazing will not be planned in these areas. The planning of these fences has also solved this issue identified during the planning process.