

Soil and Water Resources Working Paper Broken Wheel Ranch Special Use Permit

**Mississippi Bluffs Ranger District
Shawnee National Forest**

Prepared by: John W. DePuy, Soil Scientist **Date:** August 28, 2007

Introduction

This assessment analyzes the potential effects of the proposed Broken Wheel Ranch special-use permit on soil and associated watershed resources occurring within the boundaries of the Shawnee National Forest. The primary purpose of this assessment is to determine whether the likely effects would result in a degradation of watershed resources in the project area.

Formal objectives of this assessment include:

- 1) identify watershed resources that would be affected by the proposed project,
- 2) ensure that Forest Service actions do not result in degradation of soil quality, water quality or air quality,
- 3) provide a process and standard that ensures that watershed resources receive full consideration,
- 4) make certain that best management practices, as per the Shawnee National Forest Amended Land and Resource Management Plan (USDA 2006) and the Region 9 Soil Quality Standards, are followed,
- 5) to maintain a case file on actions regulated under environmental policy and procedures.

Current Management Direction

Current policy as stated in the Forest Service, Region 9 Soil Quality Standards includes the following: Temporary roads used for vegetation management are included as areas evaluated for soil quality. System road and trails, on the other hand, and other administrative facilities within or adjacent to the activity area, are dedicated land uses and not considered detrimental soil conditions (USDA Forest Service 2005). However, changes to the existing condition on the trails as a result of activities associated with the project need to be addressed. Detrimental soil disturbance will be minimized to the extent possible. Adhere to soil quality standards identified in land management plan direction (USDA Forest Service 2005).

The management direction specified by the Shawnee National Forest Land and Resource Management Plan (Forest Plan; USDA 2006) is to conserve soil and water resources and ensure the protection of streams, stream banks, lakes, wetlands, and other bodies of water in accordance with applicable laws and regulations. Activities will be guided by the best management practices defined by the Illinois Department of Natural Resources, Division of Forest Resources and may include stream bank restoration and/or stabilization and management of large, woody debris.

Description of the Proposed Project

The Broken Wheel Ranch property has recently been purchased and the new owner is seeking a special use permit so that his overnight clients can utilize the surrounding Shawnee National Forest for equestrian riding. The majority of the use would be in the Bald Knob and Clear Springs Wildernesses, with access by the River to River Trailhead immediately adjacent to the private property boundary. Hikers and equestrian riders will be able to leave the overnight rental property and immediately enter the River-to-River trail system. Some overnight horse accommodations are available, although limited. During times when the wilderness is not available for horse use, the Cedar Lake and Kincaid trail systems will be highlighted as alternate riding locations.

A special use permit that would allow for this activity to occur would be issued. By issuing this permit, the Forest will be improving upon the now unregulated use, improve resource protection while at the same time, assist in providing for a growing business opportunity, in association with the demand for horse riding within the western portion of the Shawnee National Forest.

In order to ensure the protection of wilderness character during the relatively short term of the permit, the following resource protection measures would be incorporated within the permit:

- ❖ Broken Wheel Ranch clients will only be allowed to ride trails identified in the permit (Appendix A) within Bald Knob and Clear Springs wilderness areas.
- ❖ Broken Wheel Ranch clients will be allowed to ride April 1 – November 30 in Bald Knob and Clear Springs Wilderness Areas (the wilderness would be closed to Broken Wheel Ranch clients from December 1st to March 31st).
- ❖ The Forest Service shall determine the extent of moisture impacts on the trails within the Bald Knob and Clear Springs Wilderness Areas and exercise its authority to temporarily close those trails it deems unreasonably wet for equestrian traffic until drier conditions prevail.
- ❖ The Broken Wheel Ranch will also be responsible for determining if trails are unreasonably wet and would notify clients when the trails are unsuitable for horse traffic. The Broken Wheel Ranch may suggest other non-wilderness trails as alternatives.
- ❖ Broken Wheel Ranch clients shall limit group size within the Bald Knob and Clear Springs Wildernesses to no more than 10 people at any one time.
- ❖ Equestrians from the Broken Wheel Ranch will display bridal tags on their horses in a visible place.
- ❖ The Broken Wheel Ranch will inform clients of the forest order not to harm/harass snakes on the Forest.

Analysis of the proposed projects effects on the soil and water resources assumes that the permit maintenance and operation plan (Case File) will be strictly followed to minimize soil disturbance and greatly reduce the potential for groundwater contamination via sedimentation and livestock waste.

Duration and Timing: A decision is expected by September 2007 and the permit would be issued shortly thereafter. This decision will allow a short-term special-use permit to be used

to limit the impact of equestrian recreation on the Forest while additional site-specific analyses for the development of a designated trail system are completed.

Existing Environment

The project area is located in one non-wilderness area and two wilderness areas: Bald Knob Wilderness and Clear Springs Wilderness. About 17 miles of trail is covered by this permit, about 6 miles are located at Bald Knob Wilderness, about 9 miles are located within Clear Springs Wilderness, and about 2 miles are located on non-wilderness areas. About 13 miles are designated system trails and about 4 miles are non-system trails. About 15 miles are located within the Hutchins Creek watershed, about 2 miles are located within the Town Creek/Big Muddy River watershed and about 0.1 miles are located within the Dutch Creek watershed. All watersheds discussed are those classified by the U.S. Geological Survey as Hydrologic Unit Code 6 watersheds. The trail system has undergone recent maintenance and refurbishment and trail conditions are generally satisfactory.

Soil

The trail mileage in the Broken Wheel project area is located on twenty soil mapping units. Soil mapping units on which the trails are located are presented in a table (Appendix A). Limitations for trails, soil erosion potential, and soil compaction potential are included in this table. Trails located on relatively gentle slopes are rated as having no limitations and those located on steeper slopes are rated as very limited due to water erosion and/or slope. Trails located on relatively gentle slopes are rated as having a slight erosion potential (about 27 percent of the trail miles), trails located on moderate slopes are rated as having a moderate potential on roads and trails (slight potential off roads and trails) (16 percent of trail mileage) and those located on steeper slopes are rated as having a severe erosion potential on roads and trails (moderate potential off roads and trails) (57 percent of trail mileage). Due to relatively high clay content, nearly all trails are located on soil mapping units having a moderate to severe or severe potential for compaction. These soils are suitable for trails but monitoring and maintenance are necessary to ensure that soil erosion is minimized.

Water

The Illinois Environmental Protection Agency (IEPA) 2006 Water Quality Report was consulted to assess the water quality of major streams in and adjacent to the project area. Beneficial use support (full support, non support, not assessed), causes for less than full support, and sources of the cause are given for seven streams in Table 2 in Appendix A. The major source for less than full support of beneficial uses was the crop production in the Big Muddy River. Forest activities were not mentioned in this report as a source of concern.

Effects of the Proposed Action

Soil and water resources can be affected. Sources of sediment on forest lands in the project area are likely. The facilities associated with transportation systems, mainly roads and trails can be a source of erosion and sediment under conditions outlined below.

Equestrian and hiker use of unimproved roads and trails can expose bare soil which can lead to accelerated erosion. 3.9 miles in the project area have been identified as non-system roads (nearly all located in the Hutchins Creek watershed.).

Existing trails with a steeper gradient have a greater erosion potential than trails with a lower gradient and steep trails have higher potential for erosion. Some steep gradients do exist on trails in the project area. 56.8 % of trail miles are located on soil mapping units identified as having severe erosion potential on roads and trails (and moderate potential off roads and trails (USDA 2006, Table 1, Appendix C). Trail conditions in these areas will require monitoring and maintenance to ensure that they do not degrade to the point where they impact watershed resources due to erosion, sedimentation, compaction or other disturbance.

Some of the trails and roads cross ephemeral, intermittent and perennial streams. These crossings are direct points of sediment delivery. Localized disturbance to banks and channel substrate can occur. Trail crossings at larger stream channels can cut the banks causing them to become unstable and erode. 4.54 miles of trail is located on soil mapping units identified as riparian soils and located at or adjacent to these trail crossings (USDA 2006, Table 1, Appendix C). Moist soil conditions can cause trails to be more vulnerable to rutting, compaction and erosion. Water is less likely to infiltrate the trail tread causing excessive runoff and sedimentation. Nearly every soil mapping unit in the project area is located on soil mapping units identified as having moderate to severe potential for rutting and compaction (USDA 2006, Table 1, Appendix C).

During periods of moist soil conditions, the Cedar Lake and Kincaid trail systems will be highlighted as alternate riding locations. Periodic maintenance and monitoring and adherence to the operation will serve to mitigate the effects mentioned above and ensure trail conditions remain at the present satisfactory condition. Satisfactory trail conditions also serve to channel human and horse movement within the trail system resulting in minimal or no increase in disturbance area.

While the permit could result in increased equestrian use, this use would be focused upon the trail system that has been maintained and cared for over the past several years. Because most of the project area trails are in relatively good condition with light to moderate trail use, we anticipate a slight (unmeasurable) increase in erosion or sedimentation to result from the proposed permit. The proposed permit should have minimal impact on the soil and water resources within the project area.

-

Cumulative Effects Area

The Cumulative Effects Area (CEA) for watershed resources for this project includes all of the three watersheds in which the permitted trail system occurs. These watersheds are: Dutch Creek, Hutchins Creek, and Town Creek/Big Muddy Creek (69, 425 acres). The time period for this analysis is five years.

Cumulative effects analyses takes in to account all known past actions, the proposed action, present actions, and reasonably foreseeable future actions which could or will impact the analyses areas. Tables 5 – 7 in Appendix A give the ownership patterns in the CEA, occurrence of wilderness, national natural landmarks, and natural areas, and prescribed burning history back to 2003.

Forest Service Activity - Prescribed burning activity in the CEA is outlined in Table 7 in Appendix C. The majority of burning has occurred in the Town Creek / Big Muddy River watershed and this is likely to continue. Future prescribed burning in the CEA may occur in the wildernesses and natural areas to aid in sustaining their wilderness character. Road and trail maintenance will also continue.

Non-Forest Service Activity - Non-irrigated crop production, sources unknown, municipal point source discharges, crop production, natural sources, surface mining have degraded water quality in the Big Muddy River. Non-irrigated crop production, sources unknown, municipal point source discharges, crop production, natural sources and surface mining have influenced water quality in Clear Creek. Crop production and discharges have been identified with water quality issues in Seminary Creek (Illinois EPA 2006). These influences can be expected to remain at current levels or to increase in the next five years.

Watershed Assessment - Forest watershed assessments will begin in FY '08 and continue for several years after. Town Creek/Big Muddy River, Hutchins Creek, and Dutch Creek are scheduled for assessments in FY '08. The assessments will include recommendations for projects. These projects will likely be located in the 10, 555 acres of wilderness which includes 679 acres of National Natural Landmarks and 1,453 acres of natural areas.

Summary

With proper maintenance, periodic monitoring, and strict adherence to the Operation and Maintenance Plan, the activities associated with the proposed permit are expected to add minimal amounts to the current erosion and sediment levels in the CEA. If prescribed burning and road maintenance are undertaken at past levels, then there would be a minimal increase in the combined erosion and sediment delivery within the watersheds. The cumulative effect of all of the sediment generated in these watersheds relative to Forest activity is minimal (unmeasurable) when added to the natural watershed processes.

Implementation of the proposed action is expected to have no cumulative impact on watershed resources within the analysis area provided the maintenance and operation plan is followed, proper maintenance is undertaken, and periodic monitoring is accomplished. Thus, there will be little or no effect on watershed resources.

Determination

As a result of this evaluation, it is my professional determination that issuance of a special use permit is not likely to impact watershed resources.

Management Recommendations

No recommendations were identified for this project for watershed resources.

Monitoring and Inspections

The District is committed to trails inspections at least bi-annually. The monitoring checklist employed on the Hoosier National Forest Trail Program may be employed for rapid assessment monitoring over the Project Area (USDA Forest Service 2002). As time and resources allow, randomly selected sites within the trail area will be inspected for monitoring.

Literature Citations

Illinois Department of Natural Resources (IDNR). 2000. Forestry Best Management Practices For Illinois.

Illinois Environmental Protection Agency. 2005. Illinois Annual Air Quality Report – 2005. Found on line at:

<http://www.epa.state.il.us/air/air-quality-report/2005/air-quality-report-2005.pdf>

Illinois Environmental Protection Agency. 2006. Illinois Water Quality Report – B-1. Stream Assessments. Found on line at:

<http://www.epa.state.il.us/water/tmdl/303-appendix/appendix-b-1-stream-assessments.pdf>

USDA Forest Service. 2002. Trail Program – Hoosier National Forest. 32 pages.

USDA, Forest Service. 2005. Forest Service Handbook, FSH 2509.18 – Soil Management, Chapter 2 – Soil Quality Monitoring, Supplement No. 2509.18 – 2005 – 1. Eastern Region, R9, Milwaukee, WI.

USDA Forest Service. 2006. Land and Resource Management Plan, Shawnee National Forest. Harrisburg, Illinois.

USDA NRCS. 2006. Soil Data Mart (Union and Jackson County reports). Found on line at:

<http://soildatamart.nrcs.usda.gov/County.aspx?State=IL>

Appendix A

Table 1. Soil Mapping Units for the Broken Wheel Permitted Trails.

Soil Mapping Unit	Trail Miles (total)	Suitability for Trails	Erosion Potential	Compaction Potential
Drury silt loam (5 – 10 % slope)	0.16	Not limited	Moderate on roads or trails	Severe
Drury silt loam (10 – 18 % slopes)	0.19	Very limited (water erosion)	Severe on roads and trails	Severe
Menfro silt loam (5 – 10%) eroded	1.01	Not limited	Moderate on roads or trails	Severe
Menfro silt loam (10 – 18 %), eroded	4.1	Not limited	Severe on roads and trails	Severe
Menfro silt loam (10 – 18 %), severely eroded	0.06	Very limited due to water erosion	Severe on roads and trails	Severe
Menfro silt loam (18 – 25 %) eroded	0.15	Very limited due to water erosion and slope	Severe on roads and trails	Severe
Menfro silt loam, (18 – 25 %) severely eroded	0.07	Very limited due to water erosion and slope	Severe on roads and trails	Severe
Menfro silt loam (25 – 35 %)	0.18	Very limited due to water erosion and slope	Severe on roads and trails	Severe
Menfro silt loam / Clarksville gravelly silt loam (18 – 35 %)	1.97	Very limited due to water erosion and slope	Severe on roads and trails	Moderate to severe
Clarksville gravelly silt loam / Menfro silt loam (35 – 70 %)	1.37	Very limited due to water erosion and slope	Severe on roads and trails	Moderate to severe
Menfro silt loam / Goss gravelly silt loam (18 – 35 %)	0.44	Very limited due to water erosion and slope	Severe on roads and trails	Moderate to severe
Goss gravelly silt loam / Menfro silt loam (35 – 70 %)	0.64	Very limited due to water erosion and slope	Severe on roads and trails	Moderate to severe
Elsah silt loam (1 – 4 %) occasionally flooded	4.12	Not limited	Slight	Severe
Haymond silt loam (0 – 3 %), occasionally flooded	0.4	Not limited	Slight	Severe
Hosmer silt loam (10 – 18 %) severely eroded	0.06	Very limited due to water erosion	Severe on roads and trails	Severe
Winfield silt loam (5- 10 %) eroded	0.46	Not limited	Moderate on roads and trails	Severe
Alford silt loam (5 – 10 %) eroded	1.02	Not limited	Moderate on roads and trails	Severe
Alford silt loam (10 – 18 %) severely eroded	0.04	Very limited due to water erosion	Severe on roads and trails	Severe
Goss very gravelly silt loam / Alford silt loam (25 – 65 %)	0.32	Very limited	Severe on roads and trails	Moderate to severe
Burnside silt loam (1 – 4 %) occasionally flooded	0.02	Not limited	Slight	Severe

Table 2. Major streams in or adjacent to the project area – from IEPA 2006 Stream Assessments.

Stream Name	Beneficial Uses	Cause	Source
Hutchins Creek	Fully supporting Aquatic Life, Not assessed for any other use	Not applicable	Not applicable
Dry Branch	Not assessed for any beneficial use	Not applicable	Not applicable
Seminary Creek	Not supporting of aquatic life Not assessed for any other use	Nitrogen, Phosphorus	Discharges, crop production
Dutch Creek	Not assessed for any beneficial use	Not applicable	Not applicable
Town Creek	Not assessed for any beneficial use	Not applicable	Not applicable
Big Muddy	Non supporting of aquatic life, fully supporting fish consumption; not assessed for all other uses	Atrazine, cadmium, Dissolved oxygen, sedimentation, siltation, sulfates, total suspended solids, pH,	Non-irrigated crop production, source unknown, municipal point source discharges, crop production, natural sources, surface mining
Clear Creek	From fully supporting to non-supporting aquatic life, fish consumption. Other uses not assessed	Aldrin, alteration in stream-side or littoral vegetation cover, dissolved oxygen, sedimentation /siltation	Non-irrigated crop production, source unknown, municipal point source discharges, crop production, natural sources, surface mining

Table 3. Miles of Broken Wheel Permitted Trail within Wilderness.

	Bald Knob Wilderness	Clear Springs Wilderness	Non-wilderness	Total
System Trails (miles)	2.8	7.9	2.2	12.9
Non-system trails (miles)	3	0.9	0	3.9
Total	5.8	8.8	2.2	16.8

Table 4. Miles of Broken Wheel project trail by Watershed.

	Dutch Creek	Hutchins Creek	Town Creek / Big Muddy River	Total
System Trails (miles)	0.11	10.93	1.87	12.9
Non-system trails (miles)	0	3.85	0.03	3.9
Total	0.11	14.77	1.91	16.8

Table 5. Ownership of the CEA (Cumulative Effects Analysis Area)				
	Acres (total)	Acres (Forest Service)	Acres (other ownership)	% acreage in Forest Service jurisdiction
Dutch Creek	20,099	4,889	15,210	24.32
Hutchins Creek	13,083	9,326	3,757	71.28
Town Creek /Big Muddy River	36,243	18,737	17,506	51.7
Total	69,425	32,952	36,473	47.46

Table 6. Wilderness, National Natural Landmarks, and Natural Area acreage in the CEA			
	Wilderness (Acres)	National Natural Landmarks (Acres)	Natural Areas (Acres)
Dutch Creek	3,408	0	6
Hutchins Creek	5,915	17	446
Town Creek / Big Muddy River	1,232	662	1,001
Total	10,555	679	1,453

Table 7: Prescribed fire activity in the CEA							
	2003	2004	2005	2006	2007	2008	Total
Dutch Creek	0	0	0	0	0	0	0
Hutchins Creek	0	0	0	0	0	11.8	11.8
Town Creek / Big Muddy River	82.1	121.8	39.7	0	121.8	40.5	405.9
Total	82.1	121.8	39.7	0	121.8	52.3	417.7