

APPENDIX I

BASELINE HABITAT FRAGMENTATION MODELING REPORT

**Analysis of Baseline Habitat Fragmentation Modeling for the
West Tavaputs Plateau Full Field Natural Gas Development Plan
Environmental Impact Statement**



Prepared for:

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I. Introduction

Based on comments received in response to the West Tavaputs Plateau (WTP) Preliminary Draft Environmental Impact Statement (PDEIS), it was determined that the impact analyses for certain resources could be strengthened by fragmentation analysis. Because fragmentation modeling requires extensive time, the Bureau of Land Management (BLM) Price Field Office decided that Buys & Associates (B&A) should first conduct preliminary fragmentation analyses based on existing disturbance within the WTP Project Area, which could be used as a baseline for comparison with other alternatives in the EIS¹. The following sections discuss the baseline fragmentation analyses as they pertain to wildlife, wild horses, and wilderness resources.

II. Goal(s) of the Fragmentation Modeling Exercise for Wildlife

- To determine/quantify the extent and spatial configuration of existing habitat fragmentation in the following wildlife habitats within the WTP Project Area: crucial winter habitat for deer; crucial winter habitat for elk; sage-grouse core winter use areas; and wild horse use areas within the Range Creek HMA.
- To determine/quantify patch size, edge effects, and connectivity to supplement existing analyses in the WTP EIS.

IIa. Assumptions Used to Build and Run the Baseline Model for Wildlife and Wild Horses

Based on Wyoming Game and Fish Department (WGFD) (2007) literature provided by the BLM Price Field Office and discussions with Resource Specialists, the following spatial buffers were placed around existing development within the WTP Project Area in order to determine the extent of existing habitat fragmentation.

- a. Mule Deer*
 - 200-meter buffer around all existing well pads; and
 - 200-meter buffer from the centerline of all existing roads and pipelines.
- b. Elk*
 - 1.2-mile buffer around all existing well pads; and
 - 0.5-mile buffer from the centerline of all existing roads and pipelines.
- c. Sage-grouse*
 - 2-mile buffer around all existing well pads; and
 - 2-mile buffer from the centerline of all existing roads and pipelines.
- d. Wild Horses*
 - 200-meter buffer around all existing well pads; and
 - 200-meter buffer from the centerline of all existing roads and pipelines.

These spatial buffers were then clipped to various wildlife habitats within the WTP Project Area (i.e., crucial winter habitat for mule deer and elk, sage-grouse core winter use areas, and wild horse use areas within the Range Creek HMA) to determine/quantify the extent and spatial

¹ Baseline fragmentation analyses were conducted using data available at the time the NOI for this EIS was filed (August 2005). It should be recognized that since publication of the NOI, natural gas development within the WTP has continued under authorizations based on the previous NEPA analyses and provisions of the Energy Policy Act of 2005.

configuration of existing habitat fragmentation within the WTP Project Area. Since publication of the NOI, natural gas development within the WTP has continued under authorizations based on the previous NEPA analyses and provisions of the Energy Policy Act of 2005. As such, it should be noted that some well pads, roads, and pipelines that currently exist within the WTP Project Area were not included in determining the extent or spatial configuration of existing habitat fragmentation within the WTP Project

Iib. Results of the Baseline Model for Wildlife and Wild Horses

Mule Deer – The extent of existing habitat fragmentation in mule deer crucial winter habitat within the WTP Project Area is summarized below in **Table 1** and illustrated in Figure 1. In a few instances, the map shows producing wells that are not connected to the existing transportation or gathering system by road or pipeline. Thus, some well pads erroneously appear to be “floating” in **Figure 1**.

Table 1. Extent of Existing Habitat Fragmentation in Mule Deer Crucial Winter Habitat within the WTP Project Area					
Acres of Crucial Winter Habitat Fragmented	Percent of Crucial Winter Habitat Fragmented	# of Existing Habitat Patches	Average Patch Size (acres)	Smallest Patch (acres)	Largest Patch (acres)
17,345	23.6	29	1,964	2	9,468

Elk – The extent of existing habitat fragmentation in elk crucial winter habitat within the WTP Project Area is summarized below in **Table 2** and illustrated in **Figure 2**.

Table 2. Extent of Existing Habitat Fragmentation in Elk Crucial Winter Habitat within the WTP Project Area					
Acres of Crucial Winter Habitat Fragmented	Percent of Crucial Winter Habitat Fragmented	# of Existing Habitat Patches	Average Patch Size (acres)	Smallest Patch (acres)	Largest Patch (acres)
54,046	67.4	18	1,207	16	7,015

Sage-grouse – All sage-grouse core winter use areas within the WTP Project Area are fragmented as illustrated in **Figure 3**.

Wild Horses – The extent of existing habitat fragmentation in wild horse use areas of the Range Creek HMA within the WTP Project Area is summarized below in **Table 3** and illustrated in **Figure 4**. As previously mentioned, in a few instances, the map shows producing wells that are not connected to the existing transportation or gathering system by road or pipeline. Thus, some well pads erroneously appear to be “floating” in **Figure 4**.

Wild Horse Use Areas within the Range Creek HMA	Acres of Herd Use Area Fragmented	Percent of Herd Use Area Fragmented	# of Existing Habitat Patches	Average Patch Size (acres)	Smallest Patch (acres)	Largest Patch (acres)
Flat Iron/Twin Hollow	4,383	40.1	5	1,693	102	6,424
Cottonwood Ridge	5,090	34.7	9	1,064	208	2,618
Cedar Ridge/Bishop	1,535	14.0	4	2,329	183	4,981

Ic. Discussion and Recommendations for Wildlife and Wild Horses

As shown in the results section, existing wildlife habitats analyzed for this baseline modeling exercise have been fragmented to varying degrees by existing development.

Based on the assumptions used for this modeling, the existing roads, pipelines, and well pads have altered the suitability of habitat for wildlife and wild horses within the WTP Project Area. The fragmentation of previously undisturbed lands may have reduced usage or caused abandonment of remaining habitat patches, dependent on the species' threshold to patch size and connectivity to other patches.

Based on the extent of existing sage-grouse habitat fragmentation within the baseline model (i.e., 100 percent of existing habitat is currently fragmented), it was determined that additional habitat fragmentation models for sage-grouse would not substantially supplement the impact analyses in the EIS. Therefore, sage-grouse habitat fragmentation modeling of the alternatives has not been conducted a comparative tool to the baseline model exercise.

However, based on the existing habitat models for mule deer (approximately 23.6 percent currently fragmented), elk (approximately 67.4 percent currently fragmented and wild horses (between 14 and 40.1 percent currently fragmented depending on the use area), it was determined that additional models should be completed to determine/quantify the extent and spatial configuration of habitat fragmentation that could occur from additional development in the WTP Project Area.

Habitat fragmentation from Alternative A, the Proposed Action, was modeled because it includes more surface disturbance than of any of the other alternatives being considered in the WTP EIS. Therefore, the results of the Alternative A model illustrate the maximum level of fragmentation that could occur. Habitat fragmentation was also modeled for Alternative D, the Conservation Alternative, because it would result in approximately 30 percent less surface disturbance than the Proposed Action, thus providing a clear contrast between the alternatives.

Alternative B, the No Action Alternative, was not separately modeled because the impacts would be substantially similar to the baseline model. Similarly, Alternatives C and E were not modeled separately because impacts would be substantially similar to those presented for Alternative A.

Results of the additional modeling exercise are presented in detail in **Section 4.9** of the WTP EIS.

III. Goal(s) of the Fragmentation Modeling Exercise for WSAs and Non-WSA lands with Wilderness Characteristics

- To quantify the impacts (e.g., sight and sound) that the proposed development could potentially have on opportunities for solitude, and/or opportunities for primitive and unconfined recreation.
- To quantify how many acres of the WSAs or lands within wilderness characteristics would be segregated from the remainder of the WSAs or non-WSA lands with wilderness characteristics.
- To quantify how fragmentation would directly impact size of WSAs and non-WSA lands with wilderness characteristics.

IIIa. Assumptions Used to Build and Run the Baseline Model for WSAs and Non-WSA lands with Wilderness Characteristics

Size – The following sources were used to determine the size of the existing WSAs and non-WSA lands with wilderness characteristics.

- The Jack and Desolation Canyon WSAs include all areas studied under Section 603 of FLPMA and included in the Utah BLM Statewide Wilderness Inventory Report.
- The Jack Canyon wilderness characteristics area includes all areas determined to have wilderness characteristics following the 2007 wilderness characteristic review.
- The Desolation Canyon wilderness characteristics area includes all areas determined to have wilderness characteristics following the 2007 wilderness characteristic review.

In terms of impacts, for the purposes of analysis, it is assumed that all areas within ½-mile of existing roads and/or inventoried routes could lack opportunities for solitude and/or primitive and unconfined recreation. In terms of wilderness characteristics, solitude and/or primitive and unconfined recreation are not required on every acre of the WSA or WIA as long as they are found somewhere within the study/inventory areas. Using this assumption, a GIS-based analysis was conducted to determine those areas within the Jack and Desolation Canyon WSAs and within the Jack and Desolation Canyon WIAs that are within ½-mile of existing roads (e.g., Cedar Ridge, Jack Ridge, and Jack Canyon) and/or inventoried routes. It should be noted that impacts to size are generally considered equal to the amount of surface disturbance so long as all areas within the WSA or WIA remain contiguous. Similarly, naturalness concerns the physical appearance of the land and is usually not affected beyond the edge of disturbance.

IIIb. Results of the Model for WSAs and Non-WSA lands with Wilderness Characteristics Areas

As shown in **Table 4**, the alternative baseline analysis shows that wilderness constituents exist in only 4 percent of Jack Canyon wilderness characteristics area and 39 percent of Jack Canyon WSA. Within Desolation Canyon, wilderness constituents exist in approximately 60 percent of the wilderness characteristics area and 76 percent of the WSA.

It should be noted that this GIS-based analysis does not take into consideration variables such as existing road conditions and/or use, visual and topographical screening, or noise propagation in mountainous/canyon terrain. Therefore, opportunities for solitude and/or primitive and unconfined recreation would likely exist in isolated areas within the ½-mile buffer.

Table 4. Extent of Existing Fragmentation within WSAs and WIAs						
Name of Area	Total Acres	Acres in the WTP Project Area	Within ½-mile of Existing Roads		More than ½-mile from Existing Roads	
			Acres	Percent	Acres	Percent
Jack Canyon WSA	7,500	7,480	4,572	61	2,908	39
Desolation Canyon WSA	290,845	24,668	5,853	24	18,815	76
Jack Canyon Wilderness Characteristics Area	1,465	1,465	1,437	96	28	4
Desolation Canyon Wilderness Characteristics Area	211,220 ¹	31,744	12,711	40	19,033	60

After reviewing the results of the baseline fragmentation analysis for WSAs and non-WSA lands with wilderness characteristics, the BLM concluded that additional modeling should be completed for each alternative that proposes development within these areas in an effort to quantify the potential impacts that additional development could have on opportunities for solitude and/or primitive and unconfined recreation. Results of these models are presented within **Section 4.17** of the EIS.