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Sublette Mule Deer Study: 2005 Annual Report WEST. Inc.

2.6 SUMMARY AND MANAGEMENT IMPLICATIONS

The objective of this monitoring effort is to evaluate potential impacts of natural gas development on mule deer in terms of: 1) direct habitat loss, 2) changes in habitat selection, and 3) population performance.

Direct Habitat Losses: Satellite imagery was used to estimate direct habitat losses (i.e., surface disturbance) for the Mesa portion of the PAPA. Through August 2004, approximately 1,029 acres had been disturbed, of which 79% was due to well pad construction and 21% to access roads. Each year development has progressed, well pads account for relatively more direct habitat loss than access roads. Pipelines and seismic tracks *were not* included in the estimates of direct habitat loss.

Habitat Selection Patterns: During Years 1 through 3 of gas development, habitat selection models and predictive maps suggested mule deer were less likely to occupy habitats in close proximity to well pads than those farther away. Changes in habitat selection appeared to be immediate (i.e., Year 1 of development) and no evidence of well pad acclimation occurred through the first 3 years of development, rather deer selected areas farther from well pads as development progressed. The lower levels of deer use within 2.7 to 3.7 km of well pads suggested indirect habitat losses may be substantially larger than direct habitat losses. Additionally, some areas classified as high deer use prior to development changed to areas of low use following development. If areas classified as high use before development were those preferred by deer, then observed shifts in their distribution were towards less preferred and presumably less suitable habitats. During Year 4 of development and following a substantial reduction in deer abundance, habitat selection patterns of deer were influenced by road density, but not proximity of well pads. This may be an artifact of the unusually severe winter during Year 4, where movement options and available habitat for deer were limited. Results from Year 5 should help clarify trends in habitat selection.

Population Performance: We monitored four population characteristics to compare population performance in the treatment (Mesa) and control (Pinedale Front) areas, including: 1) recruitment, 2) over-winter adult doe survival, 3) over-winter fawn survival, and 4) abundance. Recruitment (i.e., doe:fawn ratios) in the treatment and control areas has been essentially the same since development began. Point estimates of over-winter adult survival have been slightly lower in the treatment area for 3 of the 5 years since development began, and over-winter fawn survival has been slightly lower 4 of 5 years. The only year over-winter fawn survival was not lower in the treatment was in the harsh winter of 2003-04, when we would expect high fawn mortality in both treatment and

control areas. While these point estimates of over-winter adult and fawn survival were not statistically different between treatment and control areas, the long-term trends in these vital rates suggest deer in the treatment area may not be performing demographically as well as deer in the control area. Additionally, [a portion of the deer normally wintering on the Mesa emigrated to a new, distinct winter range during the 2003-04 winter. The combination of changes in births, deaths, and emigration resulted in an estimated 46% reduction in deer abundance over four years, although we are unable to estimate the relative contribution of these factors to the decline. There is no evidence of a similar decline in abundance in the control area.]

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Possible management implications include:

Monitoring shifts in distribution, or habitat use, or population parameters allows mitigation measures aimed at reducing impacts to be evaluated and timely, site-specific strategies to be developed. The current mitigation measure is focused on seasonal timing restrictions, where drilling activity is limited to non-winter months. This type of mitigation is common across federal lands and intended to reduce human activity and presumably the associated stress to big game during the winter months, typically 15 November to 30 April. [Major shifts in the distribution of mule deer on the Mesa occurred during Years 1 through 3 of development even though drilling on federal lands was largely restricted to non-winter months. Estimates of deer abundance on the Mesa have significantly declined since development began. To date, our findings suggest seasonal timing restrictions may not be achieving desired results.]

In deep-gas fields like the PAPA where well densities range from 4 to 16 pads per section, the number of producing well pads and associated human activity may negate the potential effectiveness of timing restrictions on drilling activities as a means to reduce disturbance to wintering deer. Reducing disturbance to wintering mule deer may require restrictions or approaches that minimize the level of human activity during both production and development phases of wells. Directional drilling technology offers promising new methods for reducing surface disturbance and human activity. Limiting public access and road management strategies may also be a necessary part of mitigation plans.