

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

The potential environmental consequences of construction, drilling, completion, and maintenance activities associated with the Proposed Action and No Action Alternative are discussed for each potentially affected resource. An environmental impact is defined as a change in the quality or quantity of a given resource due to a modification in the existing environment resulting from project-related activities. Impacts can be beneficial or adverse; a primary (direct) result or a secondary (indirect) result of an action; long-term (more than five years) or short-term (less than five years); and can vary in degree from a slightly discernable change to a total change in the environment.

In accordance with 40 CFR 1502.16, this chapter includes a discussion of the potential environmental consequences of the Proposed Action and the No Action Alternative on each of the affected resources. Potential impacts are quantified when possible; however, when impacts are not quantifiable appropriate adjectives are used to best describe the level of impact and appropriate mitigation measures are suggested where appropriate.

4.2 CULTURAL RESOURCES

Cultural resources, including archaeological and historic sites, on lands subject to federal authority are protected by various laws, rules and regulations commencing with the *Antiquities Act* of 1906. Specific directives concerning Cultural Resource Management can be found in *Archaeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines* (Federal Register 1983) and BLM Manual Section 8100. Prior to the initiation of any federal action, cultural resources must be inventoried and evaluated to determine their eligibility for inclusion in the NRHP. NRHP criteria (36 CFR 60.4) for determining eligibility define four criteria of significance based upon "...the quality of significance in American history, architecture, archaeology, and culture present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, and association; and that:

- are associated with events that have made a significant contribution to the broad patterns of our society; or
- are associated with the lives of persons significant in our past; or
- embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- have yielded, or may be likely to yield, information important in prehistory or history”.

Cultural properties are generally not eligible for inclusion in the NRHP if they lack diagnostic artifacts, subsurface remains, or structural features. Furthermore, sites that cannot be placed in a temporal context or shown to be related to other sites are usually not eligible and therefore are discharged from management.

4.2.1 The Proposed Action

As indicated in Section 3.4, Class III cultural resource inventories have been completed on those areas that would be disturbed in conjunction with access to and construction of the eight wells proposed in the Hornbuckle Field. Approximately 112.47 acres were inventoried in conjunction with the Proposed Action and no cultural sites were identified in conjunction with these inventories. Any unanticipated discoveries of cultural resources made during construction activities would be evaluated according to standard procedures and project personnel would be prohibited from collecting any artifacts or disturbing any significant cultural resources in the area. As a consequence, impacts to cultural resources would likely be negligible to nonexistent.

4.2.2 The No Action Alternative

Under the No Action Alternative, there would be no project-related surface disturbance and impacts to cultural resources would remain at current levels.

4.2.3 Mitigation and Monitoring

Measures for the protection of cultural resources are included in both the Multi-Point Surface Use and Operation Plan (SUP) and Conditions of Approval (COAs) for the individual APD's. These measures include, but are not necessarily limited to, the following:

- SWPC would be responsible for informing all persons associated with this project that they shall be subject to prosecution for damaging, altering, excavating or removing any archaeological, historical, or vertebrate fossil objects on-site. If archaeological, historical, or vertebrate fossil materials are discovered, the operator would suspend all operations that further disturb such materials and immediately contact the Authorized Officer. Operations would not resume until written authorization to proceed is issued by the Authorized Officer.

Within five working days, the Authorized Officer would evaluate the discovery and inform SWPC of actions that would be necessary to prevent loss of significant cultural or scientific values.

SWPC would be responsible for the cost of any mitigation required by the Authorized Officer. The Authorized Officer would provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the Authorized Officer that the required mitigation has been completed, the operator would be allowed to resume operations.

4.3 INVASIVE, NON-NATIVE SPECIES

The disturbance of existing, native vegetation would create opportunities for the establishment of invasive, non-native (invasive) species. Invasive species are easily established and commonly found on all newly disturbed and reclaimed sites throughout Wyoming. These species are fast growing, can out-compete native species, can increase the danger of wildfires, and can prevent the establishment of native species including grasses, forbs and, and shrubs.

Several species of invasive plant species have become established on disturbed sites throughout central Wyoming including, but not necessarily limited to, Canada thistle (*Cirsium arvense*), cheatgrass (*Bromus tectorum*), halogeton (*Halogeton glomeratus*), musk thistle (*Carduus nutans*) and Russian knapweed (*Centaurea repens*) and the ongoing drought conditions experienced in central Wyoming over the past several years would appear to have exacerbated the proliferation of these invasive species on recently reclaimed areas.. If allowed to become established, infestations of these invasive species could provide seed sources for the invasion of adjacent, neighboring lands and could impact forage production on these affected lands for both domestic livestock and wildlife.

4.3.1 The Proposed Action

Construction activities associated with the Proposed Action would result in the short-term disturbance of approximately 49.04 acres of surface estate. The invasion of these newly-disturbed areas by invasive plant species would be a potential impact resulting from surface disturbing activities associated with additional horizontal drilling operations in the Hornbuckle Field.

Private surface owners across Wyoming recognize the threat from infestations of invasive species and it is commonplace for surface use agreements between these private surface owners and the oil/gas operators to contain fairly strict provisions for ongoing treatment of any infestations of invasive species occurring on those lands disturbed in conjunction with oil/gas exploration and development activities. In this regard, SWPC has included language in their individual APDs stating that they agree to control any infestations of invasive plant species that are identified on those areas disturbed in conjunction with project-related activities. Considering the somewhat limited amount of surface disturbance which would be associated with the Proposed Action and the commitment from SWPC to control potential infestations of invasive species on these disturbed lands, the potential for widespread infestation is considered to be negligible.

4.3.2 The No Action Alternative

Under the No Action Alternative, the 49.04 acres of initial surface disturbance associated with the Proposed Action would not occur thereby eliminating the potential spread of noxious weeds to areas not previously infested with these species.

4.3.3 Mitigation and Monitoring

No mitigation is recommended.

4.4 SOILS

Impacts that could result from surface disturbing activities associated with the Proposed Action would include the removal of vegetation, subsequent exposure and disturbance of the soil, mixing of soil horizons, an increase in the susceptibility of the soil to wind/water erosion, loss of the soil resource, and a long-term alteration in the topography of the affected areas(s). The initial disturbance of the soil, in association with the potential loss of soil through erosion, could ultimately reduce both the quantity and productivity of topsoil available for reclamation operations. However, all available topsoil would be salvaged during initial construction and stockpiled for later revegetation in order to assure that the natural fertility and reclamation potential of the topsoil resource is not reduced.

Increased surface runoff and water erosion would primarily occur in the short-term and would decline over time due to natural stabilization and surface crusting. Soil and climatic factors in the overall area, combined with utilization of technological and/or mechanical applications designed to enhance revegetation would generally ensure stabilization of each disturbed area within one to two years after initial disturbance.

4.4.1 The Proposed Action

Construction of the eight well locations proposed by SWPC in the Hornbuckle Field would account for approximately 71% of the initial surface disturbance associated with the Proposed Action. Using the calculations for surface disturbance presented in Table 2.3, well location surface disturbance by SMU is provided below:

- SMU 105: 5.13 acres;
- SMU 109: 4.44 acres;
- SMU 121: 4.53 acres;
- SMU 122: 15.01 acres; and
- SMU 137: 9.28 acres.

As shown above, approximately 64% of the surface disturbance resulting from well pad construction would occur in SMUs 122 and 137. As shown in Table 3.7, soils in the Hiland-Bowbac complex (SMU 122) generally exhibit a moderate hazard for both wind and water erosion, while the soils in the Tassel-Tullock-Vonalee association generally exhibit a severe hazard of wind erosion and a moderate hazard for water erosion (NRCS 1986). Soils included in

these two SMUs also represent the primary soils encountered on/along the proposed access road routes as well (see Table 2.3). The hazard of wind and water erosion would increase as the degree of slope increases; however, all of the proposed well locations and their associated access road routes are situated on relatively gentle slopes.

A detailed analysis of projected soil erosion rates was conducted for the *Cave Gulch-Bullfrog-Waltman Natural Gas Development Project* (BLM 1997). The Modified Soil Loss Equation (MSLE) was used to calculate soil erosion, and erosion rates were determined based on general assumptions of conditions and operating procedures for the comparison of alternatives. These calculations suggest that soil erosion can be reduced significantly with the application of Best Management Practices (BMP) as referenced in BLM Instruction Memorandum 2004-124 (www.blm.gov/bmp) and the joint BLM/U.S. Forest Service (USFS) publication: *Surface Operating Standards for Oil and Gas Exploration and Development* (Fourth Edition). Table 4.1 provides estimated erosion rates based upon the 1997 Cave Gulch analysis.

Table 4.1

Estimated Erosion Rates per Acre of Surface Disturbance Calculated Both With and Without the Application of Best Management Practices in Tons/Acre/Year

Type of Disturbance	Bare Soil Surface - BMP Not Applied	BMP Applied - Erosion After One Year	BMP Applied - Erosion After Five Years
Individual Well Pads	13.8 tons/acre/year	1.5 tons/acre/year	0.2 tons/acre/year
Access Roads	5.8 tons/acre/year	2.3 tons/acre/year	0.5 tons/acre/year

Source: Soils, Water, and Vegetation Resources Technical Report. Report prepared for the *Cave Gulch-Bullfrog-Waltman Natural Gas Development Project EIS* (Grah 1997).

As demonstrated above, implementation of BMP for reclamation and erosion control would result in a 95% reduction in erosion in the first year and a 96% reduction in erosion by the fifth year, with implementation of BMP resulting in an overall 99% reduction in erosion after five years. These analyses suggest that soil erosion resulting from the Proposed Action could be significantly reduced with the application of BMP for reclamation and stabilization of disturbed soils (BLM 1997, BLM 2003, Grah 1997). Soil characteristics in the area of potential affect (APE) for the Proposed Action were compared with soil characteristics in the Cave Gulch-Bullfrog-Waltman Natural Gas Development Project area (BLM 1997) and were generally found to be similar in terms of soil attributes and erosion factors.

Notwithstanding the generally sensitive nature of the soils encountered in conjunction with the Proposed Action, the initial disturbance of approximately 49.04 acres of the soil resource is not considered as a major impact thereto. As discussed above, successful implementation of BMP in

the reclamation of surface disturbance associated with this project should reduce erosion by 99% after five years.

4.4.2 The No Action Alternative

Under the No Action Alternative there would be no project-related disturbance of soils and soils would remain in their current state.

4.4.3 Mitigation and Monitoring

In order to minimize the overall impact to soil resources within the Hornbuckle Field which could result from surface disturbing activities associated with the Proposed Action, the following mitigation measures are recommended.

1. Construction and/or surface disturbing activities would be prohibited during periods when the soil material is saturated, frozen, or when watershed damage is likely to occur.
2. All available topsoil (e.g., 6 to 12 inches) should be removed (stripped) from areas of new construction and stockpiled for future reclamation of these disturbed areas. This stored topsoil, as well as cut and fill slopes on the well pad, should be secured from erosion through mulching and temporary revegetation if reclamation is not anticipated within one year following initial construction.
3. Unused areas (borrow ditch) along the proposed access road route(s) which would be denuded of existing vegetation during initial construction should be reseeded in order to re-establish vegetative cover and reduce the overall potential for erosion and off-site sedimentation.
4. Sandy soils which are prone to wind and water erosion should be uniformly mulched with certified weed-free native grass, hay, or small grain straw at a rate of two tons/acre. Cotton, jute, or synthetic netting may be applied in steep areas where erosion would be a problem as required by the Authorized Officer in consultation with the affected private surface owner. Mulch would be crimped two to four inches into the soil on the contour, tackified, or incorporated into erosion control blankets to prevent it from blowing or washing away and from entering waterways. Mulch would protect the soil from wind and water erosion, raindrop impact, and surface runoff, and would help hold seeds in place. Mulching may occur prior to or after broadcast seeding but must not occur before drill seeding.

Hydromulch, biodegradable erosion control netting, or matting would be firmly attached to the soil surface on steep slopes where it is unsafe to operate equipment, at sites where soils have 35% or more surface rock content, or on notably unstable areas.

5. All reclaimed surfaces would be left rough and would be mulched as described above to reduce the potential for wind and water erosion. Erosion and sediment control structures

would be installed on reclaimed areas wherever slopes exceed 3:1. Runoff from reclaimed areas on hillsides with 3:1 or greater slopes would be controlled using standard structures including, but not limited to, waterbars, silt fences, geotextile, and/or energy dissipaters. Waterbars would be installed in accordance with standard BLM specifications and would drain into undisturbed vegetation as follows:

- Prior to commencement of reseeding activities, waterbars would be constructed at least one foot deep, on the contour with approximately two feet of drop per one hundred feet of waterbar to ensure drainage, and extended into established vegetation. All waterbars would be constructed with the berm on the downhill side to prevent the soft material from silting in the trench. The initial waterbar should be constructed at the top of the backslope. Subsequent waterbars should follow the following general spacing guidelines:

Waterbar General Spacing Guidelines

% Slope	Spacing Interval (feet)
2% or <	200'
2% - 4%	100'
4% - 5%	75'
5% or >	50'

- Silt fences, if/as necessary, would be placed downslope from reclaimed areas where erosion may impact a water body, and would be installed according to manufacturers' instructions. Energy dissipaters would be used to slow flows wherever water is channelized (e.g., by a waterbar or an interceptor ditch). All runoff and erosion control structures would be inspected and maintained by SWPC on a regular basis until the site is determined to be stable.

It should be noted that some of the mitigation measures recommended above may be included in the Multi-Point Surface Use and Operation Plan (SUP) prepared for each well by SWPC, while others may be included in Lease Notice #1 appended to the approved oil/gas lease. Those mitigation measures not included in either the SUP or Lease Notice #1 will be applied as Conditions of Approval to the individual APD's as necessary to minimize impacts to the soil resource.

4.5 WILDLIFE

Impacts on local wildlife populations would result from direct removal or alteration of habitat, increased human presence associated with additional oil/gas exploration and development activity, and direct wildlife/human interaction. Activities associated with additional exploration and/or development activity within the WCPA would temporarily eliminate approximately 49.04 acres of wildlife habitat, consisting mostly of grasses and forbs. This would result in a

proportionate reduction in the amount of herbaceous and browse forage available to herbivorous species such as antelope and mule deer, as well as a reduction in nesting, feeding and security habitat for game birds (e.g., sage grouse) and those smaller vertebrate species that may inhabit the affected areas. These habitat losses can generally be classified as being either short-term or long-term in duration, with these terms defined below.

- Short-term loss refers to disturbances that would be reclaimed immediately after exploration and/or development activities are completed. Loss or alteration of habitats in grass-shrub meadows and/or on grassy slopes would be considered short-term and are expected to occur in conjunction with lease development.
- Long-term loss would occur in areas that could not be returned to their original vegetative state within a reasonable period of time (three to five years), such as producing well sites and access roads.

4.5.1 The Proposed Action

The removal of 49.04 acres of wildlife habitat in the short-term and 18.86 acres in the long-term would have a negligible impact on wildlife populations because of the small area(s) affected and the relative availability of similar, undisturbed habitats in directly adjacent areas. Once conclusion of operations within the Hornbuckle Field and successful reclamation of these disturbed areas has been achieved, these affected habitats would return to pre-project conditions.

4.5.1.1 Big Game Species

As stated in Section 3.7.1, there are no crucial big game habitats within the APE for the Proposed Action. Rather than direct habitat loss, the greatest impact on wildlife populations would be from displacement of big game species from preferred habitats as a result of increased level(s) of human activity (including vehicular traffic) and associated noise. The extent of this displacement is difficult to predict when one considers that response to noise and human presence varies from species to species as well as among individuals of the same species. In some cases, wildlife species may habituate to noise and human presence after initial exposure, and begin to utilize areas that were formerly avoided. Numerous studies have examined the effects of human presence on big game species (Klein 1974; Irwin and Peek 1979; Ward and Cupal 1979; MacArthur et al. 1982; Brekke 1985) and it is commonly presumed that these effects are detrimental to individual species. However, research on the relationship between displacement from preferred habitats and increased stress due to human harassment (both intentional and otherwise) on overall population dynamics has been inconclusive to date, particularly pertaining to oil/gas exploration and development activity.

In addition to the avoidance response, an increased human presence intensifies the potential for wildlife-human interactions ranging from the harassment of wildlife to poaching and increased legal harvest. Likewise, increased traffic levels on existing access roads could increase the

potential for wildlife-vehicle collisions. These collisions are most frequent where roads traverse areas commonly frequented by game species.

Generally speaking, construction, drilling and completion activities within the Hornbuckle Field would temporarily displace big game animals in the immediate vicinity (up to 0.5 miles) of such activities. However, once these intensive activities have been completed, most big game animals would become acclimated to the reduction in traffic and human activity and would continue to utilize suitable habitat in closer proximity to well pads and access road routes. However, such habitat may not be utilized to the same extent as it was prior to disturbance. It could take 10 to 20 years for some reclaimed areas to attain pre-disturbance shrub conditions and vegetation diversity. However, once all production operations have been terminated, existing facilities abandoned and removed, reclamation and reseeding operations completed, and suitable vegetation has been re-established, big game animals would likely re-occupy all previously disturbed areas within the Hornbuckle Field.

4.5.1.2 BLM Sensitive Species

As stated in Section 3.7.2, there are no greater sage grouse leks known to exist with an approximate nine mile radius of the APE for the Proposed Action and the availability of suitable greater sage grouse nesting and early brood-rearing habitat is limited in this area. An assessment of habitat suitability has been performed in conjunction with the on-site inspections conducted on each of the proposed well locations and access road routes and the results of these assessments are presented in Table 4.2.

Table 4.2

Greater Sage Grouse Nesting and Brood-Rearing Habitat Suitability

Facility Name And Number	Legal Location of Facility				Habitat Suitability	
	Quarter	Section	Township	Range	Road	Location
BR Federal 44-4H	SE ¹ / ₄ SE ¹ / ₄	4	37 North	73 West	No	No
BR Federal 11-10H	NW ¹ / ₄ NW ¹ / ₄	10	37 North	73 West	No	No
DCR Federal 31-24H	NW ¹ / ₄ NE ¹ / ₄	24	37 North	73 West	No	No
HR Federal 44-20H	SE ¹ / ₄ SE ¹ / ₄	20	38 North	73 West	No	No
GH Federal 44-21H	SE ¹ / ₄ SE ¹ / ₄	21	38 North	73 West	No	No
GH Federal 24-22H	SE ¹ / ₄ SW ¹ / ₄	22	38 North	73 West	No	No
BR Federal 24-26H	SE ¹ / ₄ SW ¹ / ₄	26	38 North	73 West	No	No
HR Federal 11-28H	NW ¹ / ₄ NW ¹ / ₄	28	38 North	73 West	No	No

Considering that there are no known greater sage-grouse leks within nine miles of the proposed project area, and the lack of extensive areas of suitable habitat within the APE, in it is highly unlikely that the Proposed Action would adversely affect greater sage grouse populations or their habitat within the project area.

The potential impacts of the Proposed Action to ferruginous hawks will be discussed in Section 4.5.1.3.

4.5.1.3 Raptor Species

Individual raptor nesting inventories have been conducted for each of the wells proposed in conjunction with the Proposed Action. These inventories have identified three historic nests within the APE, including two ferruginous hawk nests and one red-tailed hawk nest. Recent nesting activity at these historic nest sites is not known.

Surface disturbance and concomitant human intrusion(s) associated with additional oil/gas exploration and development activity within the Hornbuckle Field could have a negative effect upon raptor breeding and/or nesting activities within the APE if these activities were allowed to proceed during the breeding/nesting season. Likewise workover/recompletion activities proposed during critical time periods in the breeding/nesting cycle could result in aborted breeding activity and/or nest abandonment. It should also be noted that construction of the DCR Federal #31-24H well location as currently proposed could result in the permanent abandonment of the historic ferruginous hawk nest identified in the SW¹/₄SE¹/₄SE¹/₄ of Section 13 in Township 37 North, Range 73 West.

4.5.1.4 Threatened and Endangered Species

A search was made of the Wyoming Natural Diversity Database (WYNDD) to determine if sightings for any of the T/E species discussed in Section 3.7.4 have been recorded within Townships 37 and 38 North, Range 73 West - which includes the APE for the Proposed Action and a sizeable buffer zone surrounding the individual wells/roads proposed herein. The WYNDD contained no sightings for these species in the selected townships and ranges (WYNDD 2009).

Those federally-listed species that may occur in the project area were identified in Section 3.7.4 and include the black-footed ferret, Preble's meadow jumping mouse, and Ute ladies'-tresses as well as five species found downstream in the North Platte River drainage that could be affected by water depletions there from (BLM 2006, BLM 2008a, BLM 2008b). Table 4.3 provides a listing of these species and their potential occurrence within the APE. Following is a brief discussion of each species including their habitat preferences and potential for occurrence in the project area.

- Black-footed ferret (*Mustela nigripes*). The black-footed ferret is a potential resident in prairie dog (*Cynomys sp.*) colonies throughout the State of Wyoming with a re-introduced population in the Shirley Basin area of northeastern Carbon County, Wyoming. There are no known prairie dog towns within the APE; consequently, impacts to black-footed ferrets will not occur.

- Preble’s meadow jumping mouse (*Zapus hudsonius preblei*). Preble’s meadow jumping mice, a threatened species, are a potential resident in riparian habitats east of the Laramie Mountains and south of the North Platte River drainages. All subspecies of *Zapus* in Wyoming are strongly associated with riparian areas, and are seldom found outside of heavy vegetation immediately adjacent to flowing streams. Preble’s meadow jumping mice are strongly associated with foothills and plains riparian areas. Heavy herbaceous cover is vital, and the highest densities of *Z. h. preblei* have been recorded in areas with some woody (e.g., cottonwood, willow) overstory. (Beauvais 2001, Keinath et al. 2003). There are no known occurrences of *Z.h. prebeli* recorded within the APE for the proposed project (WYNDD 2009) and the habitat requirements for this species are not present therein.

Table 4.3

Federally Listed Threatened and Endangered Species and Their Potential Occurrence within the Hornbuckle Field APE

Common Name	Scientific Name	Federal Status ¹	Potential Occurrence Within the APE ²
MAMMALS			
Black-footed ferret	<i>Mustela nigripes</i>	E	X
Preble’s meadow jumping mouse	<i>Zapus hudsonius preblei</i>	T	X
BIRDS			
Interior least tern ³	<i>Sterna antillarum</i>	E	X
Piping plover ³	<i>Charadrium melodus</i>	T	X
Eskimo curlew ³	<i>Numenius borealis</i>	E	X
FISH			
Pallid sturgeon ³	<i>Scaphirhynchus albus</i>	E	X
PLANTS			
Ute ladies’-tresses	<i>Spiranthes diluvialis</i>	T	X
Western prairie fringed orchid ³	<i>Plantanthera praeclara</i>	T	X

¹ Federal status: E = listed as federally endangered.
T = listed as federally threatened.

² Species occurrence:

- O = occasional; this species may occur in the HQPA during specific times of the year and may be locally common when suitable food is available; generally not present for extended periods.
- R = rare; species may occur in the HQPA for just a few days or hours (e.g., stopping over during migration), or the species has only occasionally or rarely been sighted in the HQPA. Encounters during the proposed action are very unlikely.
- X = unlikely; there has been no recent historical record of the species’ occurrence in the HQPA; probability of encountering the species during project-related activity is very unlikely.

³ North Platte River species.

- Ute ladies'-tresses (*Spiranthes diluvialis*). Ute ladies'-tresses is a perennial orchid that occurs primarily on moist, sub-irrigated or seasonally flooded soils in valley bottoms, gravel bars, old oxbows, or floodplains bordering springs, lakes, rivers, or perennial streams at elevations between 1,800 and 6,800 feet (Fertig 2000; Keinath et al. 2003; Spackman et al. 1997). Where Ute ladies'-tresses occur in ephemeral drainages, groundwater is typically shallow (i.e., within approximately 18 inches of the ground surface) (BLM 2005).

In Wyoming, *S. diluvialis* is known from Converse, Goshen, Laramie and Niobrara Counties in the Antelope Creek, Horse Creek and Niobrara River watersheds (Fertig 2000, Heidel 2007). Nine occurrences of the species have been recorded in Wyoming, with the closest recorded occurrence of *S. diluvialis* to the project area recorded in northwestern Converse County approximately 20 miles to the north/northwest thereof (Heidel 2007, WYNDD 2009). There are no perennial streams with associated riparian habitats as discussed above within the APE and there have been no occurrences of *S. diluvialis* recorded within the project area (WYNDD 2009).

Surface disturbing activities associated with the Proposed Action would not occur in the drainages of Antelope Creek, Horse Creek or the Niobrara Rivers. Consequently, impacts to *S. diluvialis* are not expected to occur as a result of surface disturbing activities associated with the Proposed Action.

- North Platte River Species. Those five North Platte species identified in Section 3.7.4 (including interior least tern, piping plover, pallid sturgeon, Eskimo curlew and western prairie fringed orchid) that may occur in the downstream riverine habitats of the North Platte River in Nebraska could be adversely affected by surface water depletions (consumption) in the North Platte River system resulting from project-related activities. As stated in Section 2.1.2.1 and Table 3.2, water to be used in drilling operations would be obtained from local sources not connected to the North Platte River. As a consequence, no depletions would result in the North Platte River system and the downstream riverine habitats of these species would not be affected by the Proposed Action.

4.5.1.5 Migratory Bird Species

As previously discussed, surface disturbing activities associated with the Proposed Action would result in the initial disturbance of approximately 49.04 acres of western mixed grass/short-grass prairie which provides a source of food, security cover and nesting habitat for many of the species listed in Table 3.9. Approximately 62% of this disturbance would be reclaimed within five years of initial disturbance resulting in a long-term (LOP) loss of approximately 18.86 acres of habitat.

Considering the relatively small percentage of total surface disturbance proposed within the APE, the actual magnitude of direct habitat loss and subsequent displacement would be minimal. The displacement of bird species to adjacent, undisturbed habitats, while difficult to predict, would be relatively short-term in nature given the overall duration of activities associated with the proposed horizontal drilling project.

4.5.2 The No Action Alternative

Under the No Action Alternative impacts to wildlife populations in the area would continue at existing levels.

4.5.3 Mitigation and Monitoring

In order to minimize the overall impact to wildlife within the Hornbuckle Field which could result from construction and drilling activities associated with the Proposed Action, the following mitigation measures are recommended.

1. To protect important raptor nesting habitat, drilling and/or surface use will not be allowed within one-half mile of occupied raptor nests during the period from February 1 to July 31.

4.6 CUMULATIVE IMPACTS

Cumulative impacts are impacts which are likely to occur due to the proposed action in combination with other ongoing activities in the area, recently constructed projects in the area, and/or projects which would likely be implemented in the area in the near future. Pursuant to NEPA, the BLM must consider the cumulative impacts of the Proposed Action in conjunction with other ongoing oil/gas exploration activities within the general area. In addition, unrelated activities within the overall project area which might have an adverse impact upon existing natural resources in the area and, consequently, which would further contribute to the overall degradation of the human environment must be considered in the analysis of cumulative impacts as well.

4.6.1 Introduction

Nine wells were drilled within the overall project area (Hornbuckle Field) in 2008 including four vertical wells, four horizontal wells and one directional well. These wells are identified in Table 4.4.

Short-term surface disturbance associated with these nine wells is estimated at 51.52 acres, with approximately 34.74 acres of disturbance attributable to pad construction and approximately 16.78 acres of surface disturbance attributable to road construction or reconstruction. These 51.52 acres of short-term surface disturbance would be cumulative to any additional surface disturbance occurring within the overall project area in association with the Proposed Action. Table 4.5 quantifies the 51.52 acres of existing, short-term surface disturbance in the Hornbuckle Field resulting from recent drilling operations conducted therein by Merit Energy Company and SWPC.

Successful interim reclamation of these disturbed areas as described in Section 2.1.5 would result in approximately 24.17 acres of long-term surface disturbance (11.75 acres for the permanent

access roads and 12.42 acres for the well locations), in the overall project area resulting from the recent drilling activity described above and would also be cumulative to any long-term surface disturbance resulting from the Proposed Action.

Table 4.4

Wells Drilled or Approved in the Hornbuckle Field in 2008

Operator	Well Name and Number	Legal (Surface) Location of Well			
		Quarter	Section	Township	Range
Merit Energy Company	Highland Flats #34-2	SW¼SE¼	2	37 North	73 West
Merit Energy Company	Highland Flats #14-34	SW¼SW¼	34	38 North	73 West
Southwestern Production Corp.	HR Fee #11-27V	NW¼NW¼	27	38 North	73 West
Southwestern Production Corp.	HR Federal #31-27H	NW¼NE¼	27	38 North	73 West
Southwestern Production Corp.	HR Federal #44-29H	SE¼SE¼	29	38 North	73 West
Southwestern Production Corp.	HR Fee #21-33H	NE¼NW¼	33	38 North	73 West
Southwestern Production Corp.	Blaylock Fee #42-34V	SE¼NE¼	34	38 North	73 West
Southwestern Production Corp.	Blaylock Federal #13-35A	SE¼NE¼	34	38 North	73 West
Southwestern Production Corp.	BR Fee #11-35V	NW¼NW¼	35	38 North	73 West

Table 4.5

Existing Short-Term Surface Disturbance in the Hornbuckle Field

Well Name and Number	Well Status	Access Road	Well Location	Total Disturbance
Highland Flats #34-2	PGW	3.21 ¹	3.20 ¹	6.41
Highland Flats #14-34	POW	0.92 ¹	2.87 ¹	3.79
HR Fee #11-27V	POW	2.48 ¹	3.24 ¹	5.72
HR Federal #31-27H	POW	1.33 ²	4.80 ²	6.13
HR Federal #44-29H	POW	1.33 ²	4.80 ²	6.13
HR Fee #21-33H	POW	2.76 ¹	4.80 ²	7.56
Blaylock Fee #42-34V	POW	0.34 ¹	3.35 ¹	3.69
Blaylock Federal #13-35A	POW	0.00 ³	2.88 ¹	2.88
BR Fee #11-35V	POW	4.41 ¹	4.80 ²	9.21
TOTALS		16.78	34.74	51.52

- 1 Calculated (actual) surface disturbance
- 2 Estimated surface disturbance (average from Table 2.3)
- 3 Access to the Blaylock Federal #13-35A is included in the BR Fee #11-35V calculations

There are no other projects currently proposed or planned in the reasonably foreseeable future within the general area that would contribute to the cumulative impacts of the eight additional horizontal wells proposed by SWPC in the Hornbuckle Field.

4.6.2 Cultural Resources

Those surface disturbing activities subject to federal jurisdiction proposed within the Hornbuckle Field including those associated with the Proposed Action have all been inventoried to determine their potential impact upon cultural resources. Any cultural sites identified in conjunction with these inventories have added to our cumulative understanding of past human habitation within the overall project area and any sites identified in conjunction with these surveys that were deemed to be potentially eligible for nomination to the National Register of Historic Places (NRHP) have either been avoided or the potential impacts thereto mitigated in accordance with BLM/SHPO recommendations. Considering that potentially eligible cultural sites identified within the overall WCPA have been and would continue to be avoided, combined with the fact that no eligible cultural sites were identified in conjunction with the Proposed Action, we would not anticipate any adverse cumulative impacts to cultural resources within the overall project area as a result of surface disturbing activities proposed in conjunction therewith.

4.6.3 Invasive Non-Native Species

Considering that invasive, non-native plant species would be controlled by SWPC within the overall project area, it is unlikely that the Proposed Action would have any adverse cumulative impacts on native plant communities arising from the invasion of and replacement with non-native species. However, any area(s) within the overall project area subjected to new surface disturbance would represent an opportunity for the establishment of these invasive, non-native species.

4.6.4 Soils

Some very small amount of soils would move off disturbed areas; however, such movement would likely cease once the soils reach undisturbed areas. Cumulative impacts to soils would be negligible based on the use of Best Management Practices (BMPs) in construction and the timely reclamation of those areas disturbed in conjunction with the construction of the roads and well pads proposed herein.

As indicated in Table 2.4, surface disturbances associated with the Proposed Action would result in the short-term disturbance of approximately 49.04 acres of the soil resource within the Hornbuckle Field and would result in approximately 100.56 acres of cumulative short-term disturbance.

Addition of the 49.04 acres of surface disturbance attributable to the Proposed Action would almost double the overall, short-term surface disturbance within the Hornbuckle Field resulting

from recent/proposed drilling activities. However, implementation of BMP for reclamation and erosion control would result in a commensurate reduction in overall erosion rates as discussed in Section 4.4.1. The successful reclamation of surface disturbance within the overall project area combined with routine monitoring of reclamation success and implementation of remedial measures as necessary to correct any identified deficiencies would reduce the cumulative impacts to the soil resource to negligible levels.

4.6.5 Wildlife

The 49.04 acres of short-term and 18.86 acres of long-term disturbance associated with the Proposed Action would add to the pre-existing surface disturbance within the Hornbuckle Field as discussed above. Overall, the generally small amounts of cumulative habitat loss would have minimal impacts on wildlife populations. Once the initial construction and drilling phases of the proposed project have been completed, the project area should return to a pre-project level of human disturbance. Moreover, once the wells in the Hornbuckle Field have been depleted, the subsequent abandonment and successful reclamation of existing facilities within the field would return the area to a pre-disturbance state.

Some small mammals could be killed during construction or by collisions with vehicles during production, and a small amount of wildlife habitat would be removed for the life of the project.

4.7 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible and irretrievable commitment of resources resulting from the Proposed Action would include any soils lost through wind and water erosion; the inadvertent or accidental destruction of previously unrecorded or potentially eligible cultural resources; the loss of animals due to earthmoving activities or by collisions with vehicles; and energy expended during project activities.

4.8 SHORT-TERM USE OF THE ENVIRONMENT VERSUS LONG-TERM PRODUCTIVITY

Short-term use of the environment during the life of the project would not detract from long-term productivity of the area. Even during the life of the project, only the small areas from which vegetation is removed would be unavailable for grazing and wildlife habitat. Once the project is completed and disturbed areas are reclaimed the same resources that were available prior to the project would be available again, except for the hydrocarbons that were extracted from the Sussex Fm. While it may ultimately take up to 25 years to regenerate a mature, climax stand of vegetation (particularly shrubs such as sagebrush) comparable to those population(s) present prior to project implementation, successful and ongoing reclamation of surface disturbance within the overall project area would introduce vegetative communities which would support wildlife and livestock grazing, stabilize the soil, and reduce the potential for erosion and sedimentation.