THE EXISTING ENVIRONMENT

Soil Resources

The Sand Hills makes up the northeastern extension of the Kill Pecker Dunes. This massive dune complex originates from the Big Sandy and Little Sandy creeks located at the southern end of the Wind River Mountains. Here in central Wyoming the dunes have stabilized, becoming the foundation for this unique ecosystem (Knight 1984). The majority of soils are classified as Orpha loamy sands and Highland loamy sands. Both of which are highly susceptible to wind and water erosion (NRCS 1985). Cut banks are not stable and are subject to slumping. Disturbed areas and those with minimal vegetation at are at high risk due to shifting sands. Blow-outs are common in disturbed areas. The terrain is gentle to sloping.

These deep and well-drained soils provide low to moderate water availability, effecting plants with root systems up to 60 inches. This availability varies based on annual precipitation, depth of sand, and types of substrate.

Vegetation Resources

Plant communities on stabilized sites include needle-and-thread grass, prairie sand reed, sand bluestem, and Indian ricegrass. Silver sagebrush, rabbitbrush, and Wyoming big sagebrush are typical of shrubs located here. Forbs are numerous and include annuals and perennials. As the range conditions deteriorates unpalatable forbs and annuals increase in abundance.

Heavy grazing, recreational activities, wildland fire suppression efforts, and motorized travel impact sand dune environments by loss of ground cover and the high potential for blow-outs. Under harsh conditions, plant vigor deteriorates quickly in this ecosystem. As the range further deteriorates, non-native plant species (cheatgrass brome and other invasive annuals) replace the more productive vegetative communities. Once ground cover is lost, the Orpha loamy sands are subjected to high winds and water erosion increasing the initial area of disturbance. Reestablishment of native plant communities is difficult at best and often unsuccessful.

Current range conditions vary based on grazing allotment, location, and season of use. In general, the northeastern portion of the Sand Hills management area has better range conditions. The potential plant community produces between 1,700 pounds of air-dry matter in a favorable year to approximately 900 pounds in unfavorable conditions. Due to seepage, livestock watering ponds are not well-suited for much of the area. Annual precipitation for the area is approximately 10 to 14 inches.

Water Resources

Sand Creek flows south and to the west of the analysis area and is entirely on private and state land. Lone Tree Gulch is located to the east of the analysis area. Both streams are intermittent. The majority of the surface water is located on private lands. Available water is a vital part of wildlife habitat as well as part of any livestock grazing operations. Therefore, water wells and reservoirs are

common range improvement projects. There are currently five water wells on public lands within the Sand Hills management area. No wells are located on public lands within the extended boundary of the TMA. Several reservoirs have been developed east of the analysis area.

Wildlife Resources

The Sand Hills TMA is within two big game herd units: the North Converse mule deer herd unit (755) and the North Converse antelope herd unit (748). According to the Wyoming Game and Fish Department (WGFD), the mule deer herd unit is approximately 8% above the population objective of 9,100 animals (WGFD 2005). Management issues identified for this herd unit include:

- Hunter access to private and land-locked public lands;
- Increasing mineral development and the associated impacts of habitat fragmentation;
- Lack of information regarding seasonal distribution and the lack of delineated crucial winter range;
- The impacts of chronic wasting disease on the mule deer herd; and,
- The impacts of extended drought on range conditions.

According to the WGFD, the antelope herd unit is approximately 15% above the population objective of 28,000 animals (WGFD 2005). However, the WGFD believes the model may actually be overestimating the population. Apart from the questionable population estimation, management issues identified for this herd unit are similar to those identified for the North Converse mule deer herd unit.

Sage grouse in Wyoming are considered a BLM state director-listed sensitive species. In accordance with the BLM 6840 manual, sensitive species are afforded the same level of protection as candidate species under the Endangered Species Act (ESA). Three sage grouse leks occur within the vicinity of the Sand Hills: BLM No. 117, Blue Hill No. 1, and Sand Spring Creek No. 1. All the leks occur in WGFD upland game management unit 35. Lek activity data for all of these leks and the management unit overall is very limited due to the inaccessibility of the area. Additionally, much of the Sand Hills may provide sage grouse seasonal habitat, including nesting, brood rearing, and winter habitat.

The analysis area also provides habitat for numerous raptor species. Some of the species that have been observed through anecdotal observations in the area include: ferruginous hawk, bald eagle, golden eagle, red-tailed hawk, Swainson's hawk, American kestrel, burrowing owl, and prairie falcon. Presently, there is only one documented raptor nest, a ferruginous hawk, within the management area. The management area lies between two bald eagle winter communal roosts. The North Fork of the Cheyenne River roost is located approximately 4 miles northeast of the TMA and the Cole Creek bald eagle roost is located approximately 9 miles to the south. The analysis area may provide some foraging opportunities for eagles using these roost locations.

Black-tailed prairie dog colonies are present in areas along the periphery of the Sand Hills where suitable soils allow colonization. The majority of the area contains sandy soils which naturally limits colonization into the area.

In addition to the wildlife discussed above, a variety of non-game wildlife including several species of songbirds, small mammals, and predators occur throughout the area.

Threatened and Endangered Species

The TMA was evaluated for the presence of all federally threatened, endangered, candidate, and proposed species as identified on the United States Fish and Wildlife Service (FWS 2007). Based on field visits to the area and a review of historical data, no threatened or endangered species occur within the project area. Suitable habitat does not exist for the endangered black-footed ferret, threatened Ute ladies-tresses, or the threatened Colorado butterfly plant. Suitable habitat is present for the endangered blowout penstemon; however, surveys conducted throughout the area had negative findings (WYNDD 2004).

Cultural Resources

Cultural resource inventories have been conducted in the Sand Hills for over 30 years. Most of the projects are linear surveys related to oil and gas exploration. Block surveys for well pads and other developments account for additional inventory coverage. The majority of the cultural resources recorded to date are of prehistoric origin (lithic workshop areas, camp sites, stone circles, etc.) with a smattering of historic materials related to the homesteading period. Livestock management (sheepherder's camps, for example) and a long history of oil and gas development have left a thin overlay of historic debris in most places. The 1864 route of the Bozeman Trail running from Richeau's Bridge (just east of present-day Casper) passes north-south through the eastern side of the planning area, generally overlain with modern two-tracks. A second route originating at Fort Caspar passes through the northeastern corner of the analysis area.

Altogether, 24 inventories have been conducted in the study area. Of these, 15 were linear inventories for which acreage is not reported (geophysical exploration and oil/gas access road; these projects may have resulted in recording sites beyond the scope of this review) and nine were 10- to 40-acre blocks amounting to 260 acres of coverage. This is a very small percentage of the TMA and cannot be definitive in terms of explaining cultural processes in the area. Nine sites have been reported, one of which is the Bozeman Trail (recorded in two counties), two stone circles, four cairn sites thought to be prehistoric in origin, and one locality identified as a hunting blind. For the most part, these sites were recorded off-survey, and no evaluation was made. Additionally, those sites reported during inventories for geophysical exploration were avoided and left unevaluated. The Bozemen Trail is a significant cultural resource, but it remains to be seen whether any segment contained in the study area would contribute to that significance.

The Sand Hills complex in other locations has produced numerous prehistoric activity areas. The low number of sites in the study area is more likely due to limited survey coverage than a low site density. It may also be that the lack of reliable water would have been a factor in directing prehistoric activities elsewhere in the area. An extensive inventory in the Sand Dunes oil and gas unit to the east of the study area produced a significantly high site density. Dunal areas generally contain a variety of resources exploitable by prehistoric people, so the absence of procurement or camp sites in the study area is at odds with the general trend.

Paleontological Resources

To date, no paleontological localities are known in the project area (personal communication Dale Hanson, BLM Regional Paleontologist, BLM-WSO).

Review of the BLM's potential fossil yield classification system (PFYCS) maps indicates that most of the project area falls within fossil yield class 2. This class (low potential) includes lands with surfaces that have little (but not zero) potential to contain significant paleontological materials. In this case, potential fossil-bearing bedrock is buried beneath a mantle of soil and earth. The Sand Hills planning area lies almost completely on Quaternary sand dunes and loess (mapping symbol 'Qs' in Love and Christianson 1985). This recent unconsolidated material overlies the Upper Cretaceous Lance Formation which has proven to be a rich source of invertebrate and vertebrate fossils. Significant finds include the first *Tyrannosaurus rex* and many other dinosaur and early mammalian fossils. The formation takes its name from the type site at Lance Creek, Niobrara County, Wyoming. This area is known to be fossil-rich. No named localities are known for the Lance Creek exposures adjacent to the Sand Hills planning area. The terminus of the Lance Formation coincides with the great Cretaceous-Tertiary extinction some 65 million years ago. Approximately 320 acres in the extreme northeastern part of the study area is included in the Lebo Member of Tertiary-aged Fort Union Formation. This is classified as PYFC-3 which is a somewhat higher sensitivity than the remainder of the study area.

Socioeconomics

The Wyoming Economic Outlook 2007 published by the Wyoming State Government and the *2006 Impact Report* published by the Wyoming Board of Tourism show a continued growth and dependence on extractive industries such as oil and gas production and mining. Energy production is a key component of the Wyoming economy and paralleled by employment increases in other industries such as construction, trade, and transportation. However, low diversification often results in a cyclic economy. Wyoming tourism is becoming increasingly important. In 2006, tourism accounted for 8.3% of Wyoming's total sales tax revenue. In addition, 29,950 full- and part-time jobs were directly related to this industry. According to state economists, travel and tourism are vital to long-term economic stability for the state.

The Wyoming Business Council reports a population of 69,799 for Natrona County for 2005. The average household income was $49,566 per year and is projected to reach $55,672 per year by 2010. The service industry employs the highest percentage of wage earners for the county at 35.28%, followed by retail trade with 21.88%. Agriculture, forestry, and fishing have a combined percentage of .88% of the total employment for the Natrona County.

The economic value of BLM-administered surface and split estate properties within the Sand Hills project area are related to non-renewable and renewable energy development, livestock grazing, and tourism. There are 15 oil/gas leases, 5 ranch allotments, and 4 permitted big game outfitters operating in the area. Map 2 displays ranch boundaries and pasture fences.

The Sand Hills management area is administratively unavailable for new oil and gas leasing. However, all valid and existing rights would be maintained. The additional BLM surface that has

been included in the TMA under some alternatives is currently available for lease. Within the analysis area, there is approximately 7,491 acres of public surface leased for oil and gas production, of which 2,847 acres are held by production. These leases are part a larger units, which extend beyond the boundary of the TMA. Leases not held by production are set to expire between 2011 and 2017. Map 3 shows current oil and gas leases and the corresponding expiration dates. The area is considered to have a moderate potential for oil and gas production. Other energy-related activities that may occur in the vicinity on private or public lands outside the TMA include wind and solar power.

Discussions with the private landowners reveal that the significance of these public lands is related more to the intrinsic values than to the economic returns. Large private in-holdings have preserved a rural social structure. The open space, a relatively undisturbed landscape, and wildlife provide the backdrop to a highly valued way of life. The recent subdivision has had a negative impact on the quality of life for long-term residents and has the potential to effect monetary gains related to ecotourism in the Sand Hills.

Recreation

The Sand Hills are approximately 12 miles northeast of Casper and near a major county road. Rural developments on private lands such as ranch homes and newly constructed roads diminish the feelings of remoteness normally associated with large blocks of public land. Inside the management area, the natural landscape dominates the view. The sights and sounds of the natural environment are common, while management presence is low. This normally takes the form of rangeland improvement projects, pasture fences, and informational signs. Other man-made structures are isolated and rarely seen from the commonly used travel routes. There is always some on-site presence of other people, and motorized use on the main corridor changes from low to moderate during the hunting season. Opportunities for solitude, self-reliance, and personal challenge are generally over-stated, and interactions with other groups are common. The existing transportation network, along with the large blocks of open space, provides a roaded natural recreational experience.

The most popular activity in the Sand Hills TMA is deer hunting. The large local deer population and restricted access creates a prime opportunity for hunters that do not want to compete with the public. Big game outfitters in the area provide all necessary amenities. Some private landowners do allow access for a fee. Other recreational opportunities for the public within the Sand Hills TMA are significantly restricted by the lack of legal motorized or reasonable public access.

Off-Highway Vehicles

All existing routes were inventoried using standards developed for the Casper Field Office. The inventory begins with the use of digital-ortho photo quads. All linear disturbances are digitized using Arc map technology. This ensures that all potential routes are verified and improves the accuracy of fence line data. Volunteers use GPS technology to ground-truth travel routes within the planning area, a 1-mile buffer, and blocks of public lands located immediately to the southwest. This inventory assessed the condition and included anecdotal information on levels of motorized use.

Map 4 shows baseline information for existing transportation routes within the Sand Hills TMA. Inventory protocols are located in appendix B.

Until the subdivision of the BB Brooks Ranch, there were only two built and maintained roads in the vicinity of the Sand Hills, neither of which provided motorized public access into the planning area. The road network constructed for the subdivision was not included in the road inventory as these routes are entirely on private lands. The majority of the existing transportation network within the analysis area consists of primitive roads. These roads are linear routes that do not meet BLM road standards and do not receive any annual maintenance. Most primitive roads have been user created and adopted into the transportation system over time. Less intrusive transportation routes are defined as "ways." All ways have been user created and are normally used to maintain rangeland improvement projects. These types of routes receive little to no use on an annual basis and normally have a moderate to high degree of vegetative cover. There is no guarantee that a specific way would be available from year to year. Ways represent less than 10% of the travel routes located within the area. For simplification purposes, primitive routes and ways would be grouped and referred to as primitive roads or as travel routes.

Most of the 1-mile analysis area on the southern boundary was not inventoried because of time limitations related to the high number of newly constructed roads. Additionally, the BLM did not acquire permission to inventory these routes from the land owner. There are numerous crowned and ditched roads in the area, and it is difficult to estimate how many more would be built. A total of 209 miles of linear travel routes within the analysis area located on BLM, Wyoming state trust lands, and private properties.

Visual Resources

The Sand Hills are characterized by open space and panoramic views. The rounded forms created by the dunes are repeated throughout this environment and are mirrored by minor changes in vegetative communities. The entire area is considered a visual resource class IV which allows for large-scale visual intrusions that not only draw the viewer's attention but also dominate the view. Currently, visual intrusions are limited to small rural developments, rangeland improvement projects, and the existing transportation system. The basic elements of the natural environment include line, form, color, and texture and are reflected in the existing structure. Travel routes on public lands within the area follow the slope, creating a low to moderate contrast with the surrounding environment.