

INVENTORY AND MAPPING OF PLANT COMMUNITIES IN THE
ALKALI BASIN - EAST SAND DUNES WILDERNESS STUDY AREA,
SWEETWATER COUNTY, WYOMING.

A Report Prepared for the Bureau of Land Management
by
George P. Jones,
Wyoming Natural Diversity Database,
University of Wyoming.

Cooperative Agreement No. KAA00009,
Task Order TO-1.

October 19, 2004

TABLE OF CONTENTS

Introduction 1

Methods..... 1

 Field Survey 1

 Report Preparation..... 2

Results 2

 Ecosystems in the WSA 3

 Wyoming Gap Analysis Project cover-types 3

 Landtypes 4

 National Vegetation Classification System types..... 4

 FLORA OF THE WSA 6

 Rare Plants..... 6

 Noxious Weeds..... 7

References 7

Tables 9

Figures..... 19

Appendix 1. Locations, descriptions, and Vegetation of the Sample Plots in the Alkali Basin - East Sand Dunes WSA..... 30

Appendix 2. Photographs from the Alkali Basin - East Sand Dunes WSA 65

LIST OF TABLES

Table 1. Coordinates and types of plots at sampling locations in the Alkali Basin - East Sand Dunes WSA..... 10

Table 2. General cover-types mapped by WYNDD in the Alkali Basin - East Sand Dunes WSA..... 11

Table 3. Areas of GAP cover-types in Wyoming and in the Alkali Basin - East Sand Dunes WSA..... 12

Table 4. Areas of the Dune Field landtype and three landtype associations in the Alkali Basin - East Sand Dunes WSA..... 12

Table 5. Plant alliances and associations of the National Vegetation Classification System likely present in the Alkali Basin - East Sand Dunes WSA..... 13

Table 6. Number of plots likely belonging to each alliance or association from the national vegetation classification that were located in each GAP primary cover-type..... 14

Table 7. Number of plots likely belonging to each alliance or association from the national vegetation classification that were located in each general cover-type mapped by WYNDD..... 14

Table 8. Seventy-five vascular plant taxa documented in sample plots in the Alkali Basin - East Sand Dunes WSA, sorted by scientific name..... 15

Table 9. Seventy-five vascular plant taxa documented in sample plots in the Alkali Basin - East Sand Dunes WSA, sorted by number of plots in which they were found. 17

LIST OF FIGURES

Figure 1. Location of the Alkali Basin - East Sand Dunes WSA in southwestern Wyoming..... 20

Figure 2. Boundary of the Alkali Basin - East Sand Dunes WSA. 21

Figure 3. General cover-types in the Alkali Basin - East Sand Dunes WSA. 22

Figure 4. Locations of sampling points in the Alkali Basin - East Sand Dunes WSA..... 23

Figure 5. Layout of the modified-Whittaker nested sampling plots..... 24

Figure 6a. Gap Analysis Program primary cover-types in the Alkali Basin - East Sand Dunes WSA... 25

Figure 6b. Gap Analysis Program secondary cover-types in the Alkali Basin - East Sand Dunes WSA.
..... 26

Figure 7. Landtypes and Landtype Association (LTA) in the Alkali Basin - East Sand Dunes WSA.... 27

Figure 8. Categories of landtype associations in southwestern Wyoming. 28

Figure 9. Dune field and playa landtypes in southwestern Wyoming..... 29

ACKNOWLEDGEMENTS

Amy Shelley provided invaluable and cheerful assistance with the field work. Walter Fertig, former WYNDD botanist, identified plant specimens and provided information on vegetation. Assistance in administrative matters and in planning field work was rendered by Andy Tenney and Jim Glennon of the BLM's Rock Springs Field Office and by Jeff Carroll of the BLM State Office. Ron Hartman and Ernie Nelson, curator and manager, respectively, of the Rocky Mountain Herbarium, made the Herbarium's facilities available for identifying plant specimens.

INTRODUCTION

In July 2000, the Bureau of Land Management and the University of Wyoming entered into a cooperative project to characterize the vegetation and other botanical values of four wilderness study areas, including the Alkali Basin - East Sand Dunes WSA in the Rock Springs Field Office (Figure 1). The information gathered in this project will be used by BLM to evaluate the degree to which the Alkali Basin - East Sand Dunes WSA represents vegetation types and landtypes present on BLM-managed lands and to help set management practices in the WSA. The University's Wyoming Natural Diversity Database (WYNDD) will use the information in its efforts to describe the composition and distribution of the state's vegetation types and the distribution and abundance of Wyoming's rare plants.

This report is based mainly on information about vegetation, landforms, rare plant species, and noxious weeds collected by WYNDD staff during field work in the WSA from July 31 - August 4, 2000. A complete survey of the WSA was impossible, so the field work was planned to allow WYNDD staff to visit sites that appeared to represent the land forms and the vegetation types of the WSA.

METHODS

FIELD SURVEY

The boundary of the study area was provided by BLM Rock Springs Field Office staff on 1:24,000-scale topographic maps, and the Red Desert Basin 1:100,000-scale topographic map (USDI Bureau of Land Management 1981) was used to assure that the study was restricted to public lands. The boundary is shown on Figure 2. Landforms within that boundary were identified on the 1:24,000-scale topographic quads, and rock types were identified on the 1:500,000-scale bedrock geology map of Wyoming (Love and Christiansen 1985). Black-and-white aerial photographs at 1:24,000-scale were used to ascertain the variation in the substrates and vegetation of the area. These photographs were obtained as digital orthophotoquad quarters from the web site of the University of Wyoming's Geographic Information Sciences Center (<http://www.sdvc.uwyo.edu/doqq/>). They were also used in the field in the selection of sampling locations.

Based on review of the maps and photographs, four major categories of substrate were mapped in the WSA (Figure 3) and used for selection of sampling sites. Stabilized sand, forming either gently rolling plains (Stabilized Sand type on Figure 3) or long, narrow ridges, most oriented east-west (Stablized Ridge type on Figure 3) cover most of the WSA. In the central and south-central part of the WSA, active sand dunes lie within the area of stabilized sand. Bedrock areas are mapped at the western and eastern ends of the WSA.

During field work, sampling locations were subjectively chosen within each of these substrate categories throughout the WSA (Figure 4). Two types of sampling plots were used to collect information on the vegetation and habitat at each sampling point. At sampling locations with *quantitative* plots, quantitative data on the structure and species composition of the vegetation were collected by George Jones and Amy Shelley in modified-Whittaker nested plots (Stohlgren *et al.* 1995). Canopy cover of each vascular plant species was estimated by percentage classes in ten 1-square-meter microplots, and the presence of additional species (i.e., those not noted in the microplots) was recorded successively in the 10-, 100-, and 1000-square meter plots (Figure 5). The percent of the ground covered by each of 8 categories of material was estimated in the macroplot. Slope angle and slope azimuth were measured, the UTM coordinates of one corner of the macroplot were recorded with a global positioning system receiver (Trimble GeoExplorer 2, Trimble Mapping and Navigation, Sunnyvale CA, USA), surface soil texture was determined by a single hand-texture, signs of disturbance were noted, the vegetation was described, and a photograph was taken.

At *descriptive* sampling locations, the vegetation was described in less detail: the height of each vegetation stratum was estimated and the most common species in each stratum recorded. The ground-cover data were estimated and the additional information was recorded as for the classification plots.

Vascular plants were identified to species in the field when possible, using Dorn (1992). When that proved impossible, specimens were collected for later identification. Some specimens were also collected to verify the identifications made in the field.

Before field work, Jones reviewed specimens of the species on the State of Wyoming's list of designated noxious weeds in the Rocky Mountain Herbarium. The locations of any of these species observed in the WSA were to be recorded during field work. Notes were made on miscellaneous biological features and signs of human impacts observed during field survey.

REPORT PREPARATION

The cooperative agreement governing this project requires that three classification systems be used to indicate the ecosystems present in the WSA: the classification of 41 landcover-types developed by the Wyoming Gap Analysis Project, the landtypes from the federal Ecomap project, and the vegetation types from the National Vegetation Classification System.

The Wyoming Gap Analysis Project (GAP) mapped the distributions of 41 landcover-types over the whole state (Merrill *et al.* 1996), and their state-wide layer is now being distributed in digital form by the University of Wyoming's Geographic Information Science Center (Wyoming Gap Analysis 1996). A digital layer of the cover-types in the Alkali Basin - East Sand Dune WSA was clipped from the state-wide layer in the ArcView 3.2 geographic information system (ESRI, Redlands CA, USA), using a digital version of WSA boundary.

For units from the Ecomap project, we are using the landtypes and landtype associations delineated for southwestern Wyoming by Reiners and Thurston (1996). A *landtype* is mapped at a scale of 1:60,000 to 1:24,000 and covers ten to hundreds of acres. A *landtype association*, in contrast, is a unit of the National Hierarchical Framework of Ecological Units (used in the Ecomap project) one level higher than the landtype. A landtype association typically is mapped at a scale of 1:250,000 to 1:60,000, covers hundreds to thousands of acres, and includes a number of landtypes. The map of southwestern Wyoming produced by Reiners and Thurston (1996) is primarily a map of landtype associations but also shows three landtypes. A modified, digital version of their map is available that shows only their landtype associations (Reiners *et al.* 1999). For this report, an approximation of Reiners's and Thurston's original map was constructed in ArcView 3.2 with the digital map as the base. The dune field and playa landtypes were added by clipping the areas of Quaternary sand and Quaternary lacustrine deposits, respectively, from the Wyoming bedrock geology map (USDI Geological Survey 1994) and laying them over the top of the landtype associations. This was the same information used by Reiners and Thurston (1996) to map those landtypes.

The final indicator of ecosystem types, the National Vegetation Classification System, is a hierarchical classification of vegetation units (Grossman *et al.* 1998). Information from the field survey was used to place the vegetation of the WSA into alliances (units identified by the dominant or diagnostic plant species in the uppermost stratum) or associations (units within an alliance, identified by additional dominant or diagnostic species from any strata) in the current list of those types (NatureServe 2003).

Plant species names used in this report are from the USDA Natural Resources Conservation Service (2001).

RESULTS

Information was collected from 13 quantitative plots and four descriptive plots in the WSA (Figure 4, Table 1). This information and the aerial photographs indicate that the substrate in nearly

half of the WSA is stabilized sand, and over a quarter of the WSA is sedimentary bedrock (Figure 3, Table 2). Stabilized sand ridges account for 19% of the area, and active sand dunes for about 7%.

ECOSYSTEMS IN THE WSA

Wyoming Gap Analysis Project cover-types

A brief explanation of how GAP mapped the cover-types is needed for a clear understanding of the estimated area of each type in the WSA. For most polygons in the state-wide landcover layer, GAP mapped a primary and a secondary cover-type and estimated the percentage of the polygon that is each type. If it were possible to use those percentages from the GAP layer, then the actual area of a cover-type in the WSA could be estimated as:

$$\sum_{\substack{\text{polygons} \\ \text{with that} \\ \text{type}}} [(\text{area of polygon})(\% \text{ as primary type}) + (\text{area of polygon})(\% \text{ as secondary type})]$$

But the boundaries of the WSA cut across GAP polygons, so when the land area of the WSA was clipped out of the state-wide layer, some of the polygons were split. There is no reason to assume that the percentage of a given cover-type in the resulting polygons is the same as its percentage in the original polygon, so the percentages from the GAP layer were not used in calculating the areas of cover-types in the WSA. Rather, the area shown in this report for a cover-type in the WSA is the sum of the areas of the polygons in which it is mapped as the primary cover-type. This method may result in an over-estimate of the amount of a cover-type in the WSA because the type actually occupies substantially less than 100% of the polygons in which it is mapped as the dominant type. Or it may under-estimate the amount of the cover-type because it ignores the polygons in which that cover-type is mapped as the secondary type.

The GAP mapped five landcover-types as primary cover-types in the WSA (Figure 6a). The most common of these is the Vegetated Dunes type, covering 61% of the WSA (Table 3). The Active sand dunes cover-type and the Wyoming big sagebrush cover-type each are mapped by GAP in about 20% of the WSA. The final two types, Greasewood fans and flats and Saltbush fans and flats, each cover less than 1% and can be seen only on large-scale maps.

Not only are the GAP Vegetated dunes and Active sand dunes cover-types two of the major components of land cover in the Alkali Basin - East Sand Dunes WSA, that area is unusual in the degree to which it encompasses those cover-types (Table 3). According to the Wyoming GAP report (Merrill *et al.* 1996), Vegetated dunes are the primary cover-type on 44,193 ha (109,157 acres) in Wyoming (only 0.17% of the state), and 56% of this cover-type, or 24,851 ha (61,382 acres), is managed by BLM. This represents only 0.35% of the lands managed by BLM. But within the Alkali Basin - East Sand Dunes WSA, the Vegetated dunes cover-type accounts for 61% of the land area, and the WSA constitutes 13% of the area of Vegetated dunes managed by BLM in Wyoming.

The WSA also includes a substantial percentage of the Active sand dunes managed by BLM (Table 3). This is the primary cover-type on only 17,708 ha (43,739 acres) of Wyoming, and 81% of that area is managed by BLM. The WSA accounts for nearly 8% of the BLM-managed Active sand dunes in Wyoming.

The remaining three GAP cover-types are represented by the Alkali Basin - East Sand Dunes WSA in a very minor way (Table 3). Thirty-three percent of Wyoming and over half of the BLM-managed public lands in the state are mapped by GAP as the Wyoming big sagebrush cover-type, and the WSA accounts for less than 1% of the BLM-managed portion of that type. Greasewood fans and flats and Saltbush fans and flats account for a much smaller percentage of the landcover in the state (1.44% and 3%, respectively) and of BLM-managed lands (2% and 8.5%, respectively), but they, too,

are very poorly represented by the WSA, which includes less than 0.01% of the BLM-managed area of each type.

In summary, the map of GAP cover-types indicates that the Alkali Basin - East Sand Dunes WSA is unusual for BLM-managed lands in Wyoming by virtue of the amount of sandy substrate ecosystems that it contains. In contrast, it contains only a very small proportion of the areas of other basin shrub ecosystems.

Landtypes

Two landtypes and one landtype association delineated by Reiners and Thurston (1996) occur in the Alkali Basin - East Sand Dunes WSA (Figure 7). Nearly 90% of the WSA is mapped as the Dune Field landtype, nearly 10% as the Playa landtype, and less than 4% as the Green River Basin Rolling Plains landtype association (Table 4).

Figures 8 and 9 show the degree to which the Alkali Basin - East Sand Dunes WSA includes the landtype associations and landtypes of southwestern Wyoming. For Figure 8, the 46 landtype associations delineated by Reiners *et al.* (1999) were reduced to 14 categories. The WSA includes only one (Rolling Plains/Alluvial Valleys), and it is almost entirely masked by the two landtypes. Both of the individual landtypes mapped in southwestern Wyoming occur in the WSA (Figure 9).

Using landtypes and landtype associations as indicators of ecosystems yields much the same result as does the use of GAP cover-types as indicators: the WSA is seen to contain ecosystem types uncommon in Wyoming's southwestern basins. Both approaches show the predominance in the WSA of sandy ecosystems, and the landtype map adds playas that were virtually missing from the GAP map. Ecosystem types common in the basins, represented by the Green River Basin landtype association, are rare in the WSA.

National Vegetation Classification System types

Information collected at the sampling locations (Appendix 1) suggests that several shrub vegetation types and grass vegetation types listed in the national vegetation classification are present in the Alkali Basin - East Sand Dunes WSA (Table 5). Only one grass vegetation type (the *Hesperostipa comata* - *Achnatherum hymenoides* Herbaceous Vegetation association) and one shrub vegetation type (The *Artemisia tridentata* ssp. *wyomingensis* / *Hesperostipa comata* Shrubland association) that may occur in the WSA are thought to be rare. The other shrub and grass vegetation types are common. Each is briefly described below. More detailed descriptions of some plant associations, and an explanation of conservation ranks, can be found on the NatureServe web site (NatureServe 2003). Information and photographs from field sampling in the WSA are included in Appendices 1 and 2, respectively.

-- *Artemisia tridentata* ssp. *wyomingensis* / *Elymus elymoides* Shrubland association.

OR

Artemisia tridentata ssp. *wyomingensis* / *Poa secunda* Shrubland association.

Four sample plots may fit one of these associations (Table 5), although neither is described in the national classification, so their relationships to the vegetation in the WSA cannot be known. The four plots were in areas mapped by GAP as Wyoming big sage, Active sand dunes, or Vegetated dunes (Table 6), and all were in areas identified by WYNDD as the bedrock general cover type (Table 7). They were distributed widely in the WSA (Figure 4), indicating that this vegetation is widespread. The vegetation consists of a shrub stratum in which *Artemisia tridentata* ssp. *wyomingensis*, *Sarcobatus vermiculatus*, *Chrysothamnus viscidiflorus*, and *Ericameria nauseosa* contribute substantial cover, and a herbaceous layer in which *Elymus elymoides*, *Poa secunda*, and *Achnatherum hymenoides* are the major species. Several dwarf-shrubs, especially *Atriplex gardneri*, may be common.

-- *Artemisia tridentata* ssp. *wyomingensis* / *Achnatherum hymenoides* Shrubland association.

OR

Artemisia tridentata ssp. *wyomingensis* / *Hesperostipa comata* Shrubland association.

Three of the sample plots appear to fit into one of these associations (Table 5). The latter association has been described in the national classification (NatureServe 2003) and the vegetation and environment described therein resemble those from the sample plots. The former association has not been described, though, so the two associations cannot be distinguished from each other and hence it's unclear to which association the sample plots should be assigned.

The vegetation in the plots has a shrub stratum composed mainly of *Artemisia tridentata* ssp. *wyomingensis* and with less *Chrysothamnus viscidiflorus*, *Ericameria nauseosa*, *Grayia spinosa*, and *Tetradymia canescens*. *Achnatherum hymenoides* and *Hesperostipa comata* are common in the herbaceous layer, and a variety of additional graminoids and forbs may be present. The sub-shrubs *Atriplex gardneri* and *Artemisia pedatifida* may be present. This vegetation corresponds to the GAP's Wyoming big sagebrush cover-type or Vegetated dunes cover-type (Table 6) and to the bedrock or stable sand WYNDD types (Table 7). All three plots were in the southeastern part of the WSA (Figure 4).

-- *Ericameria nauseosa* Shrubland alliance

Three sample plots were in vegetation with a shrub stratum of *Ericameria nauseosa* (usually dominant) and *Chrysothamnus viscidiflorus*, and sometimes containing several other species (Table 5). Common herbaceous species were *Achnatherum hymenoides*, *Elymus lanceolatus* ssp. *lanceolatus*, *Hesperostipa comata*, and *Psoralidium lanceolatum*. These plots were within the GAP Active sand dunes or Vegetated dunes cover-types (Table 6) and two of them were on the stable ridge general cover-types (Table 7). All three fit within this alliance from the national classification. The national classification includes a *E. nauseosa* / *Leymus flavescens* / *Psoralidium lanceolatum* association with vegetation and substrate that sound similar to this vegetation except for the difference in the common wheatgrass. A second association (the *E. nauseosa* / *Muhlenbergia pungens* - *Achnatherum hymenoides* Shrub Short-herbaceous association from Colorado) is listed but undescribed in the national classification. The plots were located in the center and at the eastern end of the WSA (Figure 4), indicating that the *Ericameria nauseosa* shrub vegetation is widespread.

-- *Sarcobatus vermiculatus* / *Distichlis spicata* Shrubland association

This shrub vegetation association seems to fit the vegetation sampled by three of the plots (Table 5), where *S. vermiculatus* forms a shrub layer (often with *Chrysothamnus* spp. and *Ericameria nauseosa*) and the herbaceous layer may contain *Distichlis spicata* (in two of the three plots), *Achnatherum hymenoides*, *Elymus lanceolatus* ssp. *lanceolatus*, *Poa secunda*, and *Spartina gracilis* as common species. A variety of forbs may be present. The plots all were in the Active sand dunes or the Vegetated dunes GAP cover-types (Table 6) and in the bedrock or the stabilized ridge WYNDD types (Table 7) and were located at both ends of the WSA (Figure 4), suggesting that this vegetation is widespread in the WSA. These plots were close to the plots in the *Distichlis spicata* vegetation described below (Figure 4).

-- *Distichlis spicata* Herbaceous Vegetation

OR

Distichlis spicata - (*Scirpus nevadensis*) Herbaceous Vegetation

Two sample plots were in grass vegetation where *Distichlis spicata*, *Poa secunda*, *Spartina gracilis*, and *Scirpus nevadensis* were common (Table 5). *Iva axillaris* was present in both and common

in one. These plots were located close to the plots in the *Sarcobatus vermiculatus* shrub vegetation described above (Figure 4). Either of two plant associations listed in the national classification may apply to this vegetation, but only one (the *D. spicata* Herbaceous Vegetation association) is described (NatureServe 2003). Both of these plots occupied areas of bedrock (Table 7) within polygons of the GAP Active sand dunes or Vegetated dunes cover-types (Table 6) at opposite ends of the WSA (Figure 4), suggesting that this is a widespread vegetation type.

-- *Hesperostipa comata* - *Achnatherum hymenoides* Herbaceous Vegetation association
OR
Achnatherum hymenoides - *Psoraleidum lanceolatum* Herbaceous Vegetation

Two plots sampled herbaceous vegetation in which *Achnatherum hymenoides* or *Hesperostipa comata* dominated or co-dominated (Table 5) and *Elymus lanceolatus* ssp. *lanceolatus* and *Psoraleidum lanceolatum* were common. Both were in areas mapped by GAP as a mix of the Vegetated dunes (Figure 6a) and Wyoming big sagebrush cover-types (Figure 6b) and by WYNDD as stable sand (Table 7). These plots might fit into two associations listed in the national classification. The *H. comata* - *A. hymenoides* association has been described from south-central Wyoming but is poorly known, and its relationship to other associations in the national classification is unclear. The *A. hymenoides* - *Psoraleidum lanceolatum* association has not been described.

These two plots were located close together in the center of the WSA (Figure 4), so there is no evidence that this is a widespread vegetation type.

FLORA OF THE WSA

Seventy-five plant taxa were documented in the 17 sample plots in the WSA (Table 8). Two plants could be identified only to genus, and 10 additional taxa could not be identified to genus or species. No species was found in all sample plots, and 50 of the taxa were found in three plots or fewer (Table 9). Only three of the plants identified to species are considered exotics. One exotic (*Salsola tragus*, russian thistle) was found in six plots, another (*Tragopogon* sp., goatsbeard) was found in two plots, and the third exotic (*Bromus commutatus*, meadow brome) was found in only one plot. Two additional plant species, four-wing saltbush (*Atriplex canescens*) and halogeton (*Halogeton glomeratus*), were noted by G. Jones in the WSA. No specimens of these species were collected.

Rare Plants

Two of the plant species documented in the sample plots are recognized by the Wyoming Natural Diversity Database as species of interest. The first is *Descurainia pinnata* ssp. *paysonii* (Payson's tanseymustard), collected in plot 00AB01.04. In Wyoming, this subspecies is known only from the basins in the south-central part of the state (Fertig, 2000). It also is found in eastern Utah, western Colorado, and northern Arizona. Payson's tanseymustard has a global heritage rank of G5T3 (indicating that the species is common but the subspecies is uncommon) and a Wyoming state heritage rank of S2 (indicating a rare species). Despite its apparent rarity, the subspecies has a low conservation priority.

The second species, *Astragalus nelsonianus* (Nelson's milkvetch), collected in plot 00AB07, is known from central and south-central Wyoming, northeastern Utah, and northwestern Colorado, and is considered uncommon both in Wyoming (S3 Wyoming heritage rank) and throughout its range (G3 global heritage rank) (Heidel and Fertig, 2003). It has been assigned a medium conservation priority for Wyoming by the Wyoming Natural Diversity Database.

Another rare plant species deserves mention because of its affinity for sand dunes, even though it is not known to occur in the Alkali Basin - East Sand Dunes WSA. *Penstemon haydenii*, blowout penstemon, is a federally endangered species known from the Ferris Dunes some 80 miles (130 km) east

of the WSA. According to a simple model of potential habitat for blowout penstemon (Fertig 2001), the dunes in the WSA are unlikely to support this species.

Noxious Weeds

Halogeton (*Halogeton glomeratus* [Bieb.] Meyer), a plant on Wyoming's noxious weed list (Wyoming Weed and Pest Council, 2004) was identified in the eastern part of the WSA by G. Jones. Several hundred plants were noted growing in four patches in a dry playa lake in T23N, R98W, Sec 19, NW1/4 of NE1/4. No specimens were collected. This was the only noxious weed species noted in the WSA.

REFERENCES

Dorn, R.D. 1992. Vascular plant of Wyoming. Second edition. Mountain West Publishing, Cheyenne WY. 340 pp.

Fertig, 2000. State species abstract for *Descurainia pinnata* ssp. *paysonii*. Wyoming Natural Diversity Database, University of Wyoming, Laramie WY. Updated 8/18/2000. Retrieved March 29, 2004 from <http://uwadmnweb.uwyo.edu/WYNDD/>.

Fertig, W. 2001. 2000 survey for blowout penstemon (*Penstemon haydenii*) in Wyoming. Unpublished report prepared for the Bureau of Land Management Wyoming State Office. Wyoming Natural Diversity Database, University of Wyoming, Laramie WY. 3 April 2001. (Available from the Wyoming Natural Diversity Database's web site, <http://www.uwyo.edu/wyndd/>)

Grossman, D.H., D. Faber-Langendoen, A.S. Weakley, M. Anderson, P. Bourgeron, R. Crawford, K. Goodin, S. Landaal, K. Metzler, K.D. Patterson, M. Pyne, M. Reid, and L. Sneddon. 1998. International classification of ecological communities: terrestrial vegetation of the United States. Volume I. The National Vegetation Classification System: development, status, and application. The Nature Conservancy, Arlington VA. Available on the World Wide Web at <http://www.natureserve.org/publications/icec/index.html>

Heidel, B. and W. Fertig. 2003. State species abstract for *Astragalus nelsonianus*. Wyoming Natural Diversity Database, University of Wyoming, Laramie WY. Updated 3/06/2003. Retrieved March 29, 2004 from <http://uwadmnweb.uwyo.edu/WYNDD/>.

Love, J.D. and A.C. Christiansen. 1985. Geologic map of Wyoming. USDI Geological Survey, Denver CO. 1:500,000-scale.

Merrill, Evelyn H., Thomas W. Kohley, Margo E. Herdendorf, William A. Reiners, Kenneth L. Driese, Ronald W. Marrs, and Stanley H. Anderson. 1996. The Wyoming gap analysis project final report. University of Wyoming, Laramie WY. 109 pp. + appendices.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. Accessed March 18, 2004.

Reiners, W.A, E. Axtmann, and R.C. Thurston. 1999. Landtype associations for Wyoming. University of Wyoming Department of Botany, Laramie WY. Retrieved May 20, 2002 from [<http://www.sdvc.uwyo.edu/clearinghouse/landtype.html>]

Reiners, W.A. and R.C. Thurston. 1996. Delineations of landtype associations for southwest Wyoming. Unpublished final report for Bureau of Land Management/ University of Wyoming Contract K-910-P50082. Department of Botany, University of Wyoming, Laramie WY.

Stohlgren, T.J., M.B. Faulkner, and L.D. Schell. 1995. A modified-Whittaker nested vegetation sampling method. *Vegetatio* 117: 113-121.

USDA Natural Resources Conservation Service. 2001. The PLANTS Database, Version 3.1. (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

USDI Bureau of Land Management. 1981. 1:100,000-scale metric topographic map of Red Desert Basin, Wyoming. Surface Management Status. BLM Edition - 1981.

USDI Geological Survey. 1994. Bedrock geology of Wyoming. Denver CO. Available at [<http://www.wygisc.uwyo.edu/24k/bedgeol.html>]

Wyoming Gap Analysis. 1996. Land Cover for Wyoming. Edition 2. University of Wyoming, Geographic Information Science Center, Laramie WY. Available on the World Wide Web at: <http://www.sdvc.uwyo.edu/24k/landcov.html>.

Wyoming Weed and Pest Council. 2004. Wyoming Weed & Pest Control Act Designated List. Retrieved March 27, 2004 from <http://www.wyoweed.org/>.

TABLES

Table 1. Coordinates and types of plots at sampling locations in the Alkali Basin - East Sand Dunes WSA.
(See Figure 3.)

Plot Number	Plot Type	UTM Northing (NAD83)	UTM Easting (NAD83)	WYNDD General Cover Type	GAP Cover-type primary / secondary
AB01.01	classification	4647817	693763	Bedrock	Active sand dunes / Vegetated dunes
AB01.02	classification	4647219	693950	Bedrock	Active Sand Dunes / Vegetated dunes
AB01.03	classification	4646695	693103	Bedrock	Active Sand Dunes / Vegetated dunes
AB01.04	classification	4646871	693368	Stabilized Ridge	Active Sand Dunes / Vegetated dunes
AB02.01	classification	4648104	699250	Stable Sand	Vegetated Dunes/ Wyo big sage
AB02.02	classification	4647335	698574	Stabilized Ridge	Vegetated Dunes/ Wyo big sage
AB02.03	classification	4646929	698383	Stabilized Ridge	Active Sand Dunes / Vegetated dunes
AB02.04	classification	4646874	699413	Stable Sand	Vegetated Dunes/ Wyo big sage
AB04.01	classification	4648378	705626	Bedrock	Vegetated Dunes / Active sand dunes
AB04.02	classification	4648099	703739	Bedrock	Vegetated Dunes / Active sand dunes
AB04.03	classification	4647580	703574	Bedrock	Vegetated Dunes / Active sand dunes
AB04.04	classification	4647172	705298	Bedrock	Vegetated Dunes/ Wyo big sage
AB05.01	classification	4645366	706148	Bedrock	Wyo big sage / Desert shrub
AB03.01	descriptive	4649569	703545	Bedrock	Vegetated Dunes / Active sand dunes
AB05	descriptive	4644896	705144	Bedrock	Wyo big sage / Desert shrub
AB06	descriptive	4645668	703479	Bedrock	Wyo big sage / Desert shrub
AB07	descriptive	4645085	707009	Stable Sand	Wyo big sage / Desert shrub

Table 2. General cover-types mapped by WYNDD in the Alkali Basin - East Sand Dunes WSA.

Cover -type	Hectares	Acres	% of WSA
Active Dune	357	881	6.7%
Stabilized Ridge	1021	2521	19.2%
Stable Sand	2432	6007	45.7%
Bedrock	1508	3724	28.4%
WSA TOTAL	5317	13133	100.0%

Table 3. Areas of GAP cover-types in Wyoming and in the Alkali Basin - East Sand Dunes WSA.

Note that the tables from Merrill *et al.* (1996) from which the values for Wyoming and for BLM-managed lands in Wyoming are taken show the areas of the polygons in which these are the dominant cover-types, not the actual areas of these cover-types. Hence these values probably are over-estimates. See Merrill *et al.* (1996), Table 2.2, for an explanation. The values from the WSA also are for the polygons in which these cover-types were mapped as the primary types. See text for explanation.

	Active Sand Dunes	Vegetated Dunes	Wyo. Big Sage	Greasewood	Saltbush
ALL WYOMING					
Hectares ⁽¹⁾	17,708	44,193	8,385,650	362,857	757,194
Acres	43,739	109,157	20,712,556	896,257	1,877,841
% of state ⁽²⁾	0.07%	0.17%	33.19%	1.44%	2.99%
BLM IN WYOMING					
Hectares ⁽¹⁾	14,314	24,851	4,129,989	153,798	613,595
Acres	35,356	61,382	10,201,073	379,881	1,521,716
% of BLM lands ⁽³⁾	0.20%	0.35%	57.51%	2.14%	8.54%
BLM as % of state	80.83%	56.23%	49.25%	42.39%	81.03%
ALKALI BASIN - EAST SAND DUNES WSA⁽⁴⁾					
Hectares	1111	3225	967	1	2
Acres	2755	7998	2398	2	5
% of WSA	20.9%	60.78%	18.22%	0.02%	0.04%
WSA as % of BLM type in state	7.76%	12.98%	0.02%	<0.01%	<0.01%

(1) Merrill *et al.* (1996), Appendix 5.1

(2) Area of Wyoming = 25,263,316 ha (62,400,391 ac); Merrill *et al.* (1996), Table 4.3

(3) Area of BLM-managed lands = 7,181,183 ha (17,737,522 ac); Merrill *et al.* (1996), Table 4.3

(4) From this report.

Table 4. Areas of the Dune Field landtype and three landtype associations in the Alkali Basin - East Sand Dunes WSA.

LANDTYPE/LANDTYPE ASSOCIATION NAME ⁽¹⁾	HECTARES	ACRES	% OF WSA
Green River Basin Rolling Plains LTA	178	441	3.35%
Playa Landtype	481	1193	9.07%
Dune Field Landtype	4647	11525	87.58%
ENTIRE WSA	5306	13159	100.00%

(1) Reiners and Thurston (1996)

Table 5. Plant alliances and associations of the National Vegetation Classification System likely present in the Alkali Basin - East Sand Dunes WSA.

SAMPLE PLOTS	ALLIANCE / ASSOCIATION	CLASSIFICATION CODE ¹	CONSERVATION RANK ²	IDENTIFICATION ³
	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> Shrubland Alliance			Certain
00AB01.01, 00AB03.01, 00AB05.01, 00AB06	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> / <i>Elymus elymoides</i> Shrubland association	CEGL1043	G4G5	Uncertain. Association is undescribed
	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> / <i>Poa secunda</i> Shrubland association	CEGL1049	G4	Uncertain. Association is undescribed
	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> Shrubland Alliance			Certain.
00AB04.04, 00AB05, 00AB07	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> / <i>Achnatherum hymenoides</i> Shrubland association	CEGL001046	G5	Uncertain. Association is undescribed
	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> / <i>Hesperostipa comata</i> Shrubland association	CEGL001051	G2	Uncertain. Association indistinguishable from <i>A. t.</i> ssp. <i>wyomingensis</i> / <i>A. hymenoides</i> association
00AB02.02, 00AB02.03, 00AB04.01	<i>Ericameria nauseosa</i> Shrubland Alliance			Certain
	<i>Sarcobatus vermiculatus</i> Intermittently Flooded Shrubland Alliance			Certain
00AB01.02, 00AB01.04, 00AB04.03	<i>Sarcobatus vermiculatus</i> / <i>Distichlis spicata</i> Shrubland association	CEGL001363	G4	Probable
	<i>Distichlis spicata</i> Intermittently Flooded Herbaceous Alliance			Certain
00AB01.03, 00AB04.02	<i>Distichlis spicata</i> Herbaceous Vegetation association	CEGL001770	G5	Probable
	<i>Distichlis spicata</i> - (<i>Scirpus nevadensis</i>) Herbaceous Vegetation association	CEGL001773	G4	Uncertain. Association is undescribed
	<i>Hesperostipa comata</i> Bunch Herbaceous Alliance			Uncertain
00AB02.01, 00AB02.04	<i>Hesperostipa comata</i> - <i>Achnatherum hymenoides</i> Herbaceous Vegetation Association	CEGL001705	G2?	Uncertain. Association is poorly known
	<i>Achnatherum hymenoides</i> Herbaceous Alliance			Uncertain
	<i>Achnatherum hymenoides</i> - <i>Psoraleidium lanceolatum</i> Herbaceous Vegetation	CEGL001650	G3Q	Uncertain. Association is undescribed

1. A classification code is assigned to each association in the national classification. Alliances have no codes.

2. Conservation rank represents the commonness or rarity of an association. G1 associations are very rare and (usually) are threatened by introduction of exotics, habitat loss, or alteration of the ecological processes upon which they depend. G5 associations are common and unthreatened. See NatureServe (2003) for an explanation.

3. Degree of certainty that the plots belong to this alliance or association. Certainty depends on the description of vegetation and physical environment from a sample plot (see Appendix 1) matching reasonably well the description of an association or alliance from the national classification. Some types in the national classification are undescribed.

Table 6. Number of plots likely belonging to each alliance or association from the national vegetation classification that were located in each GAP primary cover-type.

		GAP Primary Cover-type				
		Active sand dunes	Vegetated dunes	Wyoming big sage	Greasewood	Desert Shrub
National classification type	<i>A. tridentata wyomingensis</i> / <i>E. elymoides</i> Shrub OR <i>A. tridentata wyomingensis</i> / <i>P. secunda</i> Shrub	1	1	2		
	<i>A. tridentata wyomingensis</i> / <i>A. hymenoides</i> Shrub OR <i>A. tridentata wyomingensis</i> / <i>H. comata</i> Shrub		1	2		
	<i>Ericameria nauseosa</i> Shrub	1	2			
	<i>S. vermiculatus</i> / <i>D. spicata</i> Shrub	2	1			
	<i>D. spicata</i> Herbaceous OR <i>D. spicata</i> - (<i>S. nevadensis</i>) Herbaceous	1	2			
	<i>H. comata</i> - <i>A. hymenoides</i> Herbaceous OR <i>A. hymenoides</i> - <i>P. lanceolatum</i> Herbaceous		2			

Table 7. Number of plots likely belonging to each alliance or association from the national vegetation classification that were located in each general cover-type mapped by WYNDD.

		WYNDD general cover-type			
		Active dune	Stabilized Ridge	Stable Sand	Bedrock
National classification type	<i>A. tridentata wyomingensis</i> / <i>E. elymoides</i> Shrub OR <i>A. tridentata wyomingensis</i> / <i>P. secunda</i> Shrub				4
	<i>A. tridentata wyomingensis</i> / <i>A. hymenoides</i> Shrub OR <i>A. tridentata wyomingensis</i> / <i>H. comata</i> Shrub			1	2
	<i>Ericameria nauseosa</i> Shrub		2		1
	<i>Sarcobatus vermiculatus</i> / <i>Distichlis spicata</i> Shrub		1		2
	<i>Distichlis spicata</i> Herbaceous OR <i>Distichlis spicata</i> - (<i>S. nevadensis</i>) Herbaceous				2
	<i>Hesperostipa comata</i> - <i>Achnatherum hymenoides</i> Herbaceous OR <i>A. hymenoides</i> - <i>Psoralidium lanceolatum</i> Herbaceous			2	

Table 8. Seventy-five vascular plant taxa documented in sample plots in the Alkali Basin - East Sand Dunes WSA, sorted by scientific name. Scientific names and plant codes are from NRCS (2001). Introduced taxa are shown in italic typeface.

Scientific Name (NRCS 2001)	On This Many Plots
<i>achnatherum hymenoides</i> , indian ricegrass	14
<i>arabis</i> sp.	2
<i>arenaria hookeri</i> , hooker's sandwort	1
<i>artemisia pedatifida</i> , birdfoot sagebrush	3
<i>artemisia spinescens</i> , bud sagebrush	4
<i>artemisia tridentata</i> ssp. <i>tridentata</i> , basin big sagebrush	1
<i>artemisia tridentata</i> ssp. <i>wyomingensis</i> , wyoming big sagebrush	9
<i>artemisia tridentata</i> ssp. <i>wyomingensis</i> , wyoming big sagebrush	1
<i>astragalus bisulcatus</i> var. <i>bisulcatus</i>	1
<i>astragalus chamaeleuce</i> , cicada milkvetch	4
<i>astragalus kentrophytus</i> var. <i>jessiae</i>	2
<i>astragalus nelsonianus</i> , nelson's milkvetch	1
<i>atriplex canescens</i> , fourwing saltbush	3
<i>atriplex confertifolia</i> , shadscale saltbush	1
<i>atriplex gardneri</i> , gardner's saltbush	6
<i>bromus commutatus</i> , meadow brome	1
<i>carex filifolia</i> , threadleaf sedge	2
<i>chaenactis douglasii</i> var. <i>douglasii</i>	4
<i>chenopodium leptophyllum</i> , narrowleaf goosefoot	2
<i>chenopodium</i> sp., goosefoot	2
<i>chrysothamnus linifolius</i> , spearleaf rabbitbrush	4
<i>chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> , yellow rabbitbrush	13
<i>cryptantha fendleri</i> , sanddune catseye	4
<i>cryptantha flava</i> , brenda's yellow catseye	3
<i>cryptantha thyrsoiflora</i> , calcareous catseye	1
<i>descurainia pinnata</i> ssp. <i>paysonii</i>	1
<i>distichlis spicata</i> , inland saltgrass	4
<i>elymus lanceolatus</i> ssp. <i>lanceolatus</i> , thickspike wheatgrass	12
<i>ericarmeria nauseosa</i> ssp. <i>nauseosa</i>	14
<i>eriogonum cernuum</i> var. <i>cernuum</i>	2
<i>eriogonum ovalifolium</i> var. <i>purpureum</i> , cushion buckwheat	4
fabaceae, unknown (legume twist leaf)	1
forb unknown	1
forb unknown (sharp lobe lvs)	1
forb, unknown (opp leaf)	1
forb, unknown (ab3)	2
forb, unknown (alt lv)	1
forb, unknown (basal oblanc)	1
forb, unknown (mentzelia)	2
forb, unknown (narrow oblanc)	1
forb, unknown (wilted flesy)	1

Table 8 (continued).

Scientific Name (NRCS 2001)	On This Many Plots
<i>gilia tenerrima</i> , delicate <i>gilia</i>	1
<i>grayia spinosa</i> , spiny hopsage	3
<i>haplopappus armerioides</i> , thrift mock goldenweed	1
<i>hesperostipa comata</i> , needle and thread	9
<i>iva axillaris</i> , povertyweed	4
<i>juncus balticus</i> var. <i>montanus</i> , mountain rush	1
<i>kochia americana</i> , greenmolly	4
<i>krascheninnikovia lanata</i> , winterfat	1
<i>leptodactylon pungens</i> , granite pricklygilia	1
<i>lesquerella ludoviciana</i> , foothill bladderpod	6
<i>leymus simplex</i> , bullgrass	2
<i>lygodesmia juncea</i> , rush skeletonplant	5
<i>machaeranthera canescens</i> ssp. <i>canescens</i> , spiny goldenweed	10
<i>muhlenbergia richardsonis</i> , mat muhly	2
<i>oenothera pallida</i> , pale eveningprimrose	3
<i>opuntia polyacantha</i> , plains pricklypear	1
<i>penstemon arenicola</i> , sand penstemon	1
<i>phlox hoodii</i> , hoods phlox	3
<i>poa secunda</i> , sandberg bluegrass	10
<i>psoralidium lanceolatum</i> , lemon scurfpea	8
<i>pyrocoma lanceolata</i> , lanceleaf goldenweed	1
<i>rumex venosus</i> , veiny dock	5
<i>salicornia rubra</i> , red swampfire	2
<i>salsola tragus</i> , <i>prickly Russian thistle</i>	6
<i>sarcobatus vermiculatus</i> , greasewood	9
<i>scirpus nevadensis</i> , nevada bulrush	2
<i>spartina gracilis</i> , alkali cordgrass	3
<i>sporobolus airoides</i> , alkali sacaton	1
<i>stenotus armerioides</i> var. <i>armerioides</i> , thrift mock goldenweed	1
<i>tetradymia canescens</i> , spineless horsebrush	5
<i>tetradymia spinosa</i> , shortspine horsebrush	2
<i>tiquilia nuttallii</i> , nuttall's coldenia	3
<i>tragopogon</i> , <i>goatsbeard</i>	2
<i>triglochin maritimum</i> , seaside arrowgrass	2

Table 9. Seventy-five vascular plant taxa documented in sample plots in the Alkali Basin - East Sand Dunes WSA, sorted by number of plots in which they were found. Scientific names and plant codes are from NRCS (2001). Introduced taxa are shown in italic typeface.

Scientific Name (NRCS 2001)	On This Many Plots
achnatherum hymenoides, indian ricegrass	14
ericarmeria nauseosa ssp. nauseosa	14
chrysothamnus viscidiflorus ssp. viscidiflorus, yellow rabbitbrush	13
elymus lanceolatus ssp. lanceolatus, thickspike wheatgrass	12
machaeranthera canescens ssp. canescens, spiny goldenweed	10
poa secunda, sandberg bluegrass	10
artemisia tridentata ssp. wyomingensis, wyoming big sagebrush	9
hesperostipa comata, needle and thread	9
sarcobatus vermiculatus, greasewood	9
psoralidium lanceolatum, lemon scurfpea	8
atriplex gardneri, gardner's saltbush	6
lesquerella ludoviciana, foothill bladderpod	6
<i>salsola tragus</i> , prickly Russian thistle	6
lygodesmia juncea, rush skeletonplant	5
rumex venosus, veiny dock	5
tetradymia canescens, spineless horsebrush	5
artemisia spinescens, bud sagebrush	4
astragalus chamaeleuce, cicada milkvetch	4
chaenactis douglasii var. douglasii	4
chrysothamnus linifolius, spearleaf rabbitbrush	4
cryptantha fendleri, sanddune catseye	4
distichlis spicata, inland saltgrass	4
erigonum ovalifolium var. purpureum, cushion buckwheat	4
iva axillaris, povertyweed	4
kochia americana, greenmolly	4
artemisia pedatifida, birdfoot sagebrush	3
atriplex canescens, fourwing saltbush	3
cryptantha flava, brenda's yellow catseye	3
grayia spinosa, spiny hopsage	3
oenothera pallida, pale eveningprimrose	3
phlox hoodii, hoods phlox	3
spartina gracilis, alkali cordgrass	3
tiquilia nuttallii, nuttall's coldenia	3
arabis sp.	2
astragalus kentrophytus var. jessiae	2
carex filifolia, threadleaf sedge	2
chenopodium leptophyllum, narrowleaf goosefoot	2
chenopodium sp., goosefoot	2
erigonum cernuum var. cernuum	2
forb, unknown (ab3)	2
forb, unknown (mentzelia)	2

Table 9 (continued).

Scientific Name (NRCS 2001)	On This Many Plots
leymus simplex, bullgrass	2
muhlenbergia richardsonis, mat muhly	2
salicornia rubra, red swampfire	2
scirpus nevadensis, nevada bulrush	2
tetradymia spinosa, shortspine horsebrush	2
<i>tragopogon</i> , goatsbeard	2
triglochin maritimum, seaside arrowgrass	2
arenaria hookeri, hooker's sandwort	1
artemisia tridentata ssp. tridentata, basin big sagebrush	1
artemisia tridentata ssp. wyomingensis, wyoming big sagebrush	1
astragalus bisulcatus var. bisulcatus	1
astragalus nelsonianus, nelson's milkvetch	1
atriplex confertifolia, shadscale saltbush	1
<i>bromus commutatus</i> , meadow brome	1
cryptantha thyrsoiflora, calcareous catseye	1
descurainia pinnata ssp. paysonii	1
fabaceae, unknown (legume twist leaf)	1
forb unknown	1
forb unknown (sharp lobe lvs)	1
forb, unknown (opp leaf)	1
forb, unknown (alt lv)	1
forb, unknown (basal oblanc)	1
forb, unknown (narrow oblanc)	1
forb, unknown (wilted flesy)	1
gilia tenerrima, delicate gilia	1
haplopappus armerioides, thrift mock goldenweed	1
juncus balticus var. montanus, mountain rush	1
krascheninnikovia lanata, winterfat	1
leptodactylon pungens, granite pricklygilia	1
opuntia polyacantha, plains pricklypear	1
penstemon arenicola, sand penstemon	1
pyrocoma lanceolata, lanceleaf goldenweed	1
sporobolus airoides, alkali sacaton	1
stenotus armerioides var. armerioides, thrift mock goldenweed	1

FIGURES

Figure 1. Location of the Alkali Basin - East Sand Dunes WSA in southwestern Wyoming.

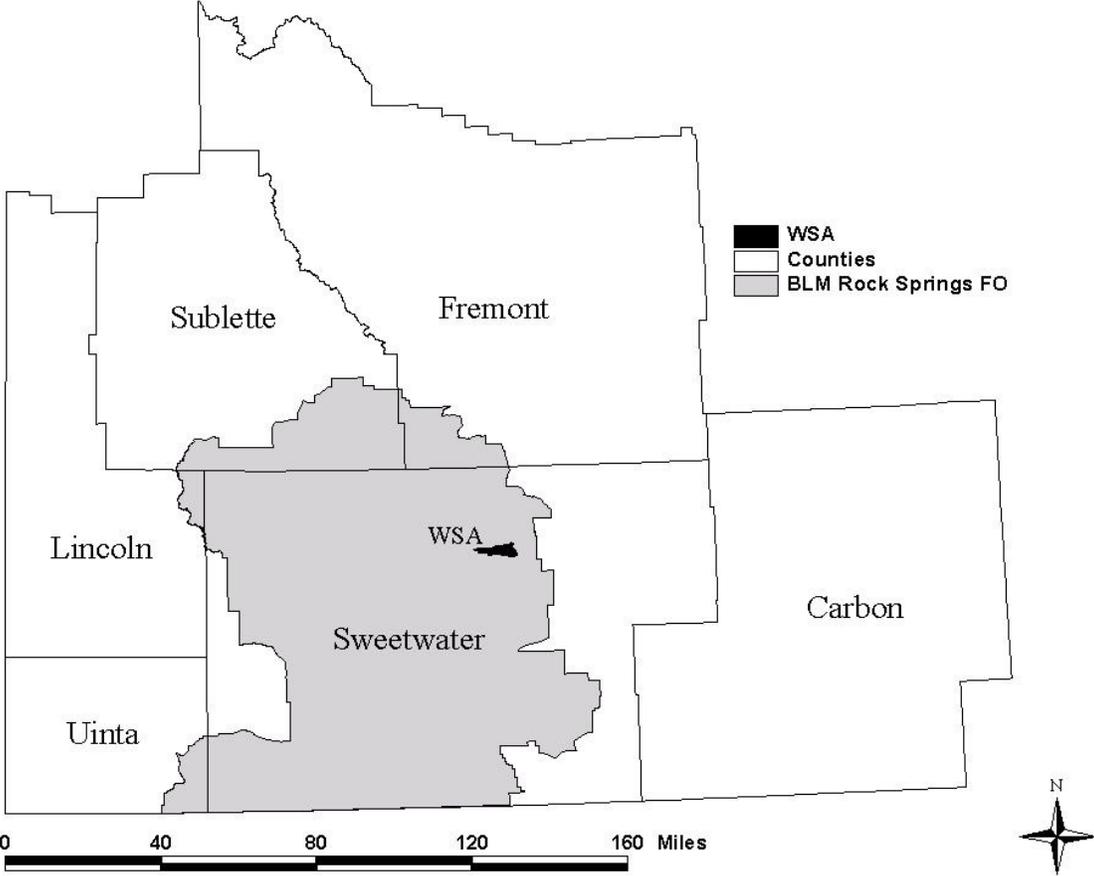


Figure 2. Boundary of the Alkali Basin - East Sand Dunes WSA.

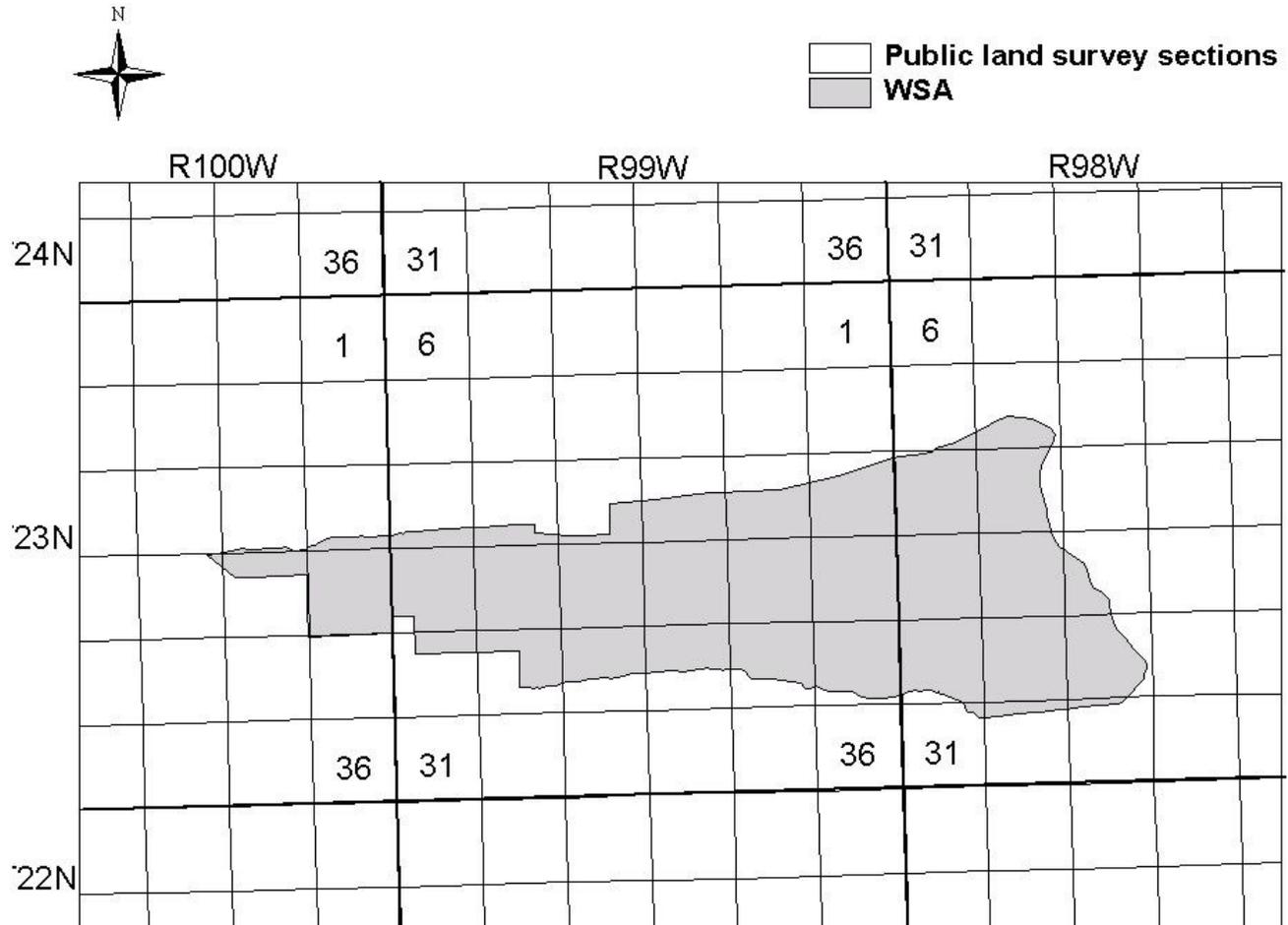


Figure 3. General cover-types in the Alkali Basin - East Sand Dunes WSA.

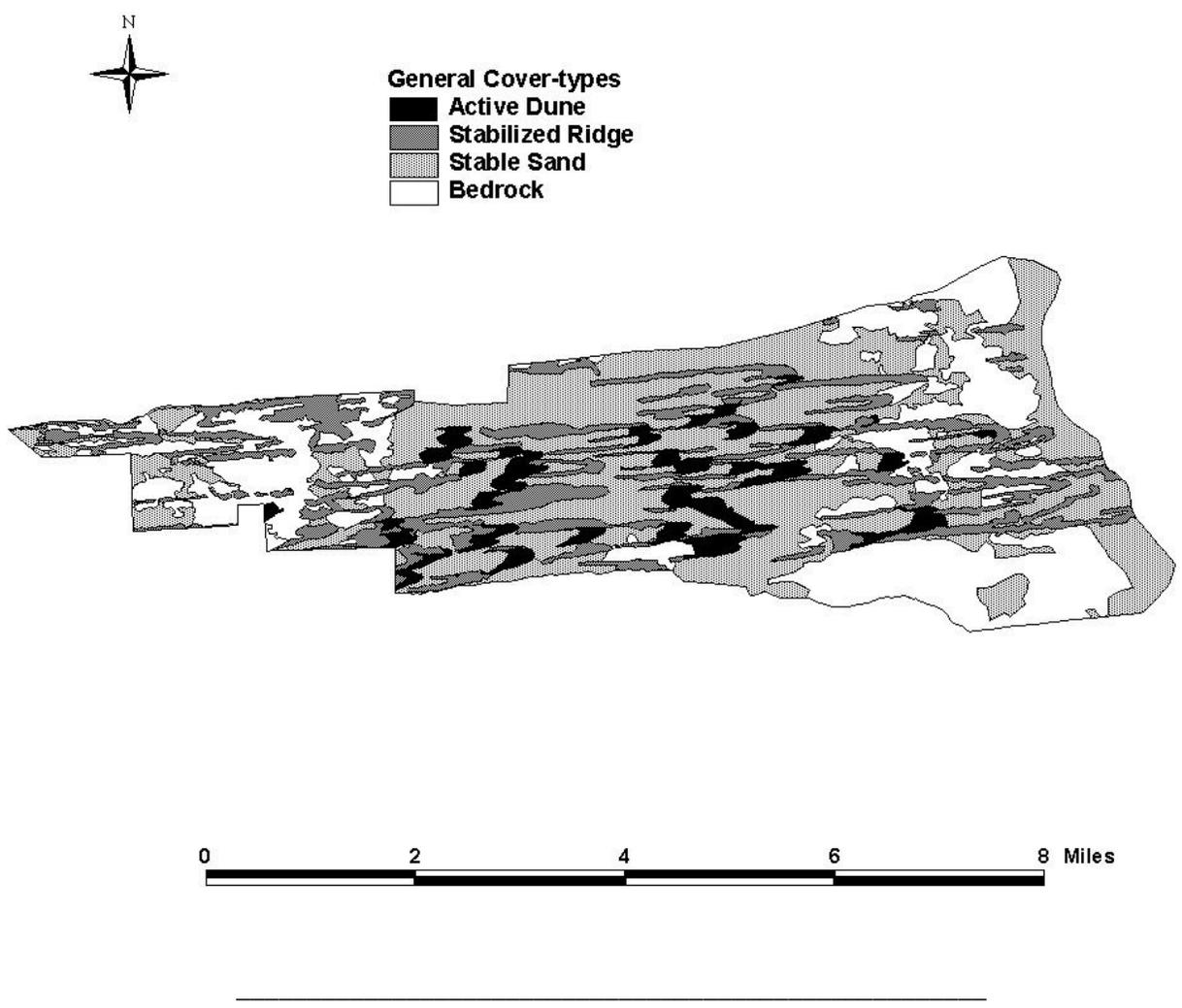


Figure 4. Locations of sampling points in the Alkali Basin - East Sand Dunes WSA.
 (See Table 1.)

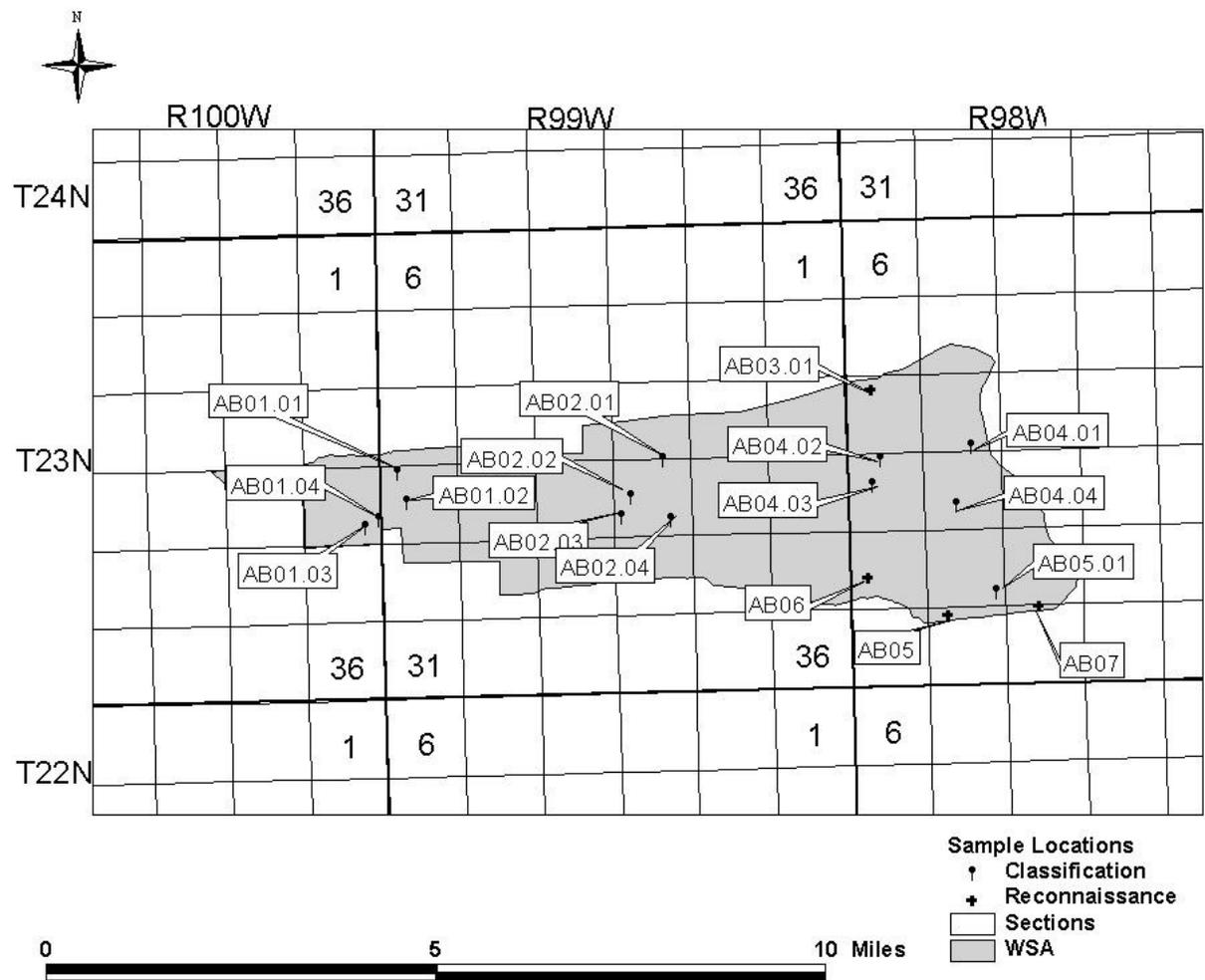


Figure 5. Layout of the modified-Whittaker nested sampling plots.

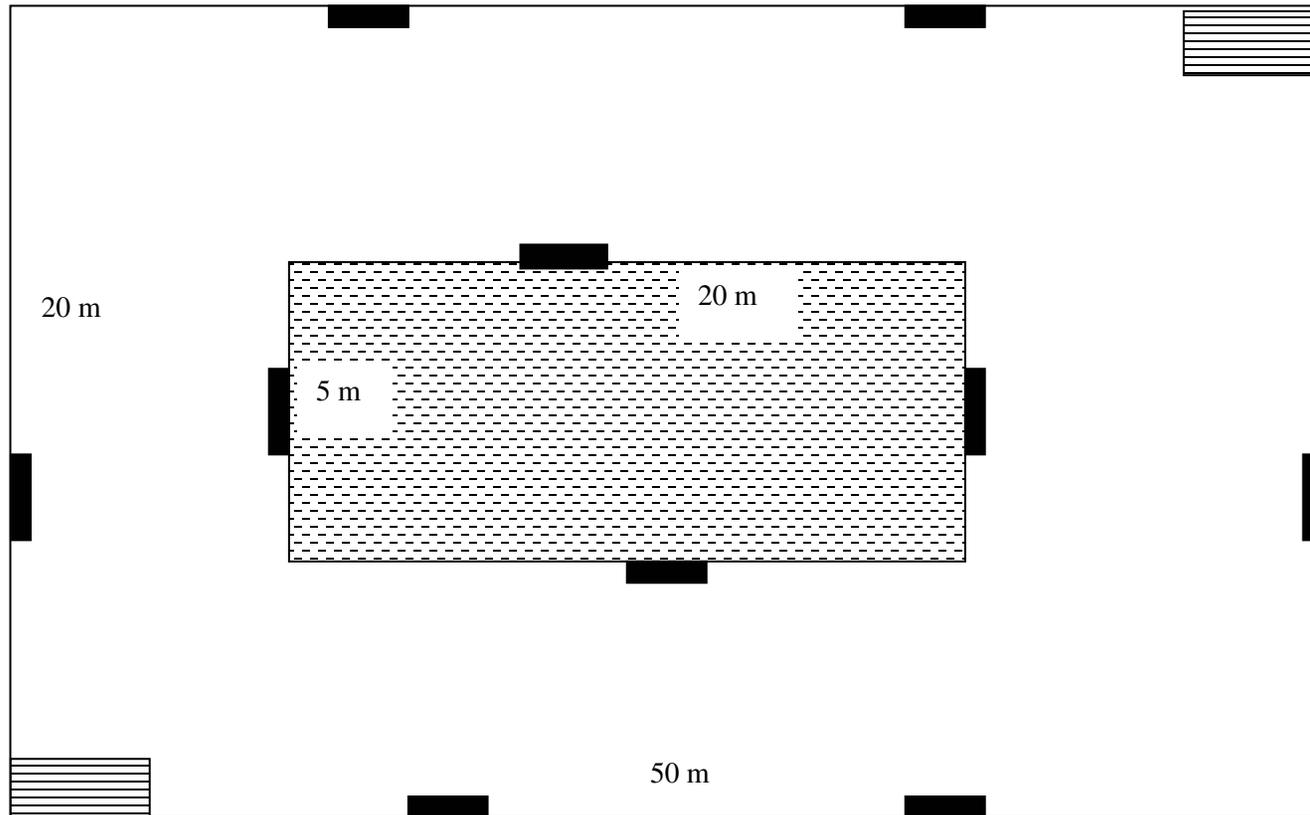


Figure 6a. Gap Analysis Program primary cover-types in the Alkali Basin - East Sand Dunes WSA.

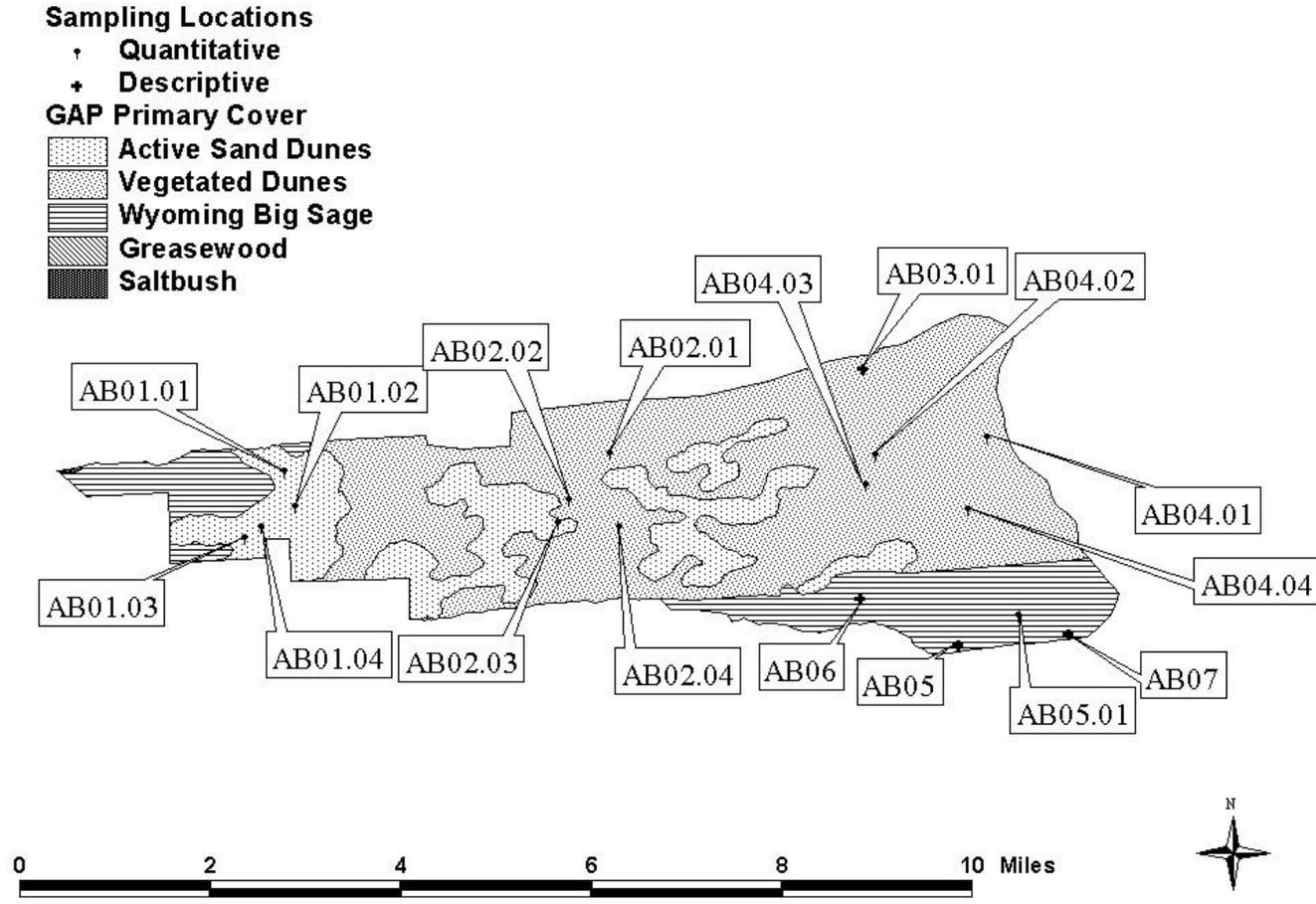


Figure 6b. Gap Analysis Program secondary cover-types in the Alkali Basin - East Sand Dunes WSA.

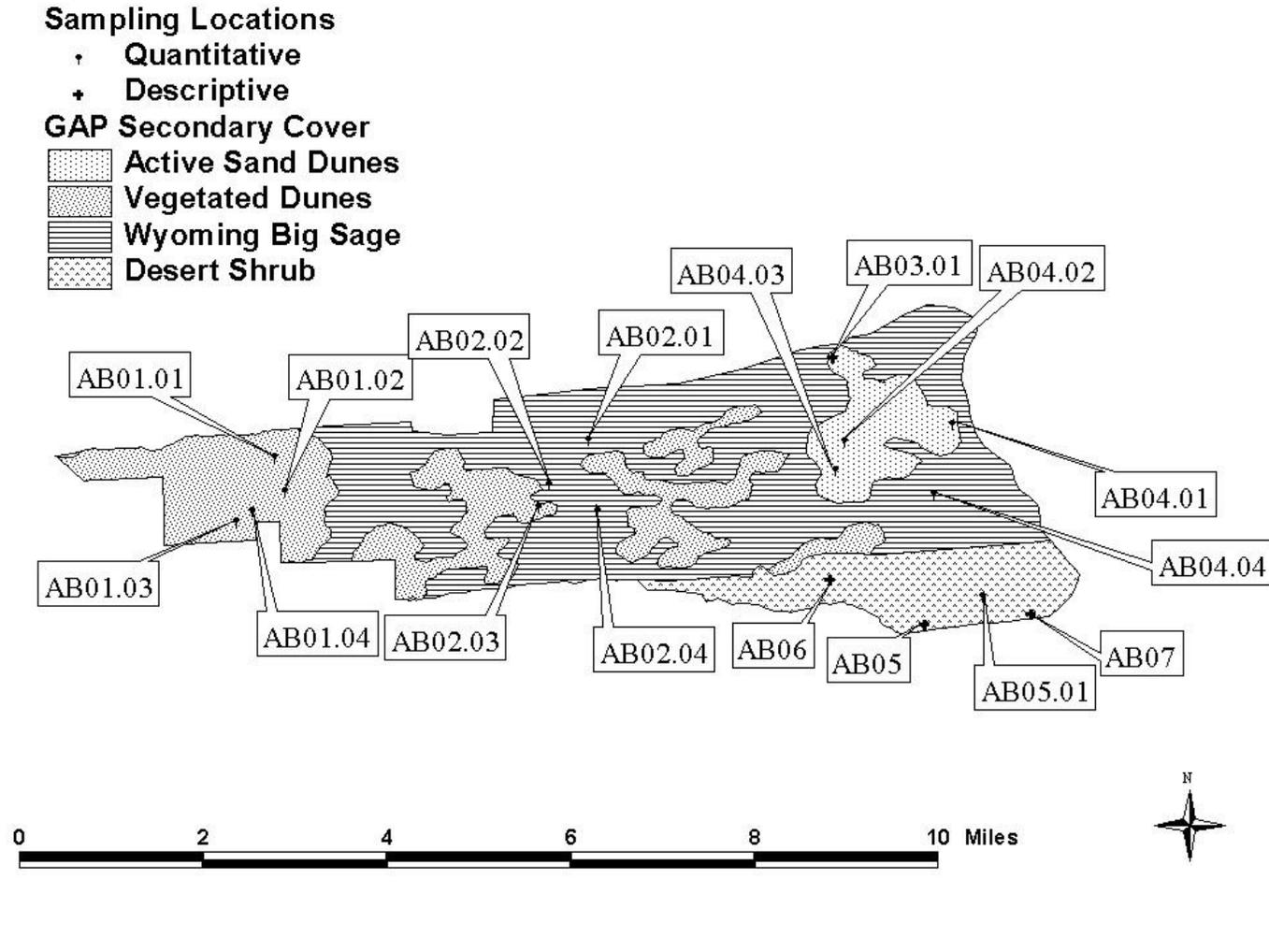


Figure 7. Landtypes and Landtype Association (LTA) in the Alkali Basin - East Sand Dunes WSA.

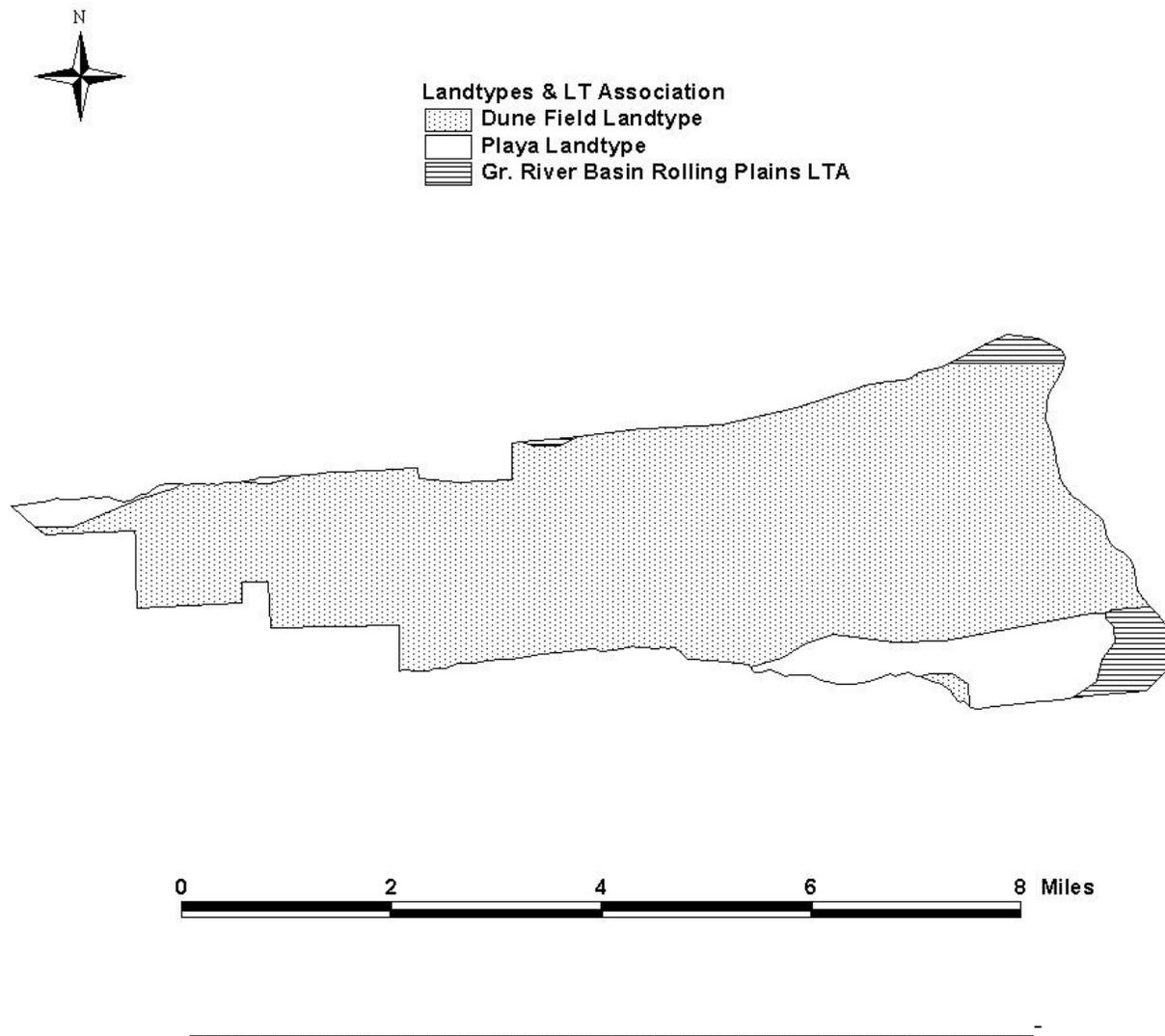


Figure 8. Categories of landtype associations in southwestern Wyoming.

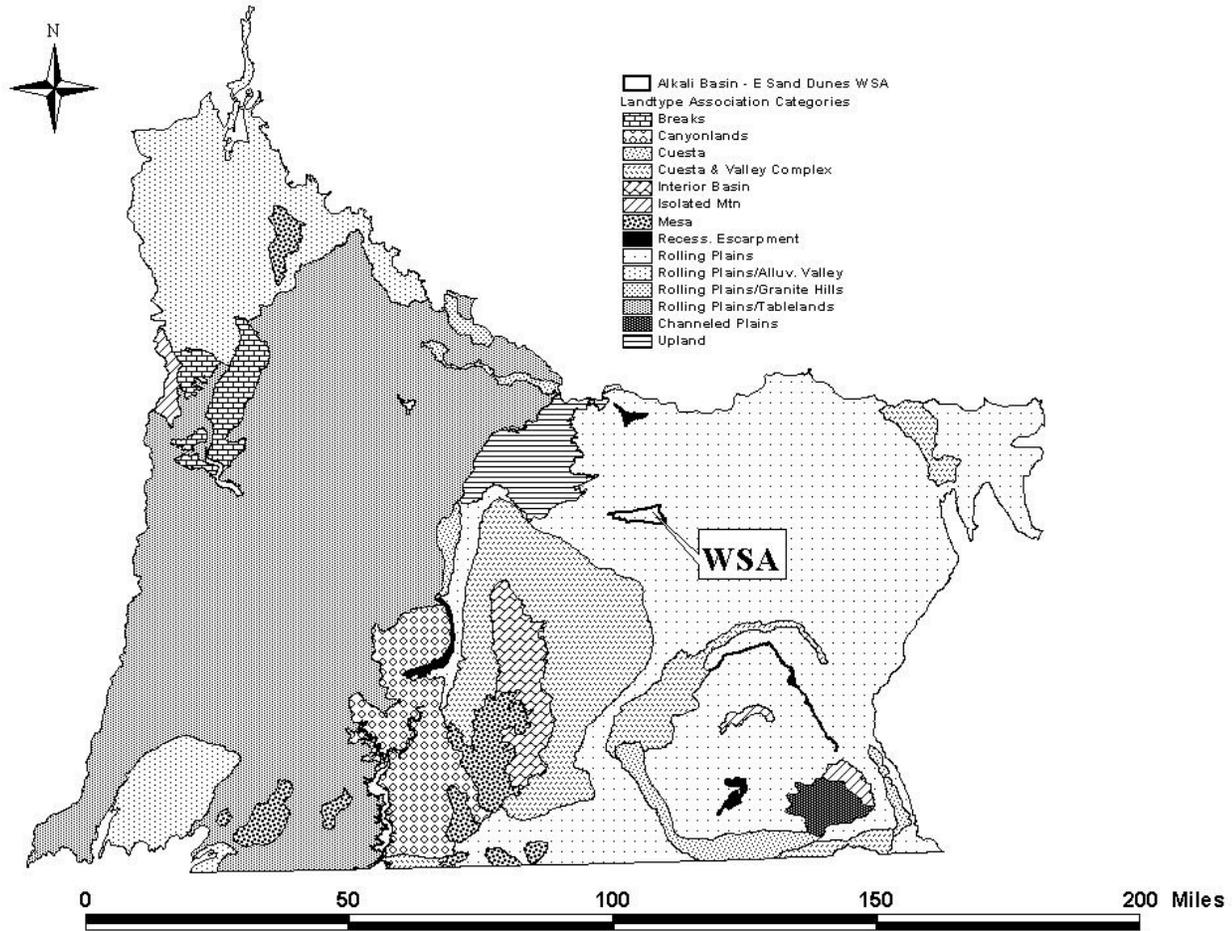
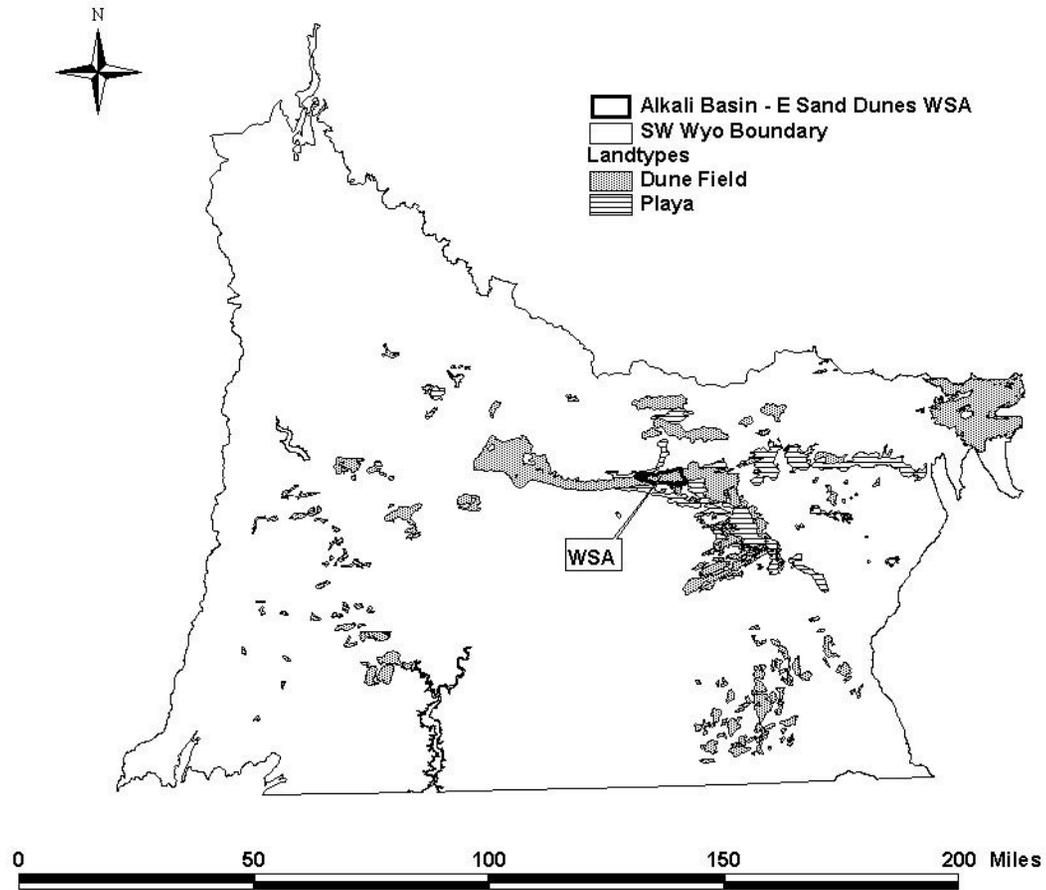


Figure 9. Dune field and playa landtypes in southwestern Wyoming.



APPENDIX 1. LOCATIONS, DESCRIPTIONS, AND VEGETATION OF THE SAMPLE PLOTS IN THE ALKALI
BASIN - EAST SAND DUNES WSA

The canopy-cover class is shown for each plant species in each plot. Cover classes are:

Cover Class	% Canopy Cover
1	< 1
3	1 - 5
10	5 - 15
20	15 - 25
30	25 - 35
40	35 - 45
50	45 - 55
60	55 - 65
70	65 - 75
80	75 - 85
90	85 - 95
99	95 - 100

Plot 00AB01.01

LOCATION

T 23 N, **R** 99W, **Sec** 19 , nw **1/4 sec** **UTM Projection** NAD 83 **Zone** 1

UTM Coordinates: 4,647,817 m N, 693,763 m E

Map name Black Rock Flat East **Scale** 1:24,000

DESCRIPTION

Plot Group: SDALK Light Patch

Why was plot done? Chosen subjectively to represent light patch on aerial photograph

Uncertainty on measurements

Completeness of Spp lists Herbaceous list incomplete because herbs are dry and we no doubt missed some early perennials and annuals.

Describe veg

Sparse shrub stand dominated by greasewood and Wyo big sage (latter more common outside plot) w/ herbaceous layer of Elymus elymoides and Poa secunda, and a dwarf-shrub layer of Atriplex gardneri. Grasses are most common, or have most cover, within shrub patches. Bright orange lichen common on stems of greasewood and big sagebrush.

Disturbance signs

Notes

ENVIRONMENT

Elevation 6,655 ft **Aspect** 0 deg. **Slope** 0 deg.

Topo. Position:

Surface deposit Alluvial **Soil Texture**

Soil features Easily broken vesicular crust in low places. Crust absent on higher (10 cm) areas.

	Soil	Gravel	Cobble	Boulder	Bedrock	
% Ground Cover	91	1	0	0	0	
	Litter	Wood	DRP	Lichen	Moss	Cush Pl.
	4	1		0	0	

Plot 00AB01.01		CANOPY COVER		
	<u>Species</u>	<u>NRCS Code</u>	<u>Cover Class</u>	<u>Origin</u>
<i>2. Shrub</i>				
	artemisia spinescens, bud sagebrush	arsp5	1	Native
	artemisia tridentata ssp. wyomingensis, wyoming big sagebrush	artrw	10	Native
	ericarmeria nauseosa ssp. nauseosa	ernan3	1	Native
	sarcobatus vermiculatus, greasewood	save4	10	Native
	tetradymia canescens, spineless horsebrush	teca2	3	Native
		<i>Total</i>	25	
<i>3. Subshrub</i>				
	atriplex gardneri, gardner's saltbush	atga	3	Native
		<i>Total</i>	3	
<i>5. Graminoid</i>				
	achnatherum hymenoides, indian ricegrass	achy	1	Native
	elymus elymoides ssp. elymoides, squirreltail	elele	3	Native
	elymus lanceolatus ssp. lanceolatus, thickspike wheatgrass	ellal	1	Native
	poa secunda, sandberg bluegrass	pose	3	Native
		<i>Total</i>	8	
<i>6. Forb</i>				
	astragalus bisulcatus var. bisulcatus	asbib	1	Native
	forb, unknown (alt lv)	forb ab2	1	Unknown
	forb, unknown (opp leaf)	forb ab1	1	Unknown
	forb, unknown (wilted fleshy)	forb ab9	1	Unknown
	kochia americana, greenmolly	koam	1	Native
		<i>Total</i>	5	
		<i>Total for Plot</i>	41	

Plot 00AB01.02

LOCATION

T 23 N, **R** 99W, **Sec** 19 , nw **1/4 sec** **UTM Projection** NAD 83 **Zone** 1

UTM Coordinates: 4,647,219 m N, 693,950 m E

Map name Black Rock Flat East **Scale** 1:24,000

DESCRIPTION

Plot Group: SDALK Light Patch

Why was plot done? Subjectively chosen to illustrate vegetation in light-colored patch on color aerial photos.

Uncertainty on measurements

Completeness of Spp lists Herbaceous list incomplete because many herbs are dried up and we no doubt missed some annuals and early perennials.

Describe veg

Sparse grass (Distichlis dominant, w/ some Poa secunda and Elymus smithii) with scattered rabbitbrush. Greasewood grows on flats of sandy clay soil. Scattered mound of loamy sand, to ca. 50 cm tall and 4 m across, support Elymus simthii and Distichlis stricta w/ some Chrysothamnus nauseosus and Oryzopsis.

Disturbance signs

Old horse droppings and tracks present. Cattle tracks present.

Notes Plot in flat between sand ridges.

ENVIRONMENT

Elevation 6,654 ft **Aspect** 0 deg. **Slope** 0 deg.

Topo. Position:

Surface deposit Residual **Soil Texture**

Soil features Flat areas of sandy clay - cracked - with some areas of salt stain. Scattered mounds of sandy loam.

	Soil	Gravel	Cobble	Boulder	Bedrock	
% Ground Cover	95	1	0	0	0	
	Litter	Wood	DRP	Lichen	Moss	Cush Pl.
	2	1		0	0	

Plot 00AB01.02

CANOPY COVER

<u>Species</u>	<u>NRCS Code</u>	<u>Cover Class</u>	<u>Origin</u>
<i>2. Shrub</i>			
chrysothamnus linifolius, spearleaf rabbitbrush	chli3	1	Native
ericarmeria nauseosa ssp. nauseosa	ernan3	3	Native
sarcobatus vermiculatus, greasewood	save4	3	Native
	<i>Total</i>	7	
<i>5. Graminoid</i>			
achnatherum hymenoides, indian ricegrass	achy	1	Native
distichlis spicata, inland saltgrass	disp	10	Native
elymus lanceolatus ssp. lanceolatus, thickspike wheatgrass	ellal	3	Native
poa secunda, sandberg bluegrass	pose	3	Native
	<i>Total</i>	17	
<i>6. Forb</i>			
chenopodium sp., goosefoot	cheno	1	Native
forb, unknown (narrow oblanc0	forb ab4	1	Unknown
iva axillaris, povertyweed	ivax	1	Native
machaeranthera canescens ssp. canescens, spiny goldenweed	macac3	1	Native
	<i>Total</i>	4	
	<i>Total for Plot</i>	28	

Plot 00AB01.03

LOCATION

T 23 N, R 10W, Sec 24, SE 1/4 sec UTM Projection NAD 83 Zone 1

UTM Coordinates: 4,646,695 m N, 693,103 m E

Map name Black Rock Flat East **Scale** 1:24,000

DESCRIPTION

Plot Group: SDALK Interdune flat

Why was plot done? Subjectively chosen to illustrate flats between dunes.

Uncertainty on measurements

Completeness of Spp lists Herbaceous list incomplete because herbs are dry and we no doubt missed some annuals and early perennials.

Describe veg

Low-growing, open graminoid layer of *Scirpus* sp. and *Distichlis spicata* on flats, w/ small dunes (< 50 cm high and up to 30 cm wide) supporting *Puccinellia*, *Spartina gracilis*, and scattered *Chrysothamnus nauseosus*, and lots of moss on soil surface.

Disturbance signs

Pocket gopher casts in sandy dunes.

Notes Surface deposit seems to be mix of alluvium and aeolian deposits.

ENVIRONMENT

Elevation 6,652 ft **Aspect** 0 deg. **Slope** 0 deg.

Topo. Position:

Surface deposit Alluvial **Soil Texture**

Soil features Flats of sandy loam devoid of surface cracks. Light-colored flats are sandy clay loam w/ surface cracks.

	Soil	Gravel	Cobble	Boulder	Bedrock	
% Ground Cover	91	0	0	0	0	
	Litter	Wood	DRP	Lichen	Moss	Cush Pl.
	5	0		1	1	

Plot	00AB01.03	CANOPY COVER		
	<u>Species</u>	<u>NRCS Code</u>	<u>Cover Class</u>	<u>Origin</u>
	<i>2. Shrub</i>			
	artemisia tridentata ssp. wyomingensis, wyoming big sagebrush	artw	1	Native
	chrysothamnus linifolius, spearleaf rabbitbrush	chli3	1	Native
	chrysothamnus viscidiflorus ssp. viscidiflorus, yellow rabbitbrush	chviv2	3	Native
	ericarmeria nauseosa ssp. nauseosa	ernan3	1	Native
	sarcobatus vermiculatus, greasewood	save4	1	Native
		<i>Total</i>	<i>7</i>	
	<i>5. Graminoid</i>			
	achnatherum hymenoides, indian ricegrass	achy	1	Native
	distichlis spicata, inland saltgrass	disp	10	Native
	elymus lanceolatus ssp. lanceolatus, thickspike wheatgrass	ellal	1	Native
	juncus balticus var. montanus, mountain rush	jubam	1	Native
	muhlenbergia richardsonis, mat muhly	muri	1	Native
	poa secunda, sandberg bluegrass	pose	3	Native
	scirpus nevadensis, nevada bulrush	scne	1	Native
	spartina gracilis, alkali cordgrass	spgr	3	Native
	sporobolus airoides, alkali sacaton	spai	1	Native
	triglochin maritimum, seaside arrowgrass	trma4	1	Native
		<i>Total</i>	<i>23</i>	
	<i>6. Forb</i>			
	arabis sp.	arab12	1	Native
	chaenactis douglasii var. douglasii	chdod	1	Native
	forb, unknown (ab3)	forb ab3	1	Unknown
	forb, unknown (basal oblanc)	forb ab5	1	Unknown
	iva axillaris, povertyweed	ivax	1	Native
	psoralidium lanceolatum, lemon scurfpea	psla3	1	Native
	pyrocoma lanceolata, lanceleaf goldenweed	pyla	1	Native
		<i>Total</i>	<i>7</i>	
		<i>Total for Plot</i>	<i>37</i>	

Plot 00AB01.04

LOCATION

T 23 N, **R** 10W, **Sec** 24 , **1/4 sec UTM Projection** NAD 83 **Zone** 1

UTM Coordinates: 4,646,871 m N, 693,368 m E

Map name Black Rock Flat East **Scale** 1:24,000

DESCRIPTION

Plot Group: SDALK Stabilized dune

Why was plot done? Subjectively selected to illustrate stabilized dunes.

Uncertainty on measurements

Completeness of Spp lists Herbaceous list incomplete because herbs are dry and we undoubtedly missed some annuals and early perennials.

Describe veg

Open shrub stand of *Chrysothamnus* (*linifolius?*), *C. viscidiflorus*, *C. nauseosus* with *Grayia spinosa* and *Sarcobatus vermiculatus*, over a sparse herb layer of *Oryzopsis hymenoides*, *Elymus* (*smithii?*), and scattered forbs.

Disturbance signs

Notes

ENVIRONMENT

Elevation ft **Aspect** 0 deg. **Slope** 0 deg.

Topo. Position:

Surface deposit Aeolian **Soil Texture**

Soil features

	Soil	Gravel	Cobble	Boulder	Bedrock	
% Ground Cover	90	0	0	0	0	
	Litter	Wood	DRP	Lichen	Moss	Cush Pl.
	6	1		1	1	

Plot 00AB01.04		CANOPY COVER		
	<u>Species</u>	<u>NRCS Code</u>	<u>Cover Class</u>	<u>Origin</u>
<i>2. Shrub</i>				
	atriplex canescens, fourwing saltbush	atca2	1	Native
	chrysothamnus linifolius, spearleaf rabbitbrush	chli3	10	Native
	chrysothamnus viscidiflorus ssp. viscidiflorus, yellow rabbitbrush	chviv2	10	Native
	ericarmeria nauseosa ssp. nauseosa	ernan3	3	Native
	grayia spinosa, spiny hopsage	grsp	3	Native
	sarcobatus vermiculatus, greasewood	save4	10	Native
		<i>Total</i>	<i>37</i>	
<i>5. Graminoid</i>				
	achnatherum hymenoides, indian ricegrass	achy	3	Native
	elymus lanceolatus ssp. lanceolatus, thickspike wheatgrass	ellal	1	Native
	hesperostipa comata, needle and thread	heco26	1	Native
		<i>Total</i>	<i>5</i>	
<i>6. Forb</i>				
	chaenactis douglasii var. douglasii	chdod	1	Native
	chenopodium leptophyllum, narrowleaf goosefoot	chle4	1	Native
	cryptantha fendleri, sanddune catseye	crfe3	1	Native
	cryptantha flava, brenda's yellow catseye	crfl5	1	Native
	cryptantha thyrsoflora, calcareous catseye	crth	1	Native
	descurainia pinnata ssp. paysonii	depip2	1	Native
	erigonum cernuum var. cernuum	ercec	1	Native
	forb, unknown (ab3)	forb ab3	1	Unknown
	gilia tenerrima, delicate gilia	gite	1	Native
	lesquerella ludoviciana, foothill bladderpod	lelu	1	Native
	machaeranthera canescens ssp. canescens, spiny goldenweed	macac3	1	Native
	psoralidium lanceolatum, lemon scurfpea	psla3	3	Native
	rumex venosus, veiny dock	ruve2	3	Native
	salsola tragus, prickly Russian thistle	satr12	1	Introduced
	tiqulia nuttallii, nuttall's coldenia	tinu2	1	Native
		<i>Total</i>	<i>19</i>	
		<i>Total for Plot</i>	<i>61</i>	

Plot 00AB02.01

LOCATION

T 23 N, **R** 99W, **Sec** 22 , nw **1/4 sec** **UTM Projection** NAD 83 **Zone** 1

UTM Coordinates: 4,648,104 m N, 699,250 m E

Map name Black Rock Flat East **Scale** 1:24,000

DESCRIPTION

Plot Group: ALK Brown Patch

Why was plot done? Subjectively chosen to illustrate smooth, brown area on aerial photo. Parts of area are longitudinal dunes w/ denser shrubs; this plot is in flat area w/ less shrubs.

Uncertainty on measurements

Stipa comata and *Oryzopsis hymenoides* are difficult to tell apart and values for one may include those for the other.

Completeness of Spp lists Annuals and perennials are dry and some of these species no doubt were missed.

Describe veg

Open grassland of *Stipa comata* and *Oryzopsis hymenoides* w/ *Elymus smithii* (?). Forbs are scattered and most common beneath the shrubs. *Chrysothamnus viscidiflorus* and *C. nauseosus* (light) are scattered and many are dead.

Disturbance signs

Pocket gopher diggings and harvester ant mounds present. Old (last year's?) cattle, pronghorn, and elk (?) droppings present.

Notes

ENVIRONMENT

Elevation 6,703 ft **Aspect** 0 deg. **Slope** 0 deg.

Topo. Position:

Surface deposit Aeolian **Soil Texture**

Soil features Gravel common on surface

	Soil	Gravel	Cobble	Boulder	Bedrock	
% Ground Cover	91	2	0	0	0	
	Litter	Wood	DRP	Lichen	Moss	Cush Pl.
	6	1		0	0	

Plot 00AB02.01		CANOPY COVER		
	<u>Species</u>	<u>NRCS Code</u>	<u>Cover Class</u>	<u>Origin</u>
<i>2. Shrub</i>				
	chrysothamnus viscidiflorus ssp. viscidiflorus, yellow rabbitbrush	chviv2	3	Native
	ericarmeria nauseosa ssp. nauseosa	ernan3	3	Native
		<i>Total</i>	6	
<i>5. Graminoid</i>				
	achnatherum hymenoides, indian ricegrass	achy	10	Native
	bromus commutatus, meadow brome	brco4	1	Introduced
	elymus lanceolatus ssp. lanceolatus, thickspike wheatgrass	ellal	10	Native
	hesperostipa comata, needle and thread	heco26	3	Native
		<i>Total</i>	24	
<i>6. Forb</i>				
	astragalus chamaeleuce, cicada milkvetch	asch4	1	Native
	chenopodium leptophyllum, narrowleaf goosefoot	chle4	1	Native
	cryptantha fendleri, sanddune catseye	crfe3	1	Native
	erigonum cernuum var. cernuum	ercec	1	Native
	fabaceae, unknown (legume twsit leaf)	fab ab1	1	Unknown
	lesquerella ludoviciana, foothill bladderpod	lelu	1	Native
	lygodesmia juncea, rush skeletonplant	lyju	1	Native
	machaeranthera canescens ssp. canescens, spiny goldenweed	macac3	1	Native
	oenothera pallida, pale eveningprimrose	oepa	1	Native
	psoralidium lanceolatum, lemon scurfpea	psla3	3	Native
	rumex venosus, veiny dock	ruve2	1	Native
	salsola tragus, prickly Russian thistle	satr12	1	Introduced
	tragopogon, goatsbeard	trago	1	Introduced
		<i>Total</i>	15	
		<i>Total for Plot</i>	45	

Plot 00AB02.02

LOCATION

T 23 N, **R** 99W, **Sec** 22 , **se** 1/4 **sec** **UTM Projection** NAD 83 **Zone** 1

UTM Coordinates: 4,647,335 m N, 698,574 m E

Map name Black Rock Flat East **Scale** 1:24,000

DESCRIPTION

Plot Group: VAR Grainy dark patch

Why was plot done? Subjectively chosen to illustrate grainy, dark patch on aerial photo.

Uncertainty on measurements

Stipa comata and Oryzopsis hymenoides hard to tell apart (few in flower) so values for one may include those for the other.

Completeness of Spp lists Lower herbaceous strata probably incomplete because herbs are dry and some annuals and early perennials were missed.

Describe veg

Open shrub stand of Chrysothamnus nauseosus (light) and C. viscidiflorus w/ a sparse undergrowth of Oryzopsis, Elymus smithii (?), and smaller amounts of Stipa comata. Psoralidium, Salsola, and Elymus seem to be most common beneath the shrubs. Shrubs have lots of dead canopy.

Disturbance signs

Horse and elk (?) droppings from last year present.

Notes

ENVIRONMENT

Elevation 6,670 ft **Aspect** 180 deg. **Slope** 7 deg.

Topo. Position:

Surface deposit Aeolian **Soil Texture**

Soil features A little gravel scattered on surface

	Soil	Gravel	Cobble	Boulder	Bedrock	
% Ground Cover	88	1	0	0	0	
	Litter	Wood	DRP	Lichen	Moss	Cush Pl.
	8	1		0	0	

Plot 00AB02.02		CANOPY COVER		
	<u>Species</u>	<u>NRCS Code</u>	<u>Cover Class</u>	<u>Origin</u>
<i>2. Shrub</i>				
	chrysothamnus viscidiflorus ssp. viscidiflorus, yellow rabbitbrush	chviv2	3	Native
	ericarmeria nauseosa ssp. nauseosa	ernan3	20	Native
		<i>Total</i>	<i>23</i>	
<i>5. Graminoid</i>				
	achnatherum hymenoides, indian ricegrass	achy	10	Native
	elymus lanceolatus ssp. lanceolatus, thickspike wheatgrass	ellal	3	Native
	hesperostipa comata, needle and thread	heco26	1	Native
		<i>Total</i>	<i>14</i>	
<i>6. Forb</i>				
	cryptantha fendleri, sanddune catseye	crfe3	1	Native
	lygodesmia juncea, rush skeletonplant	lyju	1	Native
	machaeranthera canescens ssp. canescens, spiny goldenweed	macac3	1	Native
	psoralidium lanceolatum, lemon scurfpea	psla3	3	Native
	rumex venosus, veiny dock	ruve2	1	Native
	salsola tragus, prickly Russian thistle	satr12	3	Introduced
	tiqulia nuttallii, nuttall's coldenia	tinu2	1	Native
		<i>Total</i>	<i>11</i>	
		<i>Total for Plot</i>	<i>48</i>	

Plot 00AB02.03

LOCATION

T 23 N, **R** 99W, **Sec** 22 , ne **1/4 sec UTM Projection** NAD 83 **Zone** 1

UTM Coordinates: 4,646,929 m N, 698,383 m E

Map name Black Rock Flat East **Scale** 1:24,000

DESCRIPTION

Plot Group: VAR Grainy dark patch

Why was plot done? Subjectively chosen to illustrate dark, grainy patch type on aerial photo.

Uncertainty on measurements

Stipa and Oryzopsis difficult to tell apart (few in flower) so value for one probably includes the other.

Completeness of Spp lists Low herbaceous strata incomplete because herbs are dry and we missed some annuals and early perennials.

Describe veg

Open shrub stand of Chrysothamnus nauseosus (light) w/ some C. viscidiflorus, to 75 cm tall. Most shrubs have some dead canopy. Undergrowth of Oryzopsis, Elymus smithii (?), Psoralidium, w/ other grasses and forbs rare.

Disturbance signs

Pocket gopher digging and harvester ant mounds present. Last year's horse droppings also present.

Notes

ENVIRONMENT

Elevation 6,700 ft **Aspect** 0 deg. **Slope** 0 deg.

Topo. Position:

Surface deposit Aeolian **Soil Texture**

Soil features

	Soil	Gravel	Cobble	Boulder	Bedrock	
% Ground Cover	84	1	0	0	0	
	Litter	Wood	DRP	Lichen	Moss	Cush Pl.
	12	1		1	1	

Plot	00AB02.03	CANOPY COVER		
	<u>Species</u>	<u>NRCS Code</u>	<u>Cover Class</u>	<u>Origin</u>
	<i>2. Shrub</i>			
	chrysothamnus viscidiflorus ssp. viscidiflorus, yellow rabbitbrush	chviv2	3	Native
	ericarmeria nauseosa ssp. nauseosa	ernan3	20	Native
		<i>Total</i>	23	
	<i>5. Graminoid</i>			
	achnatherum hymenoides, indian ricegrass	achy	3	Native
	elymus lanceolatus ssp. lanceolatus, thickspike wheatgrass	ellal	3	Native
	hesperostipa comata, needle and thread	heco26	3	Native
		<i>Total</i>	9	
	<i>6. Forb</i>			
	chenopodium sp., goosefoot	cheno	1	Native
	cryptantha fendleri, sanddune catseye	crfe3	1	Native
	forb unknown	forbunk	1	Unknown
	forb, unknown (mentzelia)	forb ab7	1	Unknown
	lesquerella ludoviciana, foothill bladderpod	lelu	1	Native
	lygodesmia juncea, rush skeletonplant	lyju	1	Native
	machaeranthera canescens ssp. canescens, spiny goldenweed	macac3	1	Native
	oenothera pallida, pale eveningprimrose	oepe	1	Native
	psoralidium lanceolatum, lemon scurfpea	psla3	10	Native
	rumex venosus, veiny dock	ruve2	1	Native
	salsola tragus, prickly Russian thistle	satr12	1	Introduced
	tiqulia nuttallii, nuttall's coldenia	tinu2	1	Native
	tragopogon, goatsbeard	trago	1	Introduced
		<i>Total</i>	22	
		<i>Total for Plot</i>	54	

Plot 00AB02.04

LOCATION

T 23 N, **R** 99W, **Sec** 22 , **se** 1/4 **sec** **UTM Projection** NAD 83 **Zone** 1

UTM Coordinates: 4,646,874 m N, 699,413 m E

Map name Black Rock Flat East **Scale** 1:24,000

DESCRIPTION

Plot Group: ALK Grass veg between ridges

Why was plot done? Subjectively selected to illustrate grass vegetation w/ few shrubs, on sand flats between dune ridge.

Uncertainty on measurements

Stipa and Oryzopsis are difficult to tell apart (few are flowering) and so the values for one probably include cover for the other.

Completeness of Spp lists Herbaceous strata probably are incomplete because the herbs are dry and we missed annuals and early perennials.

Describe veg

Open grassland of Stipa comata and Oryzopsis hymenoides, w/ Elymus smithii (?) and scattered forbs. Psoralidium is common. Scattered shrubs to ca. 75 cm tall are present -- Chrysothamnus nauseosus (light), C. viscidiflorus -- but contribute < 5% cover.

Disturbance signs

Harvester ant mound present

Notes

ENVIRONMENT

Elevation 6,693 ft **Aspect** 0 deg. **Slope** 0 deg.

Topo. Position:

Surface deposit Aeolian **Soil Texture**

Soil features Scattered surface gravels

	Soil	Gravel	Cobble	Boulder	Bedrock	
% Ground Cover	87	2	0	0	0	
	Litter	Wood	DRP	Lichen	Moss	Cush Pl.
	7	1		0	0	

Plot	00AB02.04	CANOPY COVER		
	<u>Species</u>	<u>NRCS Code</u>	<u>Cover Class</u>	<u>Origin</u>
	<i>2. Shrub</i>			
	chrysothamnus viscidiflorus ssp. viscidiflorus, yellow rabbitbrush	chviv2	1	Native
	ericarmeria nauseosa ssp. nauseosa	ernan3	1	Native
	tetradymia canescens, spineless horsebrush	teca2	1	Native
		<i>Total</i>	3	
	<i>5. Graminoid</i>			
	achnatherum hymenoides, indian ricegrass	achy	10	Native
	elymus lanceolatus ssp. lanceolatus, thickspike wheatgrass	ellal	3	Native
	hesperostipa comata, needle and thread	heco26	20	Native
		<i>Total</i>	33	
	<i>6. Forb</i>			
	astragalus kentrophytus var. jessiae	askej	1	Native
	cryptantha flava, brenda's yellow catseye	crfl5	1	Native
	erigonum ovalifolium var. purpureum, cushion buckwheat	erovp2	1	Native
	forb, unknown (mentzelia)	forb ab7	1	Unknown
	forb, unknown (sharp lobe lvs)	forb ab6	1	Unknown
	lesquerella ludoviciana, foothill bladderpod	lelu	1	Native
	lygodesmia juncea, rush skeletonplant	lyju	1	Native
	machaeranthera canescens ssp. canescens, spiny goldenweed	macac3	1	Native
	oenothera pallida, pale eveningprimrose	oepa	1	Native
	psoralidium lanceolatum, lemon scurfpea	psla3	3	Native
	rumex venosus, veiny dock	ruve2	1	Native
	salsola tragus, prickly Russian thistle	satr12	1	Introduced
		<i>Total</i>	14	
		<i>Total for Plot</i>	50	

Plot 00AB03.01

LOCATION

T 23 N, **R** 98W, **Sec** 18 , nw **1/4 sec** **UTM Projection** NAD 83 **Zone** 1

UTM Coordinates: 4,649,569 m N, 703,545 m E

Map name Black Rock Flat East

Scale 1:24,000

DESCRIPTION

Plot Group: SDALK Light Patch

Why was plot done? Selected subjectively to illustrate light patch in eastern part of WSA

Uncertainty on measurements

Completeness of Spp lists Probably missed some early annual and perennial herbs.

Describe veg

Sparse shrub stand of *Sarcobatus* and *Artemisia tridentata* ssp. *wyomingensis* on low dunes, with *Poa secunda*, *Suaeda*, and *Elymus smithii*. The flats are more sparsely vegetated with *Suaeda* and *Phlox hoodii*. The composition of the flats shifts from mostly *Elymus smithii* on the margins to mostly *Elymus elymoides* in the centers.

Disturbance signs

Notes This description applies to a depression covering ca. 60 acres, surrounded by sandy ridges. The floor of the depression is clay soil developed in residual or aeolian material. Low dunes of sandy clay, ca. 50 cm tall, support more shrub vegetation.

ENVIRONMENT

Elevation ft **Aspect** 0 deg. **Slope** 0 deg.

Topo. Position:

Surface deposit Aeolian **Soil Texture**

Soil features Flats are clay w/ surface cracks and little vegetation. Higher areas (0.5 m) w/ more shrubs are loamy sand.

	Soil	Gravel	Cobble	Boulder	Bedrock	
% Ground Cover	Litter	Wood	DRP	Lichen	Moss	Cush Pl.

Plot	00AB03.01	Species	NRCS Code	Cover Class	Origin
		<i>2. Shrub</i>			
		artemisia spinescens, bud sagebrush	arsp5	1	Native
		artemisia tridentata ssp. wyomingensis, wyoming big sagebrush	artrw	10	Native
		chrysothamnus viscidiflorus ssp. viscidiflorus, yellow rabbitbrush	chviv2	1	Native
		ericarmeria nauseosa ssp. nauseosa	ernan3	1	Native
		sarcobatus vermiculatus, greasewood	save4	10	Native
		<i>Total</i>		23	
		<i>3. Subshrub</i>			
		atriplex gardneri, gardner's saltbush	atga	10	Native
		<i>Total</i>		10	
		<i>5. Graminoid</i>			
		elymus elymoides ssp. elymoides, squirreltail	elele	1	Native
		poa secunda, sandberg bluegrass	pose	3	Native
		<i>Total</i>		4	
		<i>6. Forb</i>			
		kochia americana, greenmolly	koam	1	Native
		<i>Total</i>		1	
		<i>Total for Plot</i>		38	

Plot 00AB04.01

LOCATION

T 23 N, **R** 98W, **Sec** 17 , sw **1/4 sec UTM Projection** NAD 83 **Zone** 1

UTM Coordinates: 4,648,378 m N, 705,626 m E

Map name Black Rock Flat East **Scale** 1:24,000

DESCRIPTION

Plot Group: SDALK Light Patch

Why was plot done? Subjectively chosen to illustrate light-colored patch on 1:24,000-scale aerial photo.

Uncertainty on measurements

Heserostipa comata and Achnatherum hymenoides are difficult to tell apart (few are flowering) and so the values for one may include the other.

Completeness of Spp lists Herbaceous undergrowth list probably incomplete because herbs are dry so some annuals and early perennials were missed.

Describe veg

Sparse shrub vegetation w/ a canopy ca. 30 cm tall, of Chrysothamnus viscidiflorus and Tetradymia canescens w/ some Artemisia tridentata and Tetradymia spinosa. The herbaceous component consists of Oryzopsis hymenoides w/ Stipa comata, Elymus smithii, Phlox hoodii, and small amounts of other forbs.

Disturbance signs

Last year's (?) cattle droppings present.

Notes Sage grouse droppings present

ENVIRONMENT

Elevation 6,790 ft **Aspect** 150 deg. **Slope** 2 deg.

Topo. Position:

Surface deposit Residual **Soil Texture**

Soil features Very sparse surface gravel

	Soil	Gravel	Cobble	Boulder	Bedrock	
% Ground Cover	94	1	0	0	1	
	Litter	Wood	DRP	Lichen	Moss	Cush Pl.
	2	1		1	1	

Plot 00AB04.01		CANOPY COVER		
	<u>Species</u>	<u>NRCS Code</u>	<u>Cover Class</u>	<u>Origin</u>
<i>2. Shrub</i>				
	artemisia tridentata ssp. tridentata, basin big sagebrush	artrt	1	Native
	atriplex canescens, fourwing saltbush	atca2	1	Native
	chrysothamnus viscidiflorus ssp. viscidiflorus, yellow rabbitbrush	chviv2	10	Native
	ericarmeria nauseosa ssp. nauseosa	ernan3	3	Native
	tetradymia canescens, spineless horsebrush	teca2	3	Native
	tetradymia spinosa, shortspine horsebrush	tesp2	3	Native
		<i>Total</i>	<i>21</i>	
<i>3. Subshrub</i>				
	krascheninnikovia lanata, winterfat	krla2	1	Native
	leptodactylon pungens, granite pricklygilia	lepu	1	Native
		<i>Total</i>	<i>2</i>	
<i>5. Graminoid</i>				
	achnatherum hymenoides, indian ricegrass	achy	10	Native
	elymus elymoides ssp. elymoides, squirreltail	elele	1	Native
	elymus lanceolatus ssp. lanceolatus, thickspike wheatgrass	ellal	3	Native
	hesperostipa comata, needle and thread	heco26	3	Native
	poa secunda, sandberg bluegrass	pose	1	Native
		<i>Total</i>	<i>18</i>	
<i>6. Forb</i>				
	arabis sp.	arab12	1	Native
	astragalus chamaeleuce, cicada milkvetch	asch4	1	Native
	chaenactis douglasii var. douglasii	chdod	1	Native
	erigonum ovalifolium var. purpureum, cushion buckwheat	erovp2	1	Native
	lesquerella ludoviciana, foothill bladderpod	lelu	1	Native
	machaeranthera canescens ssp. canescens, spiny goldenweed	macac3	1	Native
	penstemon sp., penstemon	penst	1	Native
	phlox hoodii, hoods phlox	phho	3	Native
	psoralidium lanceolatum, lemon scurfpea	psla3	1	Native
		<i>Total</i>	<i>11</i>	
		<i>Total for Plot</i>	<i>52</i>	

Plot 00AB04.02

LOCATION

T 23 N, **R** 98W, **Sec** 19 , nw **1/4 sec** **UTM Projection** NAD 83 **Zone** 1

UTM Coordinates: 4,648,099 m N, 703,739 m E

Map name Black Rock Flat East **Scale** 1:24,000

DESCRIPTION

Plot Group: SDALK Saline wetland

Why was plot done? Subjectively selected to illustrate saline patches on 1:24,000-scale aerial photos.

Uncertainty on measurements

Elymus smithii (?) and *Spartina gracilis* may have been confused w/ one another.

Completeness of Spp lists We may have missed some early-season herbaceous species, but few plants are dried up.

Describe veg

Short (ca. 12 cm tall), sparse vegetation of *Scirpus nevadensis*, *Salicornia rubra*, *Elymus smithii*, *Distichlis*, and *Spartina gracilis* w/ few other species. Few *Sarcobatus* shrubs are present, ca. 25 cm tall.

Disturbance signs

Vehicle tracks by N side of plot (outside). Cattle hoof prints in plot.

Notes This is a playa w/ a salt crust.

ENVIRONMENT

Elevation 6,525 ft **Aspect** 0 deg. **Slope** 0 deg.

Topo. Position:

Surface deposit Residual **Soil Texture**

Soil features Surface crusted and white w/ salts

	Soil	Gravel	Cobble	Boulder	Bedrock	
% Ground Cover	96	1	0	0	0	
	Litter	Wood	DRP	Lichen	Moss	Cush Pl.
	4	0		0	0	

Plot	00AB04.02	CANOPY COVER		
	<u>Species</u>	<u>NRCS Code</u>	<u>Cover Class</u>	<u>Origin</u>
	<i>2. Shrub</i>			
	sarcobatus vermiculatus, greasewood	save4	1	Native
		<i>Total</i>	<i>1</i>	
	<i>3. Subshrub</i>			
	atriplex gardneri, gardner's saltbush	atga	1	Native
		<i>Total</i>	<i>1</i>	
	<i>5. Graminoid</i>			
	distichlis spicata, inland saltgrass	disp	3	Native
	leymus simplex, bullgrass	lesi5	1	Native
	poa secunda, sandberg bluegrass	pose	1	Native
	scirpus nevadensis, nevada bulrush	scne	3	Native
	spartina gracilis, alkali cordgrass	spgr	1	Native
		<i>Total</i>	<i>9</i>	
	<i>6. Forb</i>			
	iva axillaris, povertyweed	ivax	3	Native
	salicornia rubra, red swampfire	saru	1	Native
	salsola tragus, prickly Russian thistle	satr12	1	Introduced
		<i>Total</i>	<i>5</i>	
		<i>Total for Plot</i>	<i>16</i>	

Plot 00AB04.03

LOCATION

T 23 N, **R** 98W, **Sec** 19 , nw **1/4 sec** **UTM Projection** NAD 83 **Zone** 1

UTM Coordinates: 4,647,580 m N, 703,574 m E

Map name Black Rock Flat East **Scale** 1:24,000

DESCRIPTION

Plot Group: SDALK Distichlis meadow

Why was plot done? Subjectively chosen to illustrate Distichlis meadow without Scirpus, which seems common around playas.

Uncertainty on measurements

Completeness of Spp lists May have missed some annuals and early perennials.

Describe veg

Sparse grass vegetation of Distichlis and Spartina gracilis with small amounts of other species (Iva axillaris, Elymus smithii). Scattered Sarcobatus and a few Chrysothamnus are present. Areas of salt crust have mainly Distichlis; areas of low, sandy dunes have mixed Distichlis and Spartina.

Disturbance signs

Horse droppings (old), and old cattle hoofprints.

Notes

ENVIRONMENT

Elevation 6,578 ft **Aspect** 0 deg. **Slope** 0 deg.

Topo. Position:

Surface deposit Aeolian **Soil Texture**

Soil features White salt deposits on surface. Low (<50 cm) dunes are present.

	Soil	Gravel	Cobble	Boulder	Bedrock	
% Ground Cover	48	1	0	0	0	
	Litter	Wood	DRP	Lichen	Moss	Cush Pl.
	2	1	0	1	0	

Plot 00AB04.03

CANOPY COVER

<u>Species</u>	<u>NRCS Code</u>	<u>Cover Class</u>	<u>Origin</u>
<i>2. Shrub</i>			
artemisia tridentata ssp. wyomingensis, wyoming big sagebrush	artw	1	Native
chrysothamnus linifolius, spearleaf rabbitbrush	chli3	1	Native
chrysothamnus viscidiflorus ssp. viscidiflorus, yellow rabbitbrush	chviv2	1	Native
ericarmeria nauseosa ssp. nauseosa	ernan3	1	Native
sarcobatus vermiculatus, greasewood	save4	3	Native
	<i>Total</i>	<i>7</i>	
<i>5. Graminoid</i>			
achnatherum hymenoides, indian ricegrass	achy	1	Native
distichlis spicata, inland saltgrass	disp	10	Native
leymus simplex, bullgrass	lesi5	1	Native
muhlenbergia richardsonis, mat muhly	muri	1	Native
poa secunda, sandberg bluegrass	pose	1	Native
spartina gracilis, alkali cordgrass	spgr	3	Native
triglochin maritimum, seaside arrowgrass	trma4	1	Native
	<i>Total</i>	<i>18</i>	
<i>6. Forb</i>			
astragalus chamaeleuce, cicada milkvetch	asch4	1	Native
iva axillaris, povertyweed	ivax	1	Native
machaeranthera canescens ssp. canescens, spiny goldenweed	macac3	1	Native
salicornia rubra, red swampfire	saru	1	Native
stenotus armerioides var. armerioides, thrift mock goldenweed	stara	1	Native
	<i>Total</i>	<i>5</i>	
	<i>Total for Plot</i>	<i>30</i>	

Plot 00AB04.04

LOCATION

T 23 N, **R** 98W, **Sec** 20 , **se** 1/4 **sec** **UTM Projection** NAD 83 **Zone** 1

UTM Coordinates: 4,647,172 m N, 705,298 m E

Map name Black Rock Flat East **Scale** 1:24,000

DESCRIPTION

Plot Group: SDALK Light Patch

Why was plot done? Subjectively located to illustrate light-colored patch on 1:24,000-scale true-color aerial photo.

Uncertainty on measurements

Completeness of Spp lists Probably missed some herbaceous spp. (annuals and early perennials) because herbs are dry now.

Describe veg

Sparse shrub vegetation of *Artemisia tridentata* ssp. *wyomingensis*, *Tetradymia canescens*, and *Chrysothamnus* spp, w/ scattered grasses (mainly *Oryzopsis hymenoides* and *Stipa comata*).

Disturbance signs

Pocket gopher diggings, horse droppings, elk (?) droppings, antelope droppings all present. Ungulate trail crosses plot.

Notes Old sage grouse droppings present

ENVIRONMENT

Elevation 6,644 ft **Aspect** 180 deg. **Slope** 4 deg.

Topo. Position:

Surface deposit Residual **Soil Texture**

Soil features Gravel sparse on surface.

	Soil	Gravel	Cobble	Boulder	Bedrock	
% Ground Cover	91	1	0	0	1	
	Litter	Wood	DRP	Lichen	Moss	Cush Pl.
	7	1		1	0	

Plot 00AB04.04

CANOPY COVER

<u>Species</u>	<u>NRCS Code</u>	<u>Cover Class</u>	<u>Origin</u>
<i>2. Shrub</i>			
artemisia tridentata ssp. wyomingensis, wyoming big sagebrush	artrw	10	Native
atriplex canescens, fourwing saltbush	atca2	1	Native
chrysothamnus viscidiflorus ssp. viscidiflorus, yellow rabbitbrush	chviv2	3	Native
ericarmeria nauseosa ssp. nauseosa	ernan3	3	Native
tetradymia canescens, spineless horsebrush	teca2	3	Native
tetradymia spinosa, shortspine horsebrush	tesp2	1	Native
	<i>Total</i>	<i>21</i>	
<i>5. Graminoid</i>			
achnatherum hymenoides, indian ricegrass	achy	3	Native
elymus elymoides ssp. elymoides, squirreltail	elele	1	Native
elymus lanceolatus ssp. lanceolatus, thickspike wheatgrass	ellal	3	Native
hesperostipa comata, needle and thread	heco26	3	Native
	<i>Total</i>	<i>10</i>	
<i>6. Forb</i>			
astragalus chamaeleuce, cicada milkvetch	asch4	1	Native
astragalus kentrophytus var. jessiae	askej	1	Native
chaenactis douglasii var. douglasii	chdod	1	Native
cryptantha flava, brenda's yellow catseye	crfl5	1	Native
erigonum ovalifolium var. purpureum, cushion buckwheat	erovp2	1	Native
lesquerella ludoviciana, foothill bladderpod	lelu	1	Native
lygodesmia juncea, rush skeletonplant	lyju	1	Native
machaeranthera canescens ssp. canescens, spiny goldenweed	macac3	1	Native
psoralidium lanceolatum, lemon scurfpea	psla3	1	Native
	<i>Total</i>	<i>9</i>	
	<i>Total for Plot</i>	<i>40</i>	

Plot 00AB05

LOCATION

T 23 N, **R** 98W, **Sec** 29 , sw **1/4 sec** **UTM Projection** NAD 83 **Zone** 1

UTM Coordinates: 4,644,896 m N, 705,144 m E

Map name Black Rock Flat East **Scale** 1:24,000

DESCRIPTION

Plot Group: SDALK Smooth dark patch

Why was plot done? Subjectively located to illustrate vegetation in smooth, dark area on 1:24,000-scale true-color aerial photo.

Uncertainty on measurements

Completeness of Spp lists Herbs were dry so some annuals and early perennials probably were missed. Only the common species in each stratum were noted.

Describe veg

Short (<50 cm) shrub-herbaceous vegetation on uplands south of the sand dunes, covering patches of at least 1000 acres each; may be matrix. *Artemisia tridentata* ssp. *wyomingensis* forms an open shrub layer < 50 cm tall, which contains some *Chrysothamnus* and *Tetradymia canescens*. The shrubs are densest in swales and draws. The common species in the herbaceous undergrowth are *Oryzopsis hymenoides*, *Stipa comata*, *Phlox hoodii*, and some *Carex filifolia*.

Disturbance signs

Notes Substrate may be aeolian

ENVIRONMENT

Elevation 6,621 ft **Aspect** 60 deg. **Slope** 4 deg.

Topo. Position:

Surface deposit Residual **Soil Texture**

Soil features

	Soil	Gravel	Cobble	Boulder	Bedrock	
% Ground Cover	Litter	Wood	DRP	Lichen	Moss	Cush Pl.

Plot 00AB05

<u>Species</u>	<u>NRCS Code</u>	<u>Cover Class</u>	<u>Origin</u>
<i>2. Shrub</i>			
artemisia tridentata ssp. wyomingensis, wyoming big sagebrush	artrw	15	Native
atriplex confertifolia, shadscale saltbush	atco	3	Native
chrysothamnus viscidiflorus ssp. viscidiflorus, yellow rabbitbrush	chviv2	3	Native
grayia spinosa, spiny hopsage	grsp	3	Native
tetradymia canescens, spineless horsebrush	teca2	3	Native
<i>Total</i>		27	
<i>3. Subshrub</i>			
artemisia pedatifida, birdfoot sagebrush	arpe6	3	Native
atriplex gardneri, gardner's saltbush	atga	3	Native
<i>Total</i>		6	
<i>5. Graminoid</i>			
achnatherum hymenoides, indian ricegrass	achy	3	Native
carex filifolia, threadleaf sedge	cafi	1	Native
elymus lanceolatus ssp. lanceolatus, thickspike wheatgrass	ellal	3	Native
poa secunda, sandberg bluegrass	pose	3	Native
stipa comata, needle and thread	stco4	3	Native
<i>Total</i>		13	
<i>6. Forb</i>			
phlox hoodii, hoods phlox	phho	1	Native
<i>Total</i>		1	
<i>Total for Plot</i>		47	

Plot 00AB05.01

LOCATION

T 23 N, **R** 98W, **Sec** 29 , sw **1/4 sec** **UTM Projection** NAD 83 **Zone** 1

UTM Coordinates: 4,645,366 m N, 706,148 m E

Map name Black Rock Flat East **Scale** 1:24,000

DESCRIPTION

Plot Group: SDALK Light Patch

Why was plot done? Subjectively selected to illustrate vegetation in closed basin, appearing as a light patch on the 1:24,000-scale true-color aerial photo.

Uncertainty on measurements

Completeness of Spp lists Herbs were dried up so some annuals and early perennials probably were missed.

Describe veg

Short (<50 cm), patchy shrub layer of *Sarcobatus* and *Artemisia tridentata* ssp. *wyomingensis* w/ some *Chrysothamnus*. Herbaceous undergrowth is sparse and consists of *Oryzopsis hymenoides* and *Suaeda* w/ several other species. *Artiplex gardneri* forms patchy dwarf-shrub layer. Vegetation is densest on low (< 40cm tall) mounds. The flats between are very sparsely vegetated.

Disturbance signs

Last year's (?) horse droppings and hoofprints present. Burrows of unidentified mammal in mounds.

Notes Site is a flat, probably residuum on sedimentary bedrock, with low mounds or dunes of aeolian sand.

ENVIRONMENT

Elevation 6,588 ft **Aspect** 0 deg. **Slope** 0 deg.

Topo. Position:

Surface deposit Aeolian **Soil Texture**

Soil features Mounds are loamy sand. Flats between mounds are sandy clay.

	Soil	Gravel	Cobble	Boulder	Bedrock	
% Ground Cover	Litter	Wood	DRP	Lichen	Moss	Cush Pl.

Plot 00AB05.01		CANOPY COVER		
	<u>Species</u>	<u>NRCS Code</u>	<u>Cover Class</u>	<u>Origin</u>
<i>2. Shrub</i>				
	artemisia spinescens, bud sagebrush	arsp5	1	Native
	artemisia tridentata ssp. wyomingensis, wyoming big sagebrush	artrw	3	Native
	chrysothamnus viscidiflorus ssp. viscidiflorus, yellow rabbitbrush	chviv2	3	Native
	ericarmeria nauseosa ssp. nauseosa	ernan3	3	Native
	sarcobatus vermiculatus, greasewood	save4	3	Native
		<i>Total</i>	<i>13</i>	
<i>3. Subshrub</i>				
	atriplex gardneri, gardner's saltbush	atga	3	Native
		<i>Total</i>	<i>3</i>	
<i>5. Graminoid</i>				
	achnatherum hymenoides, indian ricegrass	achy	3	Native
	elymus elymoides ssp. elymoides, squirreltail	elele	1	Native
	poa secunda, sandberg bluegrass	pose	3	Native
		<i>Total</i>	<i>7</i>	
<i>6. Forb</i>				
	haplopappus armerioides, thrift mock goldenweed	haar2	1	Native
	kochia americana, greenmolly	koam	1	Native
	machaeranthera canescens ssp. canescens, spiny goldenweed	macac3	1	Native
	penstemon arenicola, sand penstemon	pear	1	Native
		<i>Total</i>	<i>4</i>	
		<i>Total for Plot</i>	<i>27</i>	

Plot 00AB06

LOCATION

T 23 N, **R** 98W, **Sec** 30 , **e** 1/4 **sec** **UTM Projection** NAD 83 **Zone** 1

UTM Coordinates: 4,645,668 m N, 703,479 m E

Map name Black Rock Flat East **Scale** 1:24,000

DESCRIPTION

Plot Group: SDALK Light Patch

Why was plot done? Subjectively placed to illustrate vegetation in closed basin, showing on 1:24,000-scale true-color aerial photo as light-colored patch.

Uncertainty on measurements

Completeness of Spp lists Only the common species in each stratum were noted.

Describe veg

Patchy shrub stand filling the bottom of a closed basin. Most of the vegetation grows on the small dunes in the basin bottom. *Sarcobatus* and *Artemisia tridentata* ssp. *wyomingensis* form a shrub layer to 50 cm tall, mainly on the dunes. The undergrowth consists of dwarf-shrubs (*Atriplex gardneri*, *Artemisia pedatifida*), forbs (*Suaeda*), and grasses (*Poa secunda*).

Disturbance signs

Old (?) horse hoofprints

Notes Basin bottom is residuum (probably mixed w/ some alluvium and aeolian material). Dunes are aeolian.

ENVIRONMENT

Elevation ft **Aspect** 0 deg. **Slope** 0 deg.

Topo. Position:

Surface deposit Aeolian **Soil Texture**

Soil features Dunes (where most of the plants grow) are loamy sand. Flats between are sandy clay loam.

	Soil	Gravel	Cobble	Boulder	Bedrock	
% Ground Cover	Litter	Wood	DRP	Lichen	Moss	Cush Pl.

Plot	00AB06	Species	NRCS Code	Cover Class	Origin
		<i>2. Shrub</i>			
		artemisia spinescens, bud sagebrush	arsp5	3	Native
		artemisia tridentata ssp. wyomingensis, wyoming big sagebrush	artrw	10	Native
		sarcobatus vermiculatus, greasewood	save4	10	Native
			<i>Total</i>	23	
		<i>3. Subshrub</i>			
		artemisia pedatifida, birdfoot sagebrush	arpe6	3	Native
		atriplex gardneri, gardner's saltbush	atga	10	Native
		opuntia polyacantha, plains pricklypear	oppo	3	Native
			<i>Total</i>	16	
		<i>5. Graminoid</i>			
		elymus elymoides ssp. elymoides, squirreltail	elele	3	Native
		elymus lanceolatus ssp. lanceolatus, thickspike wheatgrass	ellal	3	Native
		poa secunda, sandberg bluegrass	pose	10	Native
			<i>Total</i>	16	
		<i>6. Forb</i>			
		kochia americana, greenmolly	koam	10	Native
			<i>Total</i>	10	
			<i>Total for Plot</i>	65	

Plot 00AB07

LOCATION

T 23 N, **R** 98W, **Sec** 28 , se **1/4 sec** **UTM Projection** NAD 83 **Zone** 1

UTM Coordinates: 4,645,085 m N, 707,009 m E

Map name Black Rock Flat East **Scale** 1:24,000

DESCRIPTION

Plot Group: SDALK Smooth dark patch

Why was plot done? Subjectively located to illustrate the vegetation in the matrix vegetation appearing as smooth, dark-colored areas on the 1:24,000-scale true-color aerial photo.

Uncertainty on measurements

Completeness of Spp lists Only the common species in each stratum were noted.

Describe veg

Grassland with scattered shrubs (<10% canopy cover) on the upland slopes south of the active sand dunes; matrix vegetation. *Stipa comata*, *Oryzopsis hymenoides*, and *Carex filifolia* are the common species. Most of the scattered shrubs are *Artemisia tridentata* ssp. *wyomingensis*.

Disturbance signs

Notes Substrate may be largely aeolian

ENVIRONMENT

Elevation ft **Aspect** 180 deg. **Slope** 4 deg.

Topo. Position:

Surface deposit Residual **Soil Texture**

Soil features Gravel common on surface

	Soil	Gravel	Cobble	Boulder	Bedrock	
% Ground Cover	Litter	Wood	DRP	Lichen	Moss	Cush Pl.

Plot 00AB07

<u>Species</u>	<u>NRCS Code</u>	<u>Cover Class</u>	<u>Origin</u>
<i>2. Shrub</i>			
artemisia tridentata ssp. wyomingensis, wyoming big sagebrush	artrw	10	Native
chrysothamnus viscidiflorus ssp. viscidiflorus, yellow rabbitbrush	chviv2	3	Native
ericarmeria nauseosa ssp. nauseosa	ernan3	3	Native
grayia spinosa, spiny hopsage	grsp	3	Native
<i>Total</i>		<i>19</i>	
<i>3. Subshrub</i>			
artemisia pedatifida, birdfoot sagebrush	arpe6	1	Native
<i>Total</i>		<i>1</i>	
<i>5. Graminoid</i>			
achnatherum hymenoides, indian ricegrass	achy	3	Native
carex filifolia, threadleaf sedge	cafi	3	Native
stipa comata, needle and thread	stco4	3	Native
<i>Total</i>		<i>9</i>	
<i>6. Forb</i>			
arenaria hookeri, hooker's sandwort	arho4	1	Native
astragalus nelsonianus, nelson's milkvetch	asne3	1	Native
erigonum ovalifolium var. purpureum, cushion buckwheat	erovp2	1	Native
phlox hoodii, hoods phlox	phho	1	Native
<i>Total</i>		<i>4</i>	
<i>Total for Plot</i>		<i>33</i>	

APPENDIX 2. PHOTOGRAPHS FROM THE ALKALI BASIN - EAST SAND DUNES WSA

Image Number 00GJ01.19 **Date** 7/3/200 **Project** Alkali - E Sand WSA
Photographer A. Shelly **Location** T23N,R99W Sec 19 NW1/4
Plot Number 00AB01.01
Description Taken from southwest corner, looking over plot



Image Number 00GJ01.20 **Date** 8/1/200 **Project** Alkali - E Sand WSA
Photographer A. Shelley **Location** T23N, R99W, Sec 9, NW 1/4
Plot Number 00AB 01.02
Description Looking across plot from west. G. Jones recording data



Image Number 00GJ01.21 **Date** 8/1/200 **Project** Alkali - E Sand WSA
Photographer A. Shelley **Location** T23N, R100W, Sec 24, SE 1/4
Plot Number 00AB01.03
Description Photo taken from west side of plot. G. Jones near center.



Image Number 00GJ01.22 **Date** 8/1/200 **Project** Alkali - E Sand WSA
Photographer A. Shelley **Location** T23N R100W, Sec 24
Plot Number 00AB01.04
Description Taken from southwest corner



Image Number 00GJ01.23

Date 8/2/200 **Project** Alkali - E Sand WSA

Photographer A. Shelley

Location T23N, R99W , Sec 22 NE 1/4

Plot Number 00AB02.01

Description Photo taken at west end of plot. G. Jones in center. Flat area is vegetated with grasses and rabbitbrush



Image Number 00GJ01.24

Date 8/2/200 **Project** Alkali - E Sand WSA

Photographer A. Shelley

Location T23N R99W Sec 22, NW 1/4

Plot Number 00AB02.02

Description



Image Number 00GJ01.25 **Date** 8/2/200 **Project** Alkali - E Sand WSA
Photographer A. Shelley **Location** T23N, R99W, Sec 22, SW1/4
Plot Number 00Ab02.03
Description Photo taken from west side of plot.



Image Number 00GJ01.26 **Date** 8/2/200 **Project** Alkali - E Sand WSA
Photographer A. Shelley **Location** T23N, R99 W, Sec 22, SE 1/4
Plot Number 00AB02.02
Description Taken directly from west of plot, showing flat, grassy area between stabilized sand ridges.



Image Number 00GJ01.27 **Date** 8/1/200 **Project** Alkali - E Sand WSA

Photographer GP Jones **Location** T23N R99W Sec 23

Plot Number

Description Looking west into WSA at mix of shrubby stabilized ridges and grassy flats between them



Image Number 00GJ01.28 **Date** 8/2/200 **Project** Alkali - E Sand WSA
Photographer G. Jones **Location** T23N R99W Sec 23
Plot Number
Description Looking WNW. This landscape is represented by plots 00AB02.01 -
00AB02.04



Image Number 00GJ01.29

Date 8/2/200 **Project** Alkali - E Sand WSA

Photographer GP Jones

Location T23N R99W Sec 23

Plot Number

Description Looking N. Bright-green patches at foot of dune probably *Psoraleidium lanceolatum*. Between dunes is series of stabilized ridges and grassy flats.



Image Number 00GJ01.30

Date 8/2/200 **Project** Alkali - E Sand WSA

Photographer GP Jones

Location T23N R99W Sec 23

Plot Number

Description Looking SE across dune to stabilized ridges in mid-ground then to active dune in back ground



Image Number 00GJ01.34 **Date** 8/3/200 **Project** Alkali - E Sand WSA
Photographer A. Shelley **Location** T23N, R98W, Sec 17, SW1/4
Plot Number 00AB04.01
Description Flat area with sparse sagebrush.



Image Number 00GJ01.35 **Date** 8/3/200 **Project** Alkali - E Sand WSA
Photographer A. Shelley **Location** T23N, R99W, Sec 19, NE1/4
Plot Number Not in plot
Description Looking south at dry lakes, with vegetation of *Distichlis spicata*, *Elymus smithii* (?), and scattered *Sarcobatus vermiculatus* in background. Note vehicle tracks through lake.



Image Number 00GJ01.36 **Date** 8/3/200 **Project** Alkali - E Sand WSA
Photographer A. Shelley **Location** T23N R98W Sec 19 NW 1/4
Plot Number 00AB04.02
Description Flat area without shrubs. Soil with alkali on surface.



Image Number 00GJ02.01
Photographer A. Shelley
Plot Number 00AB04.03
Description

Date 8/3/200 **Project** Alkali - E Sand WSA
Location T23N R98W Sec 19 NW 1/4



Image Number 00GJ02.03 **Date** 8/4/200 **Project** Alkali - E Sand WSA
Photographer A. Shelley **Location** T23N R98W Sec 29 SW 1/4
Plot Number 00AB05.01
Description Looking across flat plot. G. Jones walking in plot



Image Number 00GJ02.04 **Date** 8/4/200 **Project** Alkali - E Sand WSA
Photographer G. Jones **Location** T23N, R98W, Sec 29, SW1/4 and Sec
32, NW 1/4
Plot Number 00AB06
Description Looking east northeast down slope



Image Number 00GJ02.05 **Date** 8/4/200 **Project** Alkali - E Sand WSA
Photographer A. Shelley **Location** T23N, R98W, Sec 30, E1/2
Plot Number 00AB06
Description Looking northeast across depression



Image Number 00GJ02.06 **Date** 8/4/200 **Project** Alkali - E Sand WSA
Photographer G. Jones **Location** T23N, R98W, Sec 28, SE1/4
Plot Number 00AB07
Description Looking northwest (344 degress) across south-facing slope

