

U97JON 01WYUS

U97JON 01WYUS

ECOLOGICAL EVALUATION OF
THE POTENTIAL PLAYAS RESEARCH NATURAL AREA
WITHIN THE THUNDER BASIN NATIONAL GRASSLAND,
CAMPBELL COUNTY, WYOMING

Prepared for
Nebraska National Forest,
USDA Forest Service

By

George P. Jones

Wyoming Natural Diversity Database
The Nature Conservancy
1604 Grand Avenue
Laramie, Wyoming 82070

July 16, 1997

ECOLOGICAL EVALUATION OF
THE POTENTIAL PLAYAS RESEARCH NATURAL AREA
WITHIN THE THUNDER BASIN NATIONAL GRASSLAND,
CAMPBELL COUNTY, WYOMING

Prepared for
Nebraska National Forest,
USDA Forest Service

By

George P. Jones

Wyoming Natural Diversity Database
The Nature Conservancy
1604 Grand Avenue
Laramie, Wyoming 82070

July 16, 1997

TABLE OF CONTENTS

INTRODUCTION	1
Land Management Planning	1
OBJECTIVES	1
PRINCIPAL DISTINGUISHING FEATURES	1
LOCATION	2
Boundary	2
Area	2
Elevation	2
Access	2
Ecoregion	3
Maps	3
AREA BY COVER TYPES	3
The Vegetation	3
Area by Type	3
PHYSICAL AND CLIMATIC CONDITIONS	4
Physical Setting	4
DESCRIPTION OF VALUES	4
Vegetation Types	4
Flora	5
Threatened, Endangered, and Sensitive Plant Species	5
Plant Species List	5
Fauna	6
Threatened, Endangered, and Sensitive Vertebrates	6
Geology	7
Lands	7
SUITABILITY FOR RESEARCH NATURAL AREA SELECTION	7
Quality	7
Condition	8
Viability	9
Defensibility	9
Degree to Which the Potential RNA Meets Criteria	10
IMPACTS AND POSSIBLE CONFLICTS	10
Mineral Resources	10
Grazing	10
Timber	10
Watershed Values	10
Recreation Values	11
Wildlife and Plant Values	11
Transportation Values	11
MANAGEMENT CONCERNS	11
REFERENCES	11

Appendix 1. Maps of the potential Playas Research Natural Area.	14
Appendix 2. Canopy cover of plants in plots in the potential Playas Research Natural Area.	17
Appendix 3. Explanations of ranks used by the Wyoming Natural Diversity Database.	21
Appendix 4. Plant community types in the potential Playas Research Natural Area.	23

ECOLOGICAL EVALUATION OF
THE POTENTIAL PLAYAS RESEARCH NATURAL AREA
WITHIN THE THUNDER BASIN NATIONAL GRASSLAND,
CAMPBELL COUNTY, WYOMING

INTRODUCTION

The potential Playas Research Natural Area (RNA) is located in the Cheyenne River Basin of northeastern Wyoming. The area includes playa lakes with western wheatgrass/needle spikerush herbaceous vegetation, surrounded by sagebrush shrub steppe. The potential RNA is in the Thunder Basin National Grassland and is currently used for livestock grazing.

In 1996, The Nature Conservancy entered a contract with the USDA Forest Service, Nebraska National Forest, to prepare ecological evaluations of areas in the Thunder Basin National Grassland and other national grasslands for use by the Forest Service in examining the suitability of the areas as research natural areas. The evaluation of the Playas area was done by the Wyoming Natural Diversity Database. This report presents the results of that evaluation.

Land Management Planning

In 1996, an interdisciplinary team from the Thunder Basin National Grassland selected the Playas area as a potential RNA for possible analysis during revision of the Land and Resource Management Plan. This ecological evaluation is intended to aid the Forest Service staff in that analysis.

OBJECTIVES

One of the primary objectives of research natural areas is to "...preserve a wide spectrum of pristine representative areas that typify important forest, shrubland, grassland, alpine, aquatic, geologic and similar natural situations..." (Forest Service Manual 4063.02).

The objectives of a Playas RNA would be to 1) maintain a reference area for (a) monitoring effects of resource management techniques and practices applied to similar ecosystems, (b) comparing results from manipulative research, and (c) determining range of natural variability; 2) protect elements of biological diversity; 3) provide a site for non-manipulative scientific research; and 4) provide on-site and extension educational opportunities.

PRINCIPAL DISTINGUISHING FEATURES

The principal distinguishing features of the potential Playas RNA are seven playa lake beds, ranging in size from ca.

0.9 acre (0.4 ha) to ca. 7 acres (3 ha), on a broad drainage divide.

LOCATION

The potential Playas RNA is located within the Thunder Basin National Grassland (Figure 1). The approximate center of the potential RNA is at latitude 43°35'05"N and longitude 105°29'15"W.

The potential RNA includes the east 1/2 of Section 27, Township 42 North, Range 77 West (6th Principal Meridian).

Boundary (See Figure 2).

The proposed boundary of the potential RNA follows property lines and half-section lines. Starting at the northeastern corner of Sec 27 (T42N, R77W), the boundary runs south 1 mile (1.6 km) along the eastern section line of Sec 27 (and the boundary between national grassland and private land) to the southeastern corner of Sec 27; thence west 0.5 mile (0.8 km) along the southern line of section 27 (and the boundary between national grassland and private land) to the quarter-section point on the southern section line of Sec 27; thence north 1 mile (1.6 km) to the quarter-section point on the northern section line of Sec 27; thence east 0.5 mile (0.8 km) along the northern section line of Sec 27 to the starting point.

Area

The total area of the potential Playas RNA is 320 acres (129 ha).

Elevation

The elevation of the potential Playas RNA ranges from ca. 5040 feet (1537 m) to 5070 feet (1546 m).

Access

The potential Playas RNA may be reached via public roads. From the intersection of Wyoming Highway 59 with a two-track road, in the NE1/4 SW1/4 Sec 23 (T42N, R72W) ca. 27 miles (43 km) north-northwest of Bill, Wyoming, travel west-southwest across national grassland on the two-track road ca. 0.7 mile (1.1 km) to the intersection with a two-track road to the south; thence south ca. 0.1 mile (0.16 km) on that two-track road to the northern boundary of the potential RNA.

Ecoregion

The potential Playas RNA lies within the Great Plains-Palouse Dry Steppe Province, Powder River Basin Section, Southern Powder River Basin-Scoria Hills Subsection (331Gf) of the ecoregion classification of Bailey et al. (1994) (Freeouf 1996).

Maps

USDA Forest Service 1/2 inch = 1 mile-scale map of the Thunder Basin National Grassland.

USDI Geological Survey 7.5 minute topographic Quadrangle Map: Teckla SW, Wyo.

AREA BY COVER TYPES

The Vegetation

The potential Playas RNA contains the following plant associations from Johnston (1987). Synonyms are shown in Appendix 4. Data from sample plots are shown in Appendix 2.

Upland vegetation

Most of the potential RNA is covered with shrub steppe of the blue grama/western wheatgrass association. Wyoming big sagebrush canopy cover varies from ca. 10% to ca. 20% and averages ca. 10% over the entire area. Blue grama, threadleaf sedge, western wheatgrass, needleleaf sedge, and prairie junegrass are the major species.

Riparian vegetation

The playa lake beds in the area support herbaceous vegetation of the western wheatgrass/needle spikerush association. In each playa lake bed, western wheatgrass and Douglas sedge dominate the vegetation in a ring on the higher part, and needle spikerush and meadow barley dominate the vegetation in the low, center part.

Area by Type

Vegetation types were mapped on a 1:24,000-scale topographic map using aerial photos and field reconnaissance, and the area of each type in the potential RNA was estimated from the map. The plant community types from Johnston (1987) listed in Table 2 are cross-referenced to plant community types from Thilenius et al. (1995) and The Nature Conservancy (1997) in Appendix 4.

Table 1. Areas of Kuchler Types (Kuchler 1966) in the potential Playas RNA.

Cover Type	Acres	Hectares
Gramma-needlegrass-wheatgrass (57) (<u>Bouteloua-Stipa-Agropyron</u>)	320	129

Table 2. Areas of community types (plant associations from Johnston [1987] except where otherwise noted) in the potential Playas RNA. See Figure 2. See synonyms in Appendix 4.

Community Types	Acres	Hectares
Blue grama/Western wheatgrass	293	119
Western wheatgrass/Needle spikerush	27	11

PHYSICAL AND CLIMATIC CONDITIONS

Physical Setting

The potential Playas RNA is located on a broad drainage divide of low relief between two major streams in the Cheyenne River Basin, Porcupine Creek to the north and Antelope Creek to the south. The drainage divide contains numerous playa lakes -- intermittently-flooded lake beds ranging in size from <1 acre (0.4 ha) to ca. 20 acres (8 ha) within closed drainage basins.

DESCRIPTION OF VALUES

Vegetation Types

See Table 1 for a list of the Kuchler (1964) vegetation types present in the area and the estimated acreage of each, and Table 2 for a list of the plant associations present and the estimated acreage of each.

Flora

Threatened, Endangered, and Sensitive Plant Species

No federally listed Threatened or Endangered plant species, or species on the USDA Forest Service Region 2 Sensitive Species List (Estill 1993), are known from the potential Playas RNA. The following species of conservation interest is known near the potential RNA.

Psilocarphus brevissimus (Dwarf woolly-heads)

Heritage Rank: G5/S1. (Heritage ranks are explained in Appendix 3.)

Federal Status: None

Geographic Range: Washington south to Baja California, east to western Montana, eastern Wyoming, and Utah (Cronquist 1955).

Habitat: Dried playa lake beds and riparian areas, often on saline soil.

Comments: Occurrence #1 is located ca. 10 miles (16 km) northeast of the potential RNA. The playa lakes in the potential RNA are suitable habitat for the species and it may occur in the area. Due to the species's diminutive stature (<2 inches or 5 cm tall), this annual plant is probably more widespread than current information indicates.

Plant Species List

The following species were identified during field work in the potential Playas RNA.

Table 3. Vascular Plants of the potential Playas RNA. Nomenclature for scientific names is based on Dorn (1992). Family acronyms are based on Weber (1982). Family taxonomy follows Dorn (1992).

<u>Scientific Name</u>	<u>Common Name</u>	<u>Family</u>
DWARF SHRUBS		
<i>Artemisia tridentata</i> var. <i>wyomingensis</i>	Wyoming big sagebrush	AST
GRAMINOIDS		
<i>Alopecurus aequalis</i>	Shortawn foxtail	POA
<i>Aristida purpurea</i> var. <i>fendleriana</i>	Purple three-awn	POA
<i>Bouteloua gracilis</i>	Blue grama	POA
<i>Bromus tectorum</i>	Cheatgrass	POA
<i>Carex douglasii</i>	Douglas's sedge	CYP
<i>Carex eleocharis</i> = <i>C. stenophylla</i>	Needleleaf sedge	CYP

Table 3. Vascular Plants of the potential Playas RNA.

<u>Scientific Name</u>	<u>Common Name</u>	<u>Family</u>
Carex filifolia	Threadleaf sedge	CYP
Eleocharis acicularis	Spikerush	CYP
Elymus smithii	Western wheatgrass	POA
Festuca octoflora	Sixweeks fescue	POA
Hordeum brachyantherum	Meadow barley	POA
Juncus balticus	Baltic rush	POA
Koeleria macrantha	Prairie junegrass	POA
Poa secunda	Sandberg bluegrass	POA
Stipa comata	Needle-and-thread	POA
FORBS		
Alyssum desertorum	Desert alyssum	BRA
Ambrosia tomentosa	Low ragweed	AST
Antennaria microphylla	Small-flowered pussytoes	AST
Artemisia frigida	Fringed sagewort	AST
Erigerion sp.	Fleabane	AST
Filago arvensis	Field cottonrose	AST
Opuntia polyacantha	Plains pricklypear	CAC
Penstemon sp.	Beardtongue	SCR
Phlox hoodii	Hood's phlox	PLM
Plantago patagonica	Indian wheat	PTG
Sphaeralcea coccinea	Scarlet globemallow	MLV
Tragopogon dubius	Yellow salsify	AST
Veronica peregrina var. xalapensis	Purslane speedwell	SCR
Xanthium strumarium	Common cocklebur	AST

Fauna

Threatened, Endangered, and Sensitive Vertebrates

No federally listed Threatened, Endangered, or Candidate vertebrate species, or species on the USDA Forest Service Region 2 Sensitive Species List (Estill 1993) are known to occur in the potential Playas RNA.

Animal Species List

The field work in the potential Playas RNA did not include identification of the animal species present.

Geology

The bedrock in the potential Playas RNA consists of the claystones of the main body of the Eocene-aged Wasatch Formation (Love and Christiansen 1985).

Lands

The potential Playas RNA is national grassland, but the area has been identified for disposal as part of an adjustment to land ownership in the Thunder Basin National Grassland (USDA Forest Service, Douglas Ranger District records). The potential RNA is bounded by private land on the east and south and by national grassland on the west and north.

SUITABILITY FOR RESEARCH NATURAL AREA SELECTION

An area is suitable for designation as a research natural area according to how well it meets four criteria: quality, condition, viability, and defensibility (Andrews 1993). Each criterion is briefly defined below, and the information collected during field work that is pertinent to each criterion is described.

Quality: the degree to which the potential RNA represents the range in variability within the ecosystem types that it contains.

Playa lakes in the region contain vegetation generally dominated or codominated by western wheatgrass, with the identity and amount of other species depending on soil chemistry and length of flooding (Ries et al. 1976, Holpp 1977, Department of the Interior 1979 [p. R2-39]). The stands of the western wheatgrass/needle spikerush association in the potential Playas RNA appear to represent the vegetation typical of non-saline playa lakes that remain flooded (or have a high water table) for an intermediate time.

The blue grama/western wheatgrass association that covers most of the potential RNA is widespread in the Cheyenne River Basin. The occurrence in the potential RNA appears to be typical of this association with a scattered Wyoming big sagebrush shrub layer, but the potential Playas RNA is too small to represent the variation found within the association throughout the region.

Condition: the degree to which the potential RNA has been altered from presettlement conditions.

The potential Playas RNA has been altered from its presettlement condition by the introduction of exotic species, changes in the ecological processes that shaped the area's ecosystems, and construction of structures such as roads, fences, and reservoirs. These causes of change are interrelated and a complete discussion is impossible; the information here is largely restricted to observations made during field survey.

-- Exotic species

Only two exotic plant species were noted during field work in the potential RNA. Yellow alyssum (Alyssum desertorum) and cheatgrass or downy brome (Bromus tectorum) are widespread in the area but contribute little cover to the vegetation in either of the plant associations.

-- Structures (Figure 2)

A two-track road runs across the southern end of the potential RNA from west to east. A water well with an electric pump and a water trough are located on the northern boundary of the potential RNA, and a powerline runs to that well from south to north across the area. The boundary of the potential RNA on the east side and south end is fenced with a barbed-wire fence. A stock pond has been excavated in a playa lake bed in the south-central part of the potential RNA.

-- Ecological processes

Grazing by large mammals was undoubtedly a major ecological factor influencing the composition of the vegetation in the Cheyenne River Basin, including the potential Playas RNA, before white settlement. Bison abounded in eastern Wyoming (Dorn 1986, Long 1965), but free-ranging bison were gone from the area by the latter 19th century. Elk were present in the Cheyenne River Basin before white settlement (Dorn 1986), but probably were much less abundant than were bison (Long 1965) and hence had less influence on the ecosystems. Elk now inhabit parts of the Cheyenne River Basin, but probably in smaller numbers than during presettlement times. Pronghorn were abundant in eastern Wyoming in presettlement times (Long 1965) and still are common.

Domestic livestock graze the potential RNA now and may influence the composition of the vegetation, but the extent to which domestic livestock have replaced bison and elk as an ecological factor is unclear. Livestock concentrate around the water trough on the northern boundary and at the stock pond in the playa lake bed in the south-central part of the potential RNA.

Black-tailed prairie dogs (Cynomys ludovicianus) exert a strong influence on the species composition and the processes in grassland ecosystems in the Great Plains (Coppock et al. 1983). The species occurs throughout eastern Wyoming (Clark and Stromberg 1987). No prairie dogs or burrows were observed during the 1996 field work, and the extent to which the species has used the potential RNA in the past is unknown.

Outbreaks of grasshoppers are a disturbance known to have large effects on the grasslands of the Great Plains (Knight 1994, Chapter 5). Although no information was encountered regarding grasshoppers in the potential Playas RNA or the immediate area, grasshopper outbreaks are known from northeastern Wyoming (Allred 1941) and undoubtedly affected the potential RNA. The effects that grasshopper control programs have had on the potential RNA are unknown.

Although no evidence of fire was gathered in the potential Playas RNA, fires are known to have burned in the Cheyenne River Basin before white settlement (Dorn 1986) and fires undoubtedly influenced the ecosystems in the potential RNA. Wildfires still burn in the region, but fire suppression is the general policy. The degree to which that policy has altered the ecosystems in the potential Playas RNA is unclear.

Viability: the prospect for long-term maintenance of the ecosystem types in the area and the survival of their constituent species.

No immediate threats to the maintenance of the ecosystems or the survival of the constituent species in the potential RNA were noted during field work. Long-term maintenance of the ecosystems in a condition similar to presettlement condition will require that the ecological processes that shaped those ecosystems continue to exert an influence. Of those processes, the ones that managers are most likely to control are grazing by large mammals, burrowing and grazing by prairie dogs, outbreaks of grasshoppers, and fire. The potential RNA is too small (320 acres, or 129 ha), though, for any of these processes to operate entirely within the boundaries of a research natural area; all would have to be managed over a larger area, including private lands.

Defensibility: the extent to which the area can be protected from extrinsic, anthropogenic factors that might worsen the condition of the area or threaten the viability of the ecosystems present.

No immediate threats to the ecosystems in the potential RNA were obvious during the 1996 field work. Two-track roads provide ready access for vehicles, but there are no obvious reasons for people except ranchers to visit the area. The potential RNA is

separated from private lands on the east and south by a fence, which should prevent unwanted use by livestock. The area is part of a pasture that includes national grassland and private land to the west and north, though, and is not separated from those lands.

Degree to Which the Potential RNA Meets Criteria

The potential Playas RNA represents the western wheatgrass/needle spikerush association typical of playa lake beds in the region, but it is too small to be considered a good representative of the blue grama/western wheatgrass association (the only other association present). The condition of the potential RNA appears to be good, although the water well and the livestock pond concentrate livestock in the area. The area is so small and so mixed with private land that maintaining the viability of the ecosystems, in the sense of maintaining the ecological processes that shaped the ecosystems, will be extremely difficult. The isolation of the area and the gentle topography will make defensibility difficult as well.

IMPACTS AND POSSIBLE CONFLICTS

This section is limited to the conflicts obvious from field survey and from conversations with USDA Forest Service staff.

Mineral Resources

Field work in 1996 revealed no impacts from mineral resources or potential conflicts between mineral resources and RNA management.

Grazing

The potential Playas RNA is part of allotment #258 and is used for season-long grazing. Establishment of a research natural area might conflict with current livestock management, although large mammal grazing was an important ecological process in the grassland ecosystem before white settlement, so grazing *per se* should not be viewed as an unacceptable impact.

Timber

There are no trees in the potential RNA.

Watershed Values

The potential RNA contains no stream courses and the playa lakes have no external drainages. Hence there are no apparent conflicts with or impacts on watershed values.

Recreation Values

The potential RNA contains no developed recreation areas. Recreational use (if any) apparently is limited to fall hunting.

Wildlife and Plant Values

Management of the area as a research natural area apparently would not conflict with the wildlife or plant values therein.

Transportation Values

The potential RNA contains no designated national grassland roads or trails, but a two-track road in the area is shown on the National Grassland map.

MANAGEMENT CONCERNS

Establishment of a Playas RNA could require a change in the current grazing management in the area, and would require that the area, currently identified for disposal, be retained as national grassland. Management of an RNA this small and in this location would probably involve management of adjoining national grassland and private land.

REFERENCES

- Allred, B.W. 1941. Grasshoppers and their effects on sagebrush on the Little Powder River in Wyoming and Montana. *Ecology* 22:387-392.
- Andrews, T. 1993. Research Natural Area Guide for the Rocky Mountain Region, USDA Forest Service, review draft. Rocky Mountain Region, Lakewood, CO. 38 pp.
- Bailey, R. G. et al. 1994. Ecoregions and subregions of the United States. 1:7,500,000-scale map. USDA Forest Service.
- Clark, T. W. and M. R. Stromberg. 1987. Mammals in Wyoming. Museum of Natural History, University of Kansas, Lawrence, KS. 314 pp.
- Coppock, D.L., J.K. Detling, J.E. Ellis, and M.I. Dyer. 1983. Plant-herbivore interactions in a North American mixed-grass prairie. I. Effects of black-tailed prairie dogs on intraseasonal aboveground plant biomass and nutrient dynamics and plant species diversity. *Oecologia* 56:1-9.
- Cronquist, A. 1995. Compositae. Part 5 of: Hitchcock, C.L., A. Cronquist, M. Ownbey, and J.W. Thompson. Vascular plants of the Pacific Northwest. University of Washington Publications in Biology 17(5): 1-343.

- Department of the Interior. 1979. Final environmental statement, proposed development of coal resources in eastern Powder River Wyoming.
- Dorn, R.D. (compiler). 1986. The Wyoming landscape, 1805 - 1878. Mountain West Publishing, Cheyenne WY. 94 pp.
- Dorn, R. D. 1992. Vascular Plants of Wyoming, second edition. Mountain West Publishing, Cheyenne, WY. 340 pp.
- Estill, E. 1993. Interim directive 2600-93-1. USDA Forest Service Region 2, Denver, CO. (Interim directive establishing Sensitive species in Region 2).
- Freeouf, Jerry A. (editor). 1996. Ecoregions and subregions of Region 2 - subsections, State of Wyoming. 1:1,000,000-scale map prepared by USDA Forest Service, Natural Resource Information Team. Revised May 1996.
- Holpp, F.A. 1977. Vegetative composition and soil analysis of selected playas, Campbell County, Wyoming. M.S. Thesis, Range Management Section, Plant Science Division, University of Wyoming, Laramie WY.
- Johnston, B.C. 1987. Plant Associations of Region Two. Edition 4. USDA Forest Service Rocky Mountain Region. R2-ECOL-87-2. Lakewood CO. 429 pp.
- Knight, D.H. 1994. Mountains and plains: the ecology of Wyoming landscapes. Yale University Press, New Haven CT. 338 pp.
- Kuchler, A. W. 1966. Potential natural vegetation. Pp. 90-91 in: Gerlach, A. D. (ed.). 1970. The national atlas of the United States of America. USDI Geological Survey, Washington, DC.
- Long, C.A. 1965. The mammals of Wyoming. University of Kansas Publications, Museum of Natural History 14(18): 493-758.
- Love, J. D. and A. C. Christiansen. 1985. Geologic Map of Wyoming. USDI Geological Survey, Reston, VA. 1:500,000 scale.
- Ries, R.E., H.G. Fisser, and A.T. Harrison. 1976. Vegetation. Chapter IX in: Bergman, H.L. and M.D. Marcus (editors). Final environmental assessment, Black Thunder Mine site, Campbell County, Wyoming. Volume II: text.
- The Nature Conservancy. 1997 International classification of ecological communities: terrestrial vegetation of the United States. The Nature Conservancy Ecology Working Group, Arlington VA. In prep.

Thilenius, J.F., G.R. Brown, and A.L. Medina. 1995. Vegetation on semi-arid rangelands, Cheyenne River Basin, Wyoming. USDA Forest Service General Technical Report RM-GTR-263. Rocky Mountain Forest and Range Experiment Station, Fort Collins CO. 60 pp.

Weber, W. A. 1982. Mnemonic three-letter acronyms for the families of vascular plants: a device for more effective herbarium curation. *Taxon* 31 (1): 74-88.