

NATIONAL PARK SERVICE
DENVER SERVICE CENTER
BRANCH OF PHOTOGRAPHICS
LIBRARY COPY

NEW AREA STUDIES

Antelope Hills, N. D.

Evaluation
as a
Potential
Prairie National Park

02

File:
Tall Grass
Prairie
National
Preserve

H. Raymond Gregg
Park Planner, WASO
DC, Fort Smith NHS

United States Department of the Interior
National Park Service

September 1968

ON MICROFILM

PLEASE RETURN TO:

TECHNICAL INFORMATION CENTER
DENVER SERVICE CENTER
NATIONAL PARK SERVICE

NATIONAL PARK SERVICE

NEW AREA STUDIES

An Evaluation
of

The Antelope Hills
Pierce County,
North Dakota

An area suggested for consideration
as a True Prairie National Park

H. Raymond Gregg
Park Planner

Supplementary ecological
data prepared by

Dr. Robert L. Burgess
Assoc. Professor of Botany
State University of North Dakota

September, 1968

CONTENTS

	<u>Page</u>
Abstract	i
Background	1
Location	1
Access	2
General Description	3
Esthetics	4
General Appraisal of Prairie Park Potential	4 5
General Biological Resources	6
Geology	8
Archeology	9
Regional History	11
Development Potential	12
Water Recreation	12
Feasibility Considerations	13
<u>Recommendations</u>	14
Alternate Recommendations	14
Recommendations on Nomenclature	15
NOTES	16

Appendices

County Highway Map, Pierce Co., N.D.

Photographic plates I-XIII, with Plate IV missing.
(12 plates)

ABSTRACT

The National Park Service has been urged to consider the potential of the Antelope Hills area of Pierce County, N.D. for establishment of a Prairie National Park.

The suggested area contains fine blocks of little altered native prairie, but it is so fragmented a long process of restoration of an adequate acreage would be necessary to create the scene of primitive vastness previously sought in establishing criteria for a True Prairie National Park.

The Antelope Hills prairie is dominantly of close affinity with the Ordinary Upland type in the True Prairie, but the four or five other plant communities deemed desirable in evaluation of other areas in the True Prairie belt are absent from the Antelope Hills, or present only in a token way. A restoration program could re-create a more diversified and expansive prairie, strongly similar, except in general vigor of plant growth, to the northern aspect of True Prairie as it once existed a few degrees in longitude to the east. However, any area which might be composed within the Antelope Hills area would not supplant the need for establishment of a True Prairie National Park within the criteria set out for consideration of areas in this Biome. From experience with previous prairie area studies, the writer believes the only remaining opportunities for an adequate True Prairie National Park lie in the Flint Hills region of Kansas and Oklahoma.

The Antelope Hills lie just west of the 100th Meridian. The 97th Meridian is generally considered to be the approximate westward boundary of the True Prairie. Due to lower evaporation and cooler climate, this boundary veers westward in the latitude of northern North Dakota, so that the transition zone between it and Mid-Grass prairie easily encompasses the Antelope Hills, which has greater affinity with True Prairie than would an area at the same longitude in Nebraska or Kansas.

If it is desirable to include a transition prairie area in the National Park System, in addition to the present purpose to establish a True Prairie National Park elsewhere, The Antelope Hills may offer a good opportunity.

This report discusses the geology, natural and human history, and park potentialities of a selected area of some 25,000-30,000 acres in the Antelope Hills area.

Other alternatives for preserving a representative section of this fine prairie resource are presented.

Background

Pursuant to arrangements with the Chief, Office of Resource Planning, San Francisco Planning and Service Center, field investigation of the True Prairie National Park potential of an area known as the Antelope Hills, Pierce County, North Dakota, was made on August 23 and 24, 1968. Park Planner H. Raymond Gregg, a re-employed annuitant of the National Park Service, was assisted by Dr. Robert L. Burgess, Associate Professor of Botany, State University of North Dakota, Fargo, N.D., under a contract with the State University.

Invaluable field assistance in assessing the regional and local geology as influences upon the prairie ecology was provided by Mr. Ted Freers, of the North Dakota Geological Survey, who currently is mapping the geology of Benson and Pierce Counties. Mr. Freers' participation was arranged through the courtesy of Dr. E. A. Noble, Associate Director, North Dakota Geological Survey.

Following publication of an article in the July, 1966 NATIONAL GEOGRAPHIC, in which Director George B. Hartzog, Jr., of the National Park Service, stated that the Service is seeking a new National Park in the prairie grasslands, a number of North Dakotans, through Senator Quentin N. Burdick, urged that consideration be given to the Antelope Hills area in Pierce County.

In subsequent exchanges of correspondence among the proponents of the Antelope Hills, Senator Burdick, and the Service, a commitment was made to investigate the area at the earliest possible time. Conditions did not permit such a study to be made until August, 1968.

Among those expressing concern in the proposal was Dr. Robert L. Burgess, identified above, who is an ecologist of national stature, who has done extensive research in the prairie belt of the United States. His interest and participation have been invaluable in compiling this evaluation of the proposed area.

Location

The Antelope Hills are not well-defined in composition, nor does the name have official status. This nomenclature is applied locally to broken and rolling hills, separated by major and minor southeast-trending valleys, lying largely within an area extending some seven miles westward from the 100th Meridian, in Townships 151 N and 152 N, Ranges 72 and 73 W, with lower hills and hummocks of ground moraine, and sizeable dune deposits extending northwesterly from the Antelope

Hills proper, into Township 153 N, Range 74 W. This northwesterly extension levels out into pothole plains near the line of Pierce and McHenry Counties. Southeasterly, the Antelope Hills fuse with the Martin moraine, a regionally extensive northeast-southwest oriented massive detrital deposit along the front of slowly receding lobe of the continental glaciers.

Access

The nearest paved highway is North Dakota Route 3, the approach to the International Peace Gardens, and the Turtle Mountain recreational complex. Route 3 connects with Manitoba Route 10, the access route to Canada's Riding Mountain National Park.

By an existing all-weather gravel road along the mid-line of Township 152 N, it is only some four miles from Route 3 to the presently choicest location within the area covered in this report. This superb piece of prairie lies on the crest and flanks of a ridge north east of the Antelope Lakes, a ridge which will be described in the discussion of geology, below.

The intersection of the above-described gravel access road with Route 3 is 14.5 miles north of Harvey, N.D., where Route 3 crosses U.S. 52. The latter is a sinuous transcontinental route, with eastern terminus at Charleston, S.C., and western terminus at the Saskatchewan boundary of North Dakota, where it connects with Saskatchewan Route 39, to Regina. U.S. 52, which is integral with Interstate 94 from St. Paul, Minn. to Jamestown, N.D., carries a considerable volume of recreational travel between the upper Midwest and Regina, and thence over Canadian Route 1 to the national parks of Alberta and British Columbia.

At Rugby, N.D., 27 miles north on Route 3 from the suggested access approach to the Antelope Hills, U.S. 2 crosses Route 3. U.S. 2 is the northernmost transcontinental trunk, extending from Houlton, Me., on the New Brunswick boundary, to Everett, Washington, on Puget Sound, just north of Seattle. It carries a sizeable tourist traffic from upper Michigan, northern Wisconsin, and from Duluth and northern Minnesota, enroute to Glacier National Park, the Canadian Rockies, and the Seattle area.

The junction of Route 3 with Interstate 94 at Steele, N.D. is only 83 miles from the suggested access road for the Antelope Hills. Eastbound Interstate 94 travelers wishing to visit an area that might be established in the Antelope Hills probably would use Route 3 from Steele. Westbound Interstate 94 travelers probably would use U.S. 52 from Jamestown, and Route 3 from Harvey.

When completed, Interstate 94 will connect on the east with Ontario Route 7 at Port Huron, Mich., and westward will connect with Interstate 90 at Billings, Montana. It will pick up traffic to the northern National Parks and the Pacific northwest, notably from Detroit, Chicago, Milwaukee, and the St. Paul-Minneapolis metropolitan area. It would importantly serve any park or recreational area which might be established in the Antelope Hills. It also is the route that traverses the South Unit of Theodore Roosevelt National Memorial Park.

General Description

Lying approximately on the 100° Meridian, the Antelope Hills are within a zone of transition between the True Prairie belt farther east, and the Mid-Grass zone to the west.

Prior to settlement, the prevailing vegetative cover, presumably representing a climax for this region in recent centuries, was predominant grassland, with scattered hardwood forest and shrub thicket cover in sheltered valleys or northerly-facing slopes, where soil moisture factors were favorable. Today, except for attrition by conversion of substantial acreages to agriculture and pasturing, these plant compositions and distributions remain substantially unchanged.

Within a rectangular area of some fifty square miles, roughly centered on middle Antelope Lake, there are perhaps 6,000-8,000 acres of basically unaltered natural cover. However, nowhere are more than approximately three contiguous sections free of dissecting county road, or plots of varying shape or size which have been under cultivation, or long used for hay production.

The largest unit of good prairie lies upon the rolling crest and upper flanks of the ridge and hills which occupy most of the west half of Township 152 N, Range 73 W. This prairie could be classed as a northern equivalent of the Ordinary Upland community encountered in the True Prairie of Nebraska-Kansas-Oklahoma.

Obliteration of two miles each of county road on the north and south lines of Sections 20 and 21 of the above-described Township would make it possible to form a continuous, somewhat kidney-shaped unit of perhaps 2,500 acres of native prairie.

Southwest of middle Antelope Lake, possibly 1,000 acres of reasonably intact aboriginal cover, of which about 20% is forest or thicket, could be blocked up from the Schwarze Ranch and adjoining properties.

The prairie within this area has been subjected to moderately heavy grazing for a number of years, but the impact has been principally quantitative, since the species content of the grassland here is closely similar to that of the unaltered or lightly used area described in the previous paragraph. With reduction or elimination of grazing, the Schwarze Ranch pastures should quickly reassume a climax expression.

Incidentally, if the National Park Service finds no further reason to consider this area, the size and natural values of the Schwarze Ranch are such that it would make an excellent and economical potential package for a State Park or Recreational area, if North Dakota should be interested.

Esthetics

The first humans with capacity for esthetic enjoyment who looked upon the natural landscape of the glaciated region of north central North Dakota must have been enthralled with the vast sweep of unblemished beauty that then spread to infinity in every direction from the higher summits of the prairie.

Only in degree is the scene less impressive today. Gone is the sense of primitive vastness, the animation of great free-ranging herds of wild ungulates, and the awesome foraging of grizzlies and timber wolves. Also lost is the feel of limitless expanse of naturally patterned plant compositions, free of the harsh geometry of fences, roads, utility lines, and windbreaks, or the patchwork of plowed ground. However, even today, man's alterations have only moderately removed the bloom from the landscape. The scenery of the region is indeed of a high order, with natural elements dominant, particularly in the area under consideration in this study. From vista points selected for the purpose, it is possible to establish an impression of separation from artificiality, and to generate in the viewer an identification with Nature's fresh handiwork.

General Appraisal of Prairie

Dr. Burgess' evaluation will provide a professional estimate of the glaciated prairie region of the mid-Dakotas, as represented in the Antelope Hills. Here, suffice it to say, the Antelope Hills area is different from any areas so far seriously considered for establishment as a True Prairie National Park.

This area would never naturally encompass all or most of the True Prairie community types contemplated for inclusion in a park in that biome.

If the more favorable sites in terms of soil and moisture conditions were restored from agriculture and haying, there would be limited, but impressive representation of the Big Bluestem community. The bulk of the surviving native prairie closely parallels the composition of the Ordinary Upland prairie community, which is so prominent in the better-drained sites in the True Prairie southward into Nebraska, Kansas, and northern Oklahoma. The better prairies within the Antelope Hills are little invaded by exotics. Little Bluestem-Stipa-Wheatgrass communities are relatively intact, but the first of these species would be more dominant with removal of grazing.

Sufficient presence of Big Bluestem and other tall grasses in the fringes of shrub thickets and wooded areas offers promise of natural re-stocking of this group into the favorable lowland sites.

Dense, cattail-bulrush-sedge compositions in the wettest places everywhere have been least altered of any of the plant associations in the Antelope Hills vicinity, except where drainage has converted shallow potholes or marshes into wet pasture or meadow.

Any area that might be composed in the Antelope Hills would not meet the need for representation of the True Prairie in the National Park System. However, it would be possible physically and ecologically, if not feasible, to define an area of broad significance, and one of much interest and appeal, representing a region and a prairie ecology not now contained within the National Park System.

Park Potential

The above discussion suggests that if it is determined the transition prairie, as distinct from the True Prairie and the Mid-Grass and Short Grass biomes, should be represented in the National Park System; and, in particular, if it is desired to represent the northern aspect of the American prairie, the Antelope Hills should be considered, and studied more thoroughly for its comparative quality as transition prairie, and to explore more adequately the feasibility factors. The superiority of this area to other locations within the same glaciated region is not established, hence any future investigation should include appraisal of additional sites.

For a most optimistic appraisal of the Antelope Hills, assume there will be no further intensification of population, agricultural use, and accompanying alterations of landscape elements within the viewing radius of approximately fifteen miles from the uplands around the Antelope Lakes; and that public acquisition were realized for a block of some 25,000-30,000 acres within a seven mile square

centered on Section 19, Township 152 N, Range 73 W.

If an area as described above were established, imaginative planning, obliteration of roads and ranch improvements, and assisted restoration of natural vegetative cover and wildlife within a sound ecological framework could produce an area of great and varied scientific, educational, and esthetic interest. This area would be in the heart of, and truly representative of the native prairie ecology and landscape of the extensive region between the now-vanished northern True Prairie of the extinct Lake Agassiz floor in the Red River valley to the east, and the vastly greater Mid-Grass and Short Grass plains beyond the Missouri River to the west.

General Biological Resources

Wooded lake benches, slopes, and ravines add greatly to the attractiveness and use potential of the Antelope Hills. Within the area under discussion in this report, there probably are some 200 acres of woodland, of which perhaps 80 acres are suitable for development of campgrounds, picnic areas, or other administrative and recreational uses. Nature trails through the woodland would be especially attractive.

Burr oak is the dominant tree species, with some admixture of basswood, boxelder, elm, hackberry, and perhaps other species not observed on this study. There are sizeable aspen groves in wet pockets of the uplands. Occurring as forest understory, or in woodland edge, even in some cases isolated as ecological pockets within prairie surroundings, there is an excellent variety of woody vines and shrubs. Two species of buffaloberry and snowberry are most likely to compose the thickets that spot the open prairie. Associated with the woodlands, these species mix with such shrubs as chokecherry, wild rose, hawthorn, ceanothus, and wild plum, which becomes treeform in some woodland edges. Most of these produce food for wildlife, the fruits attracting birds and small mammals. Several of the woody species of the region are important as deer browse. Woody vines include woodbine and poison ivy, both of which make brilliant autumn displays.

Whitetailed deer are sufficiently abundant to attract hunters to the hilly country extending from near the Wells County line northwesterly to the vicinity of the Antelope Lakes. Ranching, farming, and unit fencing have all but extirpated pronghorn antelope, whose abundance once gave the hills their name; but this species could thrive on a preserve of adequate size in this region.

"Buffalo rocks," erratic boulders can be found in many places. Repeated rubbing by buffalo has given the face of these boulders a

smooth finish, even abrading the faces of the quartz crystals. These rocks, and the depressions surrounding them, produced by the milling hooves of bison, attest to the former abundance of this species. A large enough park could support a representation of this species in the prairie wildlife.

Coyotes are present in numbers tolerated by stockmen, and there has been a recent valid report of cougar in the general region. Badgers and skunks are relatively abundant, along with the full complement of small prey mammals native to the prairie. Foxes probably are present. It is unknown whether they were here prior to settlement, but raccoons seem to be fairly common, from the number observed as traffic fatalities. Porcupines also are present, whether or not they were aboriginal in occurrence. No marmots were observed, but the groundhog probably is present.

Sharptailed grouse are present in modest numbers, and would quickly rise in numbers within the capacity of food and cover if a park were established. Prairie chickens are less abundant, but would re-enter and re-populate the area under protection. Bobwhite quail are present in normal numbers.

Red-tailed hawks, harriers, and kestrels were observed. Eagles, presumably the golden eagle, were reported as being present in the region, at least seasonally. The unsuitability of the pothole lakes for fish populations probably would limit the occurrence of bald eagles and ospreys to vagrants or migrants, although they should be on a bird list for the area. Vultures, believed to be turkey buzzards, seemed fairly common. Crows are abundant within the food resources of the vicinity. Blackbirds and redwings are extremely abundant in the marshy areas.

On the prairie, songbird species are well represented. Sparrows of several species, lark buntings, horned larks, and meadowlarks were seen almost everywhere. Robins were widely distributed in the area. No observations were made, but the woodlands should support a variety of warblers and other small songbirds. Yellow-shafted flickers were observed, but no other species of woodpecker. Others should be present. It is possible this area might be a meeting ground of the yellow-shafted and red-shafted flickers, and hybrids would not be unexpected in that instance.

Nesting and migrant waterfowl, waders, and shorebirds of many species are abundant in the vicinity. At the time of this study, coot and teals predominated in the dense flocks that dotted every body of water.

This limited contact with the avian resources suggests that there would be much of interest for the visiting birdwatcher, or serious student of ornithology, if a significant park area were established.

Hungarian partridges have been introduced in this section of the State, and occur within the area studied. They would probably continue as a compatible exotic element in any future natural area which might be composed in this section of North Dakota, since this bird is a highly esteemed game species which will remain in the surrounding region.

Observation of live or traffic-killed species such as meadow frog, toad, and garter snake suggest a normal occurrence and abundance of the native reptiles and amphibians. Insect life seems to be normal for the region, with excellent populations of butterflies as an esthetic element accompanying the beauty of the abundant flowering herbs which are an imposing element in the prairie vegetation.

Geology

The landforms and composition of rocks in the Antelope Hills are expressions of late Wisconsin glaciation overriding a land of modest relief, leaving upon their retreat a mantle of morainal debris which all but obscures the character of underlying bedrock.

The last ice occupation was by a glacial lobe which was deflected around the southwest flanks of the Turtle Mountains, some 70 miles to the northwest. It flowed southeasterly, gouging elongated valleys into bedrock, which locally is represented principally by the Fox Hills Formation, of late Cretaceous age. It is possible windows of Pierre Formation may be discovered within the vicinity, when more comprehensive geological research has been accomplished.

Post-glacial melting of buried masses of stagnant ice within the debris-filled valleys has produced basins which now form lakes, ponds, or marshes, according to depth, drainage, or periodic precipitation cycles. Most of the lakes have been subjected to such prolonged evaporation effects that they are saline or alkaline. In dry weather, they may be ringed with alkaline mud flats that glisten in bright sunlight.

The present surface levels of the Antelope Lakes may fluctuate as much as five feet seasonally, under normal precipitation. During the drouth cycle of the 1930's, they were reported to have gone dry. The east lake has done so in recent years. Since the recession of the last glacial ice, there have been periods of stable water levels considerably higher than the present mean surface level of the Antelope Lakes, at which times a lake of much greater extent filled this valley and the surrounding terrain of sufficiently low relief. Some lake terraces are susceptible of interpretation. On the

northeast shore of the middle Antelope Lake is a conspicuous wavecut steep slope, exposing bedrock and contact with the overlying moraine materials.

In some road-cuts, both within valleys and on the crests or slopes of hills, the Fox Hills clays and sandstones are exposed. However, the undisturbed surface of the area is one of continental ground moraine, great irregularity of deposits, and well dotted with erratic boulders or larger rocks exposed from the unassorted deposits by erosion of the surrounding finer materials. Room-sized erratics that occur elsewhere in comparable glacial terrain were not observed, and were reported to be very scarce or absent altogether.

The focus of the area studied is occupied by the glacier-gouged valley containing the Antelope Lakes, and flanking hills to the northeast and southwest. To the northeast, a low ridge of eroded ground moraine separates the Antelope Lakes trough from a minor valley containing pothole marshes, beyond which a conspicuous ridge of several miles length rises to the highest elevation in this vicinity. The prairie cover of this ridge has been described at the top of page 4. This ridge is mantled with glacial debris, but its topography is controlled by bedrock.

When the massive ice sheet thrust southeastward over the pre-wisconsin surface, the weak rocks of the Fox Hills Formation were buckled and shattered, generally in a "fallen domino" pattern of tilted and jumbled blocks. Aerial photographs graphically depict the blocky pattern of the ridge, although on the ground, the effect is less obvious to the observer, except that the crest profile as seen from the southwest is somewhat bluntly serrate. These modest eminences play a role in the archeological story of the area, as discussed briefly below.

The above examples illustrate the possibilities for interpreting fascinating geological stories in situ, or from commanding vista points.

Archeology

The Region between the Red River valley and the Missouri River probably was a sort of "proving grounds" in which Indians from the Great Lakes region woodlands made the transition from more sedentary agricultural people to the nomadic hunter economy prevailing among many of these tribes when first encountered by Europeans. Most of the artifacts and field evidences collected in the Antelope Hills vicinity probably relate to this period of transition.

While conditions were less favorable here during the immediate post-glacial era than on the unglaciated higher plains which extended

from the Missouri River to the Rockies, the Antelope Hills region was ice-free early enough to permit establishment of vegetation and wildlife sufficient to support a hunter-gatherer economy contemporarily with the Great Plains paleo-Indians.

Little serious archeological exploration and research has been accomplished in this region, what with available resources and energies being directed to salvage archeology in the Missouri River Basin impoundments during the past two decades. The far-flung works planned for the Garrison Diversion Project may give impetus to salvage-related investigations which will shed light upon both early and recent human occupation of this region.

Local collectors and hobbyists have recovered much surface material. Illustrated in this report is a random assortment of stone artifacts and potsherds picked up by Mr. Felix Schwarze on the family ranch. Most of the chert objects, with the exception of fragments of obsidian, presumably trade material from the Yellowstone National Park area, were typical Knife River flint. Mr. Schwarze also displayed a box of human skeletal remains, excavated from a knoll on the uplands east of the ranchhouse. The bones were thoroughly stained by red ochre clay. Mr. Schwarze stated these and other burials he had observed seemed to be bone bundles upon or embedded in red clay, which is extraneous to the sites of the burials. During our visit, arrangements were made with Mr. Freers to obtain radioactive measurement of organic materials from the Antelope Hills area, through courtesy of the State Geological Survey, in connection with his geological mapping work in this vicinity in the near future.

Mr. Schwarze stated that either stone rings or piles of glacial boulders occur on many of the distinct summits on the uplands around the Antelope Lakes. Burials have been found in or associated with these rock mounds or rings, according to Mr. Schwarze. He said the bone material illustrated in this report was found beneath or beside a good-sized boulder near, but distinctly separate from one of the typical rock rings. He said there usually was a "marker stone" close by such rings. Dr. Burgess and the writer observed several of these stone accumulations or rings, the latter with an excavated depression inside the stone ring in some instances, possibly indicating pot-hunting.

The writer found a granite "pemmican pounder," a glacial cobble with the pounding end much abraded, and a complete chipped groove around the circumference near the base. Mr. Hugh Farrington, publisher of the Harvey Herald, who has done some amateur collecting, advised that these stone pounders are fairly common in the region. This

one was found on the floor of a wooded ravine, near abundant supplies of wild fruits and acorns, suitable for compounding with venison into pemmican.

From description of the observations and information collected on the study, Dr. Wilfred D. Logan, Chief Research Archeologist of the Midwest Regional Office, National Park Service, expressed belief they relate to historic Sioux, proto-historic Sioux or other woodland people in transition from agriculture to hunting culture, or at earliest, to late Woodlands people pushed westward by pressure from hostile Indians from farther east or southeast.

When enough is learned through orderly research, it should be possible to build an interesting and richly illustrated interpretation of the pre-history and historic Indian occupation of this region.

Regional History

According to Superintendent Ray H. Mattison, of the North Dakota Historical Society, there is no significant history relating to the section of the State around the Antelope Hills, and certainly none of National interest, unless it be the occurrence of the Geographic Center of North America in Rugby, N.D., some 25 miles to the north.

Settlement of this portion of the State came relatively late, after penetration by the transcontinental railroads. The Verendreys had explored the country to the northwest in the 18th Century, but there is no evidence they reached the Antelope Hills vicinity. French trappers may have approached closely, or even crossed through the area, in harvesting beaver from the Souris valley to the northwest, and up the Sheyenne River from the east. If so, there is no known record or evidence, and no impact upon the subsequent history.

The immediate area of the Antelope Hills was within the vast horse ranching empire of a Mr. Hinkle-Smith an Englishman. His major market was supplying animals for horse-drawn streetcars in eastern cities. The coming of electric trollies ended this bonanza, and led ultimately to the breakup of Hinkle-Smith's far-flung enterprise.

Mr. Felix Schwarze's father was a ranch worker and foreman for Hinkle-Smith. When the operation broke up, the elder Schwarze came to middle Antelope Lake, and built up a ranch of some 1700 acres, which remained in the family until recently, when it sold to a resident of Minot, N.D., for whom Felix Schwarze acts as resident supervisor of grazing.

The nearest approach to exciting folklore is the presence near the Schwarze ranchhouse of a large dead burr oak, reputed to be the spot

on which the last horsethief to be hanged in North Dakota was captured, an event apparently witnessed by Mr. Schwarze's father. The hanging took place elsewhere in a legal manner, robbing the venerable burr oak of the dubious distinction as a "hanging tree"!

Development Potential

If an area were established in the Antelope Hills, the Schwarze Ranch offers an attractive location for administration, central interpretive center, and other public use facilities.

The relatively level lake terrace surrounding the ranchhouse is largely open woodland, splendidly suitable for camping and picnicking. Wells could provide adequate potable water. Power already is available, and could be expanded. Glacial fill in the valley is excellent for sewage fields.

Terrain of the vicinity generally is such that approach and circulation roads would fit beautifully to the landscape without dissecting major units of prairie. Probably some ten to fifteen miles of interior road would be adequate, replacing some 60 miles of Section line roads now within the 7 mile square described in this report. This assumes removal of residents, and consent of Pierce County to vacating existing roads.

Water Recreation

There is generous surface acreage of water within the entire pothole region of which the Antelope Hills are part. However, the alkaline nature of the potholes generally has made them unsuitable for a fishery. This would be a minus factor in assessing recreational potentials of the area.

Recreational boating on a modest scale might develop as incidental use by visitors who come for other purposes, but the interest would be local, since no pothole in the immediate area studied could compete with the big lakes on the Missouri, the James and the Sheyenne. Fluctuating shoreline and shallow margins would be adverse factors.

Possibly the ultimate development of the Garrison Diversion Project might provide means of improving water quantity and quality for fishing and other water recreations, but this prospect is so remote it should not be contemplated in measuring water recreation as a corrolary value.

Feasibility Considerations

The scope of this study allowed only incidental attention to factors of feasibility. What information was obtained is presented here.

The attitude of Antelope Hills landowners in general is unknown. If it were deemed desirable to project a park for this area, the obstacle of owner resistance should be no more prohibitive than in many other cases where the Service has proceeded successfully.

Ownership generally is in holdings of one or more Sections. This means fewer owners, and concomitantly narrows potential landowner opposition numbers. Probably there are no more than 40 to 50 owners involved, even in an area of 25,000 to 30,000 acres.

Regional support and advocacy are important factors in feasibility. In this regard a project in this area probably would enjoy a favorable climate. Correspondence dating from the fall of 1966 puts full initiative in the matter upon North Dakotans, mostly from the immediate area. Strong interest was expressed in behalf of a Prairie National Park for the Antelope Hills by influential citizens of Harvey, Esmond, and Anamoose. These people remain actively interested. Mr. Clarence Jensen, a well-known nurseryman, and former State Senator John Leier, both of Esmond, N.D., drove to the area from Esmond to assist and accompany Dr. Burgess and the writer on the first morning of the study. Mr. Hugh Farrington, publisher of the Harvey Herald and Wells County Press, of Harvey, N.D., gave a full day to accompanying us on the study, and arranged a meeting with a number of interested citizens in Harvey one evening. Several Anamoose citizens have expressed interest, but none from that community were in contact with us during the study.

It should be noted, and may be of significance, that none of these communities is in Pierce County, whose tax base would be affected by park land acquisition.

Mr. Farrington stated that land values in that vicinity are well below those for comparable land farther east in North Dakota, or in the prairie states to the south. For example, he states the owner of a spread which includes perhaps a third of the fine prairie on the ridge northeast of the Antelope Lakes, told him he was not interested in selling, but valued his ranch at \$40 per acre, including the improvements and the agricultural lowland; and that he considered \$26 per acre a fair price for the hill grassland. Mr. Farrington thought the present owner of the Schwarze Ranch, who holds it as an investment, would not object to selling it if a park project developed; and that this 1700-acre spread probably could be acquired for \$65,000 or less.

Recommendations

First, it is recommended that this report and Dr. Burgess' statement be reviewed carefully up to the decision level of the Service, so that a judgment of future disposition of the matter may be an informed one.

Second, it is recommended that there be a policy review of the whole matter of representation of the American prairie in the National Park System. If the sole interest of the Service is in ultimately including an adequate True Prairie area in the System, there is nothing to be gained by pursuing studies in areas which are not within this Biome.

Third, if the Service does have an interest in obtaining representative prairie areas in Transition, Mid-Grass, or Short-Grass belts, it could well schedule an adequate study of the potentials and costs, and the true feasibility of a transition zone area in the Antelope Hills, or in a similar area in this belt of mid-North Dakota. A caution is in order in considering this possibility.

Studies by Weaver and associates at the University of Nebraska during and following the dust bowl era of the 1930's indicate that the prolonged drouth of that period shifted the boundaries of prairie types some 50 miles or more in longitudinal position. Being a zone of inter-blending, perhaps less stable than the three major biomes, the transition prairie belt may be susceptible to radical changes in composition under prolonged climatic cycles of the future, as it probably was in the past, parallel with what happened in the areas studied in Kansas and Nebraska. This ecologic dynamism could be an asset in terms of interest for interpretation and potential for scientific investigations, but the possibility of future changes beyond the capacity of management to stabilize, should be considered in a decision whether the Service should pursue further an interest in this type of prairie, or in particular, the possibilities in the Antelope Hills.

Alternate Recommendations

If the Service has no further interest in the Antelope Hills, it may wish to suggest to the State of North Dakota the area be studied for possible inclusion in its Statewide park and recreation plan under the Land and Water Conservation Fund program. (Governor Guy's current discontent with the restrictions in the L & WCF program may not be conducive to immediate consideration of such a suggestion.)

If North Dakota is not interested, the Service may wish to bring this opportunity for preserving a choice piece of prairie to the attention of The Nature Conservancy. Possibly the Service or the Bureau of Outdoor Recreation could assist The Conservancy in developing cooperation and sponsorship of such a project on the part of some conservation organization in North Dakota, or by one of the State institutions of higher learning. Such an area would comprise an excellent field laboratory for research in prairie biology and ecology. There also is considerable opportunity for broader areas of scientific investigation in the fields of geology, archeology, hydrology, and land economics.

A Nature Conservancy or institutional project probably could be adequately composed by acquiring the Schwarze Ranch, or by shaping up a unit including the fine prairie in Section 17, T 152 N, R 73 W, and portions of adjoining Sections, totaling perhaps 400-600 acres, preferably with connection and control of some shoreline and water area of one of the nearby pothole lakes, and intervening or associated marshland.

Recommendation on Nomenclature

It would be well to seek recognition of the Antelope Hills nomenclature by the Board on Geographic Names. The Service may wish to initiate, or suggest to the appropriate source the initiation of a request for such recognition.

If there is interest in an NPS project as discussed here, a euphonious and descriptive "Pothold Prairie NP" is suggested.

NOTES

1. Four copies of this report have been prepared for distribution within the Service. Two include illustrations, two have equivalent plates with the photo captions. This omission was to reduce the cost of photographic prints. If the recipients of the unillustrated copies desire the prints, I will retain the negatives and a reference set of the photographs so that I can supply photos to be inserted; or will forward the negatives upon request so that the recipient may complete his version of the report. Numbering of photos corresponds with negative numbers; e.g., 3-6= roll 3, negative #6.
2. Each copy of the report includes a copy of the County Highway Map for the south half of Pierce County, delineated to show features of the area studied. Copies of the county maps for adjoining counties, and for the north half of Pierce County were purchased from the State Highway Department to provide road connections, and indications of areas in the region which are relatively free of roads, and hence prospects for study, if the Antelope Hills prove unsuitable for prairie preservation. These maps will be held for instructions on disposition. They may be useful if future studies in the region are scheduled.
3. Through the courtesy of the N. D. State Water Commission, copies of 1:250,000 topographic maps NM 14-1, McClusky; NM 14-2, New Rockford; NM 14-10, Minot; and NM 14-11, Devils Lake, were obtained, since the area studied overlaps the common corners of these maps. Review of the regional geological and vegetative indications on these maps suggests that the Antelope Hills and the nearby uplands west of Clifton contain about the only woodlands of the entire region outside the Souris valley and around Devils Lake which would enhance public use and esthetic values, factors which figured in the NPS criteria for a Prairie National Park.

Study of these topo maps indicates a splendid variety of continental glaciation phenomena, and interesting illustrations of post-glacial drainage patterns, lake terraces, etc. An especially noteworthy feature is depicted northwest of the Balfour siding on the Milwaukee railway, in Township 152 N, Ranges 77 and 78 W. An almost die-line "hogback ridge" depicted has been interpreted as an esker. Mr. Freers has made soil borings in this ridge, and believes it to be primarily composed of clays. He has suggested the possibility

it represents a "smearing" of a massive pre-Wisconsin clay body into this present ridge. The alignment of the ridge is precisely parallel with the gouge valleys of the region produced by the glacial lobe which occupied this entire region of North Dakota. If there were a prospect of owner interest in preserving this striking feature (it is only in minor degree impaired by a rail cut through it immediately west of Balfour), it would be a likely prospect for designation as a Natural Landmark. It is suggested this be called to the attention of the appropriate office to investigate this possibility.

It was my impression that within an area equally compact and subject to development of orderly circulation and interpretation to that involved in the previous proposal for an Ice Age Scientific Preserve in Wisconsin, there is a possibility a comparable Preserve, encompassing features sufficiently distinct from those in Wisconsin, might be a worthy subject for investigation by the Service. When Mr. Freers' work is published, tentatively in late 1969, a better appraisal of this possibility can be made.

4. In the interest of economy, and because of time limitations, aerial photographs of the study area, and the two 1:24,000 topographic maps which cover the area, were not purchased. Fortunately, they were available for field reference through Mr. Freers. Should future studies be conducted in this vicinity the 7 $\frac{1}{2}$ ' sheets for Anamoose, and Clifton will be useful. There is aerial photo coverage to give the whole environment of the Antelope Hills in the following prints, available from SCS, Salt Lake City:

	Flight Line	DOG-1W:	
131-135	108-113	88-94	58-64
	39-43		

To orient the immediate region to the whole glacial picture in North Dakota, a future study would benefit from Misc. Geol. Investig. Map I-331, Preliminary Glacial Map of North Dakota, by Colton, Lemke, and Lindvall. Mr. Freers has made corrections from his findings in Benson and Pierce Counties, which will be reflected in his maps, when published by the State Geological Survey. The two maps together will provide an excellent working reference.

5. Mr. Freers stated that much of Pierce County is covered by speculative oil leases, but that no drilling has occurred

in this part of the State, and in his opinion none is imminent pending further geophysical investigations.

6. In January, 1967, when notice of advocacy of a prairie national park for North Dakota came to his attention, Mr. Loren Stadig, Economist with the North Dakota Economic Development Commission addressed pertinent questions to Director Hartzog, which were given interim response in Acting Assistant Director Freeman's letter of January 20, 1967 (L58 CPL). When some decision is made on the further interest of the Service, it is urged that Mr. Stadig be informed. Publicity in State papers, notably a half-page feature story in the Minot Daily News on the impending study, may rekindle Mr. Stadig's concern. Possibly he should have an interim notice of the status of the matter.
7. Dr. Burgess informed me that within the 71,000-acre Sheyenne National Grassland (USFS) in Ransom and Richland Counties, some 40 miles southwest of Fargo, there is considerable acreage of good True Prairie. It was his impression that because of its remoteness from administrative control (he thought from Custer, S.D.), this area might not be nearest to the heart of the USFS, and, if it offered possibilities for a True Prairie Park, negotiations might obtain its release for that purpose.

I did not transgress the policy of avoiding interest in USFS holdings, but enroute from Fargo to Omaha, I detoured through the area marked out on a state highway map by Dr. Burgess, for a "tourist look" from county and state roads which surround and to some extent liberally grid the area marked for me.

There is, indeed, some beautiful Big Bluestem type, but what I saw is much checkered with apparent surviving private agricultural and grazing lands, although there is a sizeable block of land either side of the Sheyenne River in the east edge of Ransom County and the west side of Richland County which I didn't get into, where there may be better blocking up of the grassland. Much of the prairie I saw is grazed at least up to optimum, and overgrazed areas were not uncommon (possibly on private, rather than USFS land, although within the marked boundaries). Still, 4-6 foot stands of tall grass suggest there is some good management in force, and if it prevails over a sufficiently large blocked acreage, may afford a creditable example of the northern aspect of True Prairie. I believe the flat terrain, and widespread presence of shelterbelt plantings would make it difficult to find an area with the quality of unbroken prairie spaciousness in this area.