Survey for additional colonies of the endemic Black Hills Atlantis fritillary butterfly, *Speyeria atlantis pahasapa*

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Introduction

Although known to science for many years, only recently (Scott et. al 1998) was the Black Hills Atlantis fritillary (Lepidoptera: Nymphalidae) given a formal scientific name. It is a relict butterfly most closely related to populations in the Riding Mountains of Manitoba, Canada (*Speyeria atlantis hollandii*) and the Rocky Mountains of WY and CO (*Speyeria atlantis sorocko*). It is also believed to be related to another Black Hills endemic fritillary, *Speyeria hesperis lurana*.

Unlike the common and widespread *lurana*, however, *S. a. pahasapa* is scarce and restricted to wet, sedgy habitats along creeks. The type locality of *S. a. pahasapa* is the wetlands on the west end of Deerfield Reservoir in Pennington Co. SD.

Previous to this study, *S. a. pahasapa* was known from Crook Co. WY (2 sites), Lawrence Co. SD (6 sites in 2 general areas), Pennington Co. (3 sites, all proximal to Deerfield Reservoir), and Custer Co. SD (2 sites) (K.Roever, personal communication; G. Marrone, personal communication; Marrone 2002).

From a conservation viewpoint, it was important to learn more about this localized butterfly. It appeared to be a bioindicator species of sedge marshes and their associated flora and fauna. Previous knowledge of *S. a. pahasapa* indicated a small total population, with the worldwide distribution limited to the Black Hills. It was thought that the species may warrant status as a state- or federally-listed endangered species.

The goal of this study was to survey for additional colonies of the butterfly and determine its rarity and distributional status.

Methods

Habitat that appeared appropriate, based on the authors' previous experience with *S. a. pahasapa* (i.e., wet sedge marshes with flowing water), was surveyed at two different times: mid-July and early August. These times coincide with the flight activity period of *S. a. pahasapa* according to published records and the authors' experience. By searching at two different times, we would hopefully be able to identify colonies by finding the commoner males (mid-July) and then breeding colonies, indicated by females (early August).

In addition to surveying for *S. a. pahasapa*, notes on other butterflies present, their abundance, nectar sources, and habitat quality were taken.

Results

Results of the survey are shown in Appendices 1 & 2. Twenty sites were identified as having *S. a. pahasapa* present, and are mapped in Appendix 2. Of these 20 sites, three of these were previously-known sites in which we verified the presence of *S. a. pahasapa*. Seventeen of these sites were new localities for this species, although several of these

sites were in close proximity to each other. In total, an estimate of 150 *S. a. pahasapa* adults was made, based on visual counts.

Because of the success of finding so many additional colonies of the butterfly, *S. a. pahasapa* can no longer be considered rare. However, this species still has a limited distribution and is a bioindicator of permanent montane wetlands in the Black Hills. From previous experience with *S. a. pahasapa* in the Black Hills, it appeared that the presence of the butterfly was closely correlated to several factors: the presence of Black Hills spruce, flowing water, and (relatively) high elevation. However, not all of these factors were present at each site. Despite this, there still appears to be a positive correlation, or at least a trend, with these factors and presence of the butterfly. One exception was perhaps the site on Upper French Creek, and even here, the creek bed was muddy, indicating that water was present earlier in the season.

Additionally, whereas other *Speyeria* species, e.g. *S. aphrodite*, *S. hesperis*, *S. edwardsii*, and *S. mormonia* were present in both mesic and xeric sites, only *S. a. pahasapa* appeared to require mesic sites with running water, or at the very least, a damp creekbed. This is consistent with unpublished observations by S. M. Spomer of a closely-related butterfly, *S. atlantis hollandii*, in the Riding Mountains of Manitoba, Canada. There, *S. atlantis* is found only in the cool, wet coniferous forests, while *S. hesperis dennisi* is found in more xeric habitats, although in some instances the butterflies are sympatric.

Conservation Recommendations

Spring Creek, along FS Road 306

Everywhere we stopped along Spring Creek we found *S. a. pahasapa*. This may be the largest metapopulation of *S. a. pahasapa* in the Black Hills. Conditions are ideal and apparently undisturbed. Management regimes, if any are currently used, should be maintained.

Upper French Creek

Of all the areas visited where *S. a. pahasapa* was present, the Upper French Creek site appeared the most vulnerable and warrants the most attention regarding site preservation. At this site, a small oxbow of habitat exists, possibly less than one square mile. On either side of the site, habitat quality diminished significantly. More tall grass was present and wild flowers (nectar sources) were absent. In addition, cattle were present at this site and may pose a serious threat to the overall health of the site. Excluding cattle (or very limited grazing) from this small refugium will be an important recommendation to conserving the fitness of this site and maintaining a population of *S. a. pahasapa*. In addition, putting the site on a regular (3-5 year?) burn schedule may promote adequate nectar sources.

Estes Creek

This site held a small population of *S. a pahasapa*, and oddly enough, this was the only *Speyeria* present. Another wet meadow species, the Silver-bordered fritillary, *Boloria selene*, was also present here, indicating the presence of violets, the larval host of both

species of butterflies. The narrow width of Estes Creek may make the adjacent wetlands near the creek prone to drying out, possibly endangering the violet hosts. Also, if snowfall and subsequent melting is insufficient to maintain a steady flow of water here (unless the creek is spring fed), the site may be imperiled. This site should be monitored on a frequent basis.

George S. Mickelson Trail

Populations of *S. a pahasapa* were evident at various sites along this trail, which runs N to S over a large area of the Black Hills. Additionally, other populations probably exist further off the trail where access is limited or land is privately owned. This 100+ mile trail, which encompasses diverse habitat types, with flowing water and ample nectar sources, will probably act as a refugium for *S. a. pahasapa*. Management strategies already in place for the trail should be upheld to maintain suitable habitat for Black Hills butterflies, including *S. a. pahasapa*.

Future Research

Although this survey identified many new sites for *S. a. pahasapa*, most of these sites are in Pennington and Lawrence Counties. Additional colonies of *S. a. pahasapa* should be searched for in Custer County, and potential sites with spring-fed springs in Fall River County should be searched. In general, however, the southern Black Hills counties (Fall River, Custer) and the NW extension of the Black Hills into Wyoming (Crook Co.) appear to be too dry and hot to support viable populations.

References

Marrone, Gary M. 2002. Field guide to butterflies of South Dakota. South Dakota Department of Game, Fish, and Parks, Pierre. 478 pp.

Scott, James A., Norbert G. Kondla, and Stephen M. Spomer. 1998. *Speyeria hesperis* and *Speyeria atlantis* are distinct species. Papilio (New Series) 8: 1-31.

Appendix 1. Localities visited in July and August, 2005.

14 July 2005

Iron Creek, Custer Co.
Speyeria aphrodite
Speyeria edwardsii
Coenonympha tullia
Polites origenes rhena
Polygonia zephyrus
Vanessa cardui
Habitat was sedgy marsh along the creek, looked like reasonable habitat for *S. a. pahasapa*, but none were seen.

4 Mile Creek, Custer Co.
Overcast, no butterflies seen
This habitat is near where a previous record of *S. a. pahasapa* existed.

15 July 2005

George S. Mickelson Trail, along Hwy. 16, Pennington Co. SD
N43° 53.071' W103° 35.685'
Speyeria hesperis lurana
Phyciodes cocyta
Speyeria edwardsii
Vanessa cardui
Pieris rapae
Coenonympha tullia
Limenitis weidemeyerii
Papilio canadensis
Pholisor catullus
Colias philodice
Speyeria mormonia
Boloria selene
Hyles euphorbiae- 3 larvae on leafy spurge (first SD record)
This site was a nice site along the creek with ample nectar sources. It looked ideal for *S. a. pahasapa*, but none were seen.

FS Road 306, along Spring Creek, not far from Hwy. 16, 5140' elev., N43° 51.814' W103° 37.720', Pennington Co. SD (Site 1)
Speyeria atlantis pahasapa- ca. 20 seen, incl. 1 female; outnumbered *S. h. lurana*
Speyeria edwardsii
Speyeria hesperis lurana
Satyrium titus
Papilio canadensis
Polygonia zephyrus

Coenonympha tullia
Limenitis weidemeyerii
Nice habitat along the creek, interspersed with willows, etc. Nectar sources were common milkweed, and *Monarda*.

FS Road 306, along Spring Creek, N43° 51.977' W103° 39.043', Pennington Co. SD (Site 2)
Speyeria atlantis pahasapa- common, ca. 10 males seen
Speyeria aphrodite- 1 male seen
Speyeria hesperis lurana- common
Colias christina krauthii- several seen
Similar habitat as previous site.

Meadow, N43° 53.302' W103° 40.591', 5639' elev., Pennington Co. SD (Site 3)
Speyeria atlantis pahasapa-1 male
Habitat was dry meadow with a temporal (but dry) creek. Atypical habitat for *S. a. pahasapa*, so lone male was possibly a stray.

Spring Creek to Negro Creek, wet sedgy meadow, N43° 53.861' W103°41.323', 5639' elev., Pennington Co. SD (Site 4)
Speyeria atlantis pahasapa- common, ca. 20-30 seen
Speyeria mormonia
Speyeria edwardsii
Colias christina krauthii
Plebejus saepiolus

Negro Creek, FS Road 297, N43° 54.210' W103° 42.012', 5675' elev., Pennington Co. SD (Site 5)
Speyeria atlantis pahasapa- 10 males seen

Ditch Creek, FS Road 291, near Ditch Creek Campground, Pennington Co. SD (Site 6)
Speyeria atlantis pahasapa- 5 males seen
Colias christina krauthii
Parnassius phoebus (=*smintheus*)
This was the site of a previous record for *S. a. pahasapa* along Ditch Creek.

W end of Deerfield Reservoir, Pennington Co. SD (Site 7)
Junonia coenia- 1 seen
Speyeria atlantis pahasapa- ca. 20-30 seen, incl. 2 females
This is the type locality for *S. a. pahasapa*. Other records near this site include Castle Creek to the NW (FS Road 110) and Nichols Creek to the W (FS Road 294).

Black Fox CG road, N44° 07.713' W103 °53.249', 6090' elev., Lawrence Co. SD (Site 8)
*Speyeria atlantis pahasa*pa- 1 female seen

Speyeria hesperis lurana- ca. 100 seen on *Rudbeckia*
Colias christina krauthii
Polygonia zephyrus
Plebejus saepiolus
Vanessa atalanta
This habitat was a small meadow along the roadside with a profuse number of *Rudbeckia* in bloom. Also, butterflies were nectaring on small white flowers and *Monarda.*

Rapid Creek, FS Road 231, N44° 08.997' W103° 49.804', 5622' elev., Lawrence Co. SD (Site 9)
Speyeria atlantis pahasapa- 2 males seen

16 July 2005

Fawn Creek, FS Road 832, Crook Co. WY
Speyeria aphrodite
Creek seemed, or was probably too dry, for *S. a. pahasapa.*

Cook Lake campground, FS Road 842, Crook Co. WY
Speyeria aphrodite
Speyeria edwardsii
Habitat was too dry.

Hills N of Warren Peak, FS Road 838, Crook Co. WY
Parnassius phoebus (= *Parnassius smintheus*)- common
Pontia occidentalis
Speyeria edwardsii
Speyeria aphrodite
Speyeria mormonia
Speyeria callippe- several, worn
Habitat was dry, rocky, prairie hilltops with thistles along roadside.

Ranch A, 6 mi. S of Beulah, Cold Springs Creek, Crook Co. WY
Habitat was swales along creek with water. Common milkweed was the only nectar source available. No fritillaries were seen. We believed this to be the site of a previous record of *S. a. pahasapa*, but later inquiries placed the actual site along FS Road 864, slightly to the east of this site.

Rattlesnake Canyon, FS Road 804, Lawrence Co. SD
Speyeria hesperis lurana
No water in creek; probably too dry here for *S. a. pahasapa.*

Timon Campground, Lawrence Co. (Site 10)
Speyeria atlantis pahasapa- 3 males seen on *Monarda*
Colias christina krauthii- 2 females seen along trail
Limenitis weidemeyerii

Trail along Little Spearfish Creek, north of campground. This was a previously-known site for *S. a. pahasapa.*

Iron Creek, FS Road 222, Lawrence Co. SD
Pontia occidentalis- common
Coenonympha tullia- several seen
Phyciodes cocyta
Habitat looked good for *S. a. pahasapa,* but it was getting cloudy and it was late in the day. This site was about two miles west of a previously-known record for *S. a. pahasapa.*

17 July 2005

Dalton Creek, FS Road 224, N44° 14.776' W103° 30.998', 4696' elev., Lawrence Co. SD (Site 11)
Speyeria atlantis pahasapa- 15-20 seen, incl. 1 female
Phyciodes batesii lakotah- 1 female
Habitat was small sunny meadows or openings along Dalton Creek, with marshy habitat and good nectar sources. Violets (two species) were seen along the creek where *S. a. pahasapa* was observed. Gary Marrone (personal communication) had collected a male *S. a. pahasapa* at Dalton Lake two weeks earlier, and Dalton Lake is mentioned in his book (Marrone 2002).

Boxelder Forks Campground, N44° 11.711' W103° 31.252', 4565' elev., Lawrence Co. SD (Site 12)
Speyeria hesperis lurana
Speyeria atlantis pahasapa- 1 male seen
Boloria selene
Speyeria edwardsii
Phyciodes batesii lakotah- 1 female
Epargyreus clarus
Habitat was forest openings along Boxelder Creek. Few nectar sources were seen, mostly thistles.

South Boxelder Walk-In Fishery, N44° 11.844' W103° 32.534', 4679' elev., Lawrence Co. SD (Site 13)
Speyeria atlantis pahasapa- 15-20 seen
Speyeria hesperis lurana
Boloria selene
Open marshy habitat along creek with thistles and *Monarda.* About equal numbers of *S. h. lurana* and *S. a. pahasapa* were seen. One female *S. h. lurana* was posturing (showing readiness for mating) and a male *S. a. pahasapa* flew by and ignored her.

Steamboat Rock Picnic Grounds, Lawrence Co. SD
Speyeria hesperis lurana- only 2 females seen
Habitat looked good for *S. a. pahasapa,* but few butterflies were seen. One *S. h. lurana* was fully silvered (a rarity for this typically-unsilvered species).

Estes Creek, FS Road 208, N44° 10.243' W103° 29.819', 4481' elev., Lawrence Co. SD (Site 14)
Speyeria atlantis pahasapa- 6 males seen
Phyciodes cocyta- 1 female seen
Boloria selene- several seen
This site was not particularly good-looking. There was constant water flowing, but only a small trickle. There were quite a few nectar sources, including buckbrush (*Symphoricarpos* sp.), *Monarda*, alfalfa, and red clover. Oddly, no *S. hesperis lurana* were observed here.

Pilot Knob, FS Road 208, Lawrence Co. SD
Looked good, but no fritillaries seen. It was fairly late in the day, however.

Roubaix Lake Campground, Lawrence Co. SD
Phyciodes cocyta- 1 female seen
Looked like great habitat, but no fritillaries were seen. It may have possibly been too late in the day.

3 August 2005

Beaver Creek, FS Road 336, outside of Wind Cave NP, Custer Co. SD
Speyeria mormonia- common
Speyeria aphrodite- few
Speyeria edwardsii- common
Habitat was a continuously-flowing creek with narrow, adjacent sedge wetlands. Some willows present. Dry, upland grasslands away from the creek with woody species, e.g. box elder, plum, chokecherry present. Nectar source here was *Monarda*.

Lightning Creek, FS Road 288, Custer Co. SD
Speyeria mormonia- few
Speyeria edwardsii- few
Creek was dry and habitat was inappropriate for *S. a. pahasapa*

Upper French Creek, FS Road 286, 2 mi. NNW off Hwy. 16, Custer Co. SD (Site 15)
Speyeria atlantis pahasapa- common, 15 females, 2 males
Speyeria hesperis lurana- 3 females, 4 males
Speyeria mormonia- 1 female
Speyeria aphrodite- 2 females, 2 males
Speyeria edwardsii- 3 females
Polygonia zephyrus
Nymphalis milberti
Limenitis weidemeyerii
Papilio canadensis
Cercyonis oetus
Papilio multicaudatus
Vanessa cardui

Cercyonis pegala
Neophasia menapia
Coenonympha tullia
Habitat was a steep-walled muddy creek bed, but no running water; very tenuous. Violets were present. Nearly all butterflies were nectaring on *Solidago* sp., although *Monarda* and *Circium* were present. Evidence of cattle grazing was present and substantial at this site.

4 August 2005

Oreville (Hwy. 385) at George S. Mickelson Trail, Pennington Co. SD (Site 16)
Speyeria atlantis pahasapa- 4 females, 1 male
Speyeria hesperis lurana- >20 females, 12 males
Speyeria edwardsii- 2 females
Vanessa cardui
Limenitis weidemeyerii
Polygonia zephyrus
Pieris rapae
Cercyonis oetus
Cercyonis pegala
Habitat was a marshy area alongside the trail. Nearly all butterflies were nectaring on Canada thistle.

Tenderfoot Creek, Hwy. 385 at George S. Mickelson Trail, Custer Co. (Site 17)
Speyeria atlantis pahasapa- 2 females
Speyeria hesperis lurana- 10 females, 3 males
Euptoiepta claudia
Pieris rapae
Nymphalis milberti
Polygonia zephyrus
Habitat was a marshy area along creek. Butterflies were nectaring on Canada thistle, although *Monarda* was also present.

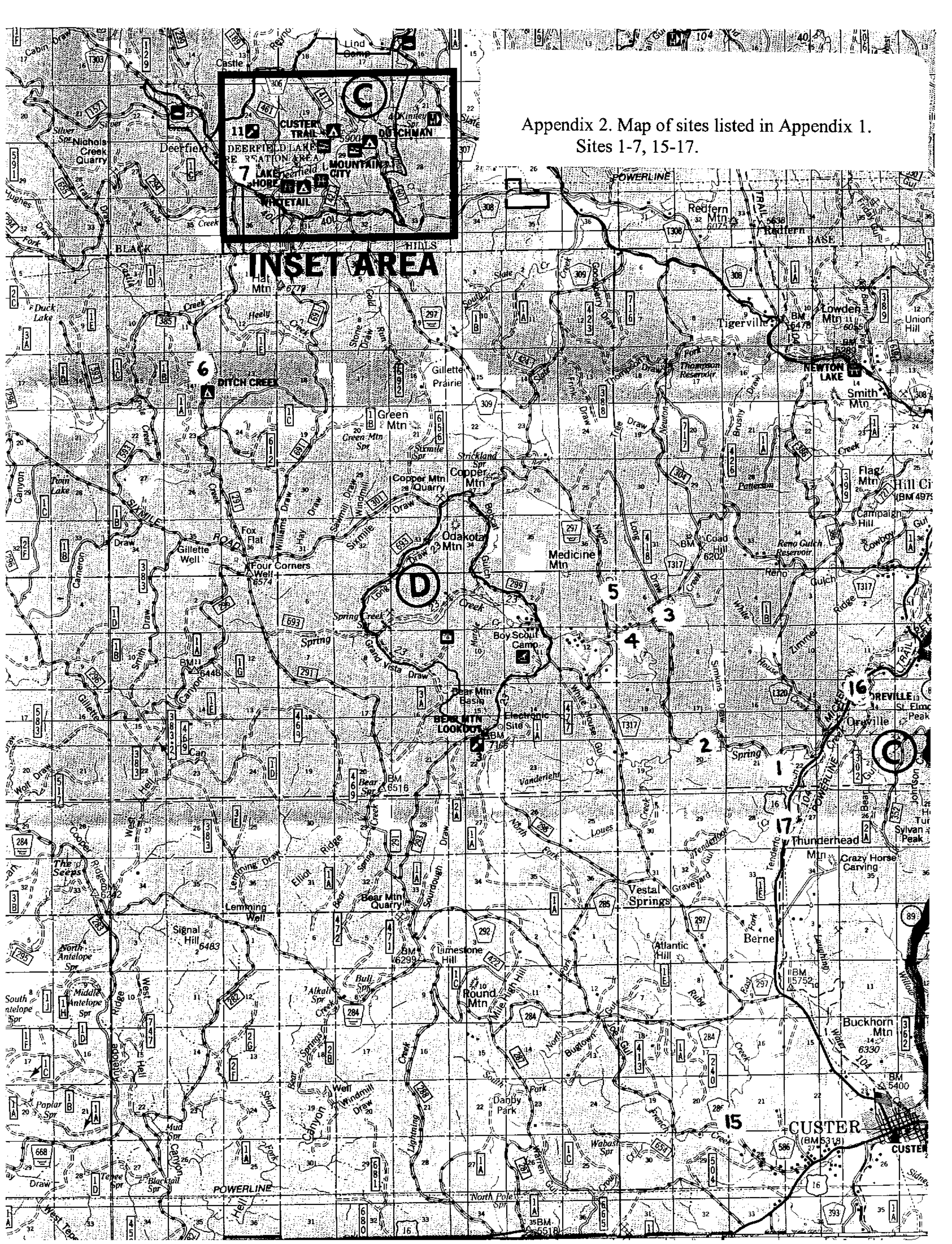
Battle Creek, FS Road 353, Pennington Co. SD (Site 18)
Speyeria atlantis pahasapa- 2 females, 1 male
Speyeria hesperis lurana- 4 females, 2 males
Speyeria edwardsii- 2 females, 1 male
Cercyonis pegala
Coenonympha tullia
Polygonia zephyrus
Vanessa cardui
Habitat was a narrow corridor of wet area along the creek. Black Hills spruce was present. Some butterflies were nectaring on *Monarda*.

Palmer Creek, FS Road 475, Pennington Co. SD (Site 19)
Speyeria atlantis pahasapa- 1 female, 1 male

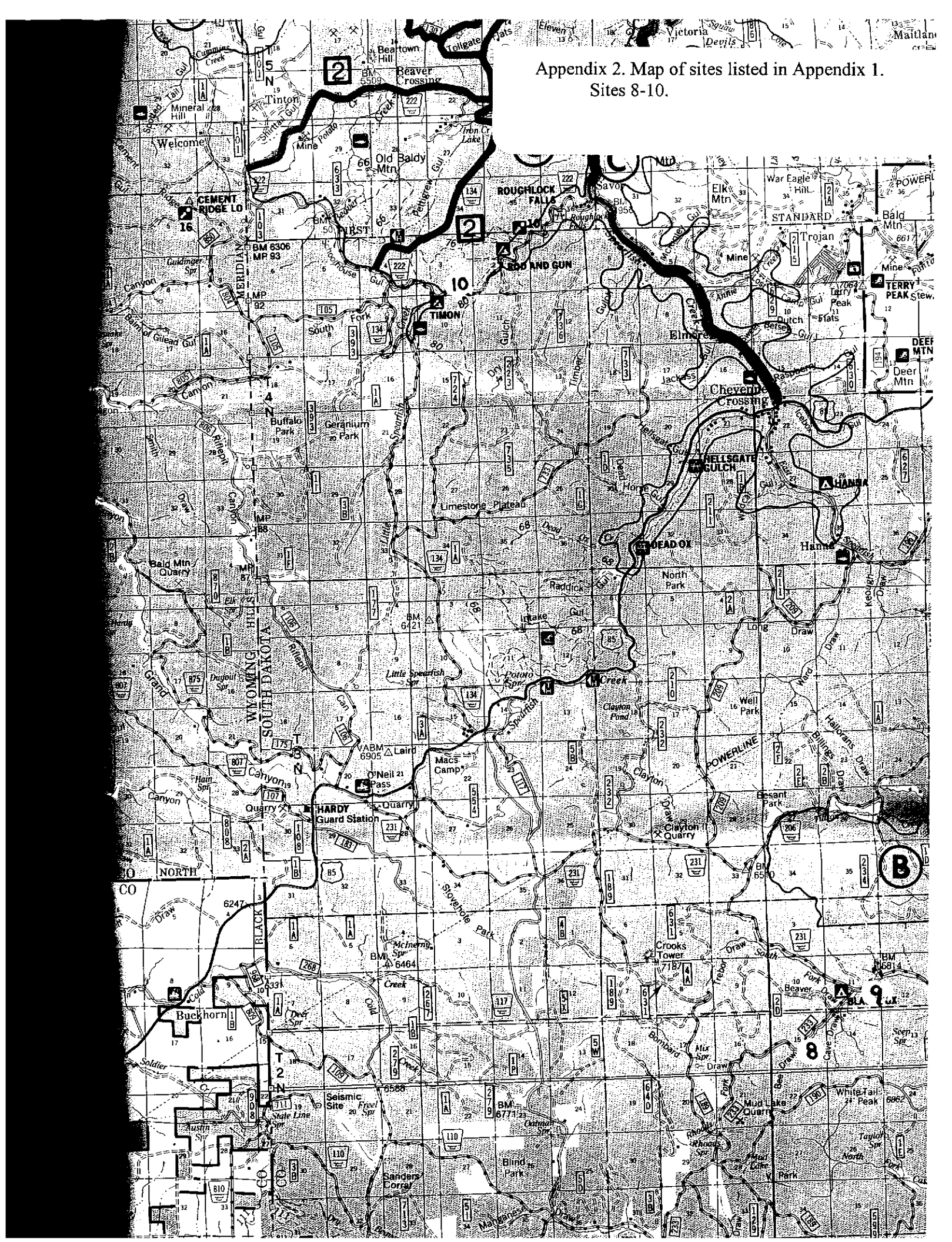
Speyeria hesperis lurana- 2 females, 4 males
Limenitis weidemeyerii
Cercyonis oetus
Vanessa cardui
Polygonia zephyrus
Habitat was similar to Battle Creek site.

Horse Spring Creek, FS Road 243, Pennington Co. SD (Site 20)
Speyeria atlantis pahasapa- 1 female
Speyeria hesperis lurana- 2 females, 2 males
Speyeria edwardsii
Speyeria mormonia
Cercyonis pegala
Polygonia zephyrus
Vanessa atalanta
Vanessa cardui
Habitat was similar to Battle Creek and Palmer Creek sites.

Appendix 2. Map of sites visited in 2005 with confirmed sightings of *S. a. pahasapa*. Numbers correspond to numbered sites in Appendix 1.



Appendix 2. Map of sites listed in Appendix 1.
Sites 1-7, 15-17.


Appendix 2. Map of sites listed in Appendix 1.
Sites 8-10.
Victoria
Devils
Maitland
Bear town Hill
Tollgate
Beaver Crossing
Tinton
Mineral Hill
Welcome
Old Baldy Mtn.
Iron Cr. Lake
CEMENT RIDGE LO
BM 6306
MP 93
MERIDIAN
ROUGHLOCK FALLS
Savoy
War Eagle Hill
Elk Mtn
STANDARD
Bald Mtn
Trojan
POWERL
TERRY PEAK Stew.
Deer Mtn
ROD AND GUN
TIMON
MP 92
MP 88
MP 87
Elmore
Cheyenne Crossing
HELLSGATE GULCH
HANNA
Hanna
DEAD OX
Limestone Plateau
Buffalo Park
Geranium Park
Bald Mtn Quarry
North Park
Raddick
Intake
BM 6421
Long Draw
Little Spearfish Spr
Spearfish Creek
Clayton Pond
Well Park
Halloran
Billings
POWERLINE
Besant Park
Clayton Quarry
VABM 6905
Laird
Macs Camp
O'Neil Pass
HARDY
Guard Station
Quarry
WYOMING
SOUTH DAKOTA
BLACK HILLS
NORTH
CO
6247
Stevenot Park
McInerny Spr
BM 6464
Crooks Tower
7187
Buckhorn
Cold Creek
Deer Spr
Soldier Cr.
Seismic Site
Frevel Spr
State Line Spr
Austin Spr
Sanders Corral
Blind Park
Mahannes
Bombard
Mix Spr
Cave Draw
Beaver Fork
BM 6681
White Tail Peak
6862
Mud Lake Quarry
Mud Lake
Rhoan Spr
Taylor Spr
North Fork
Park
Seep Spr
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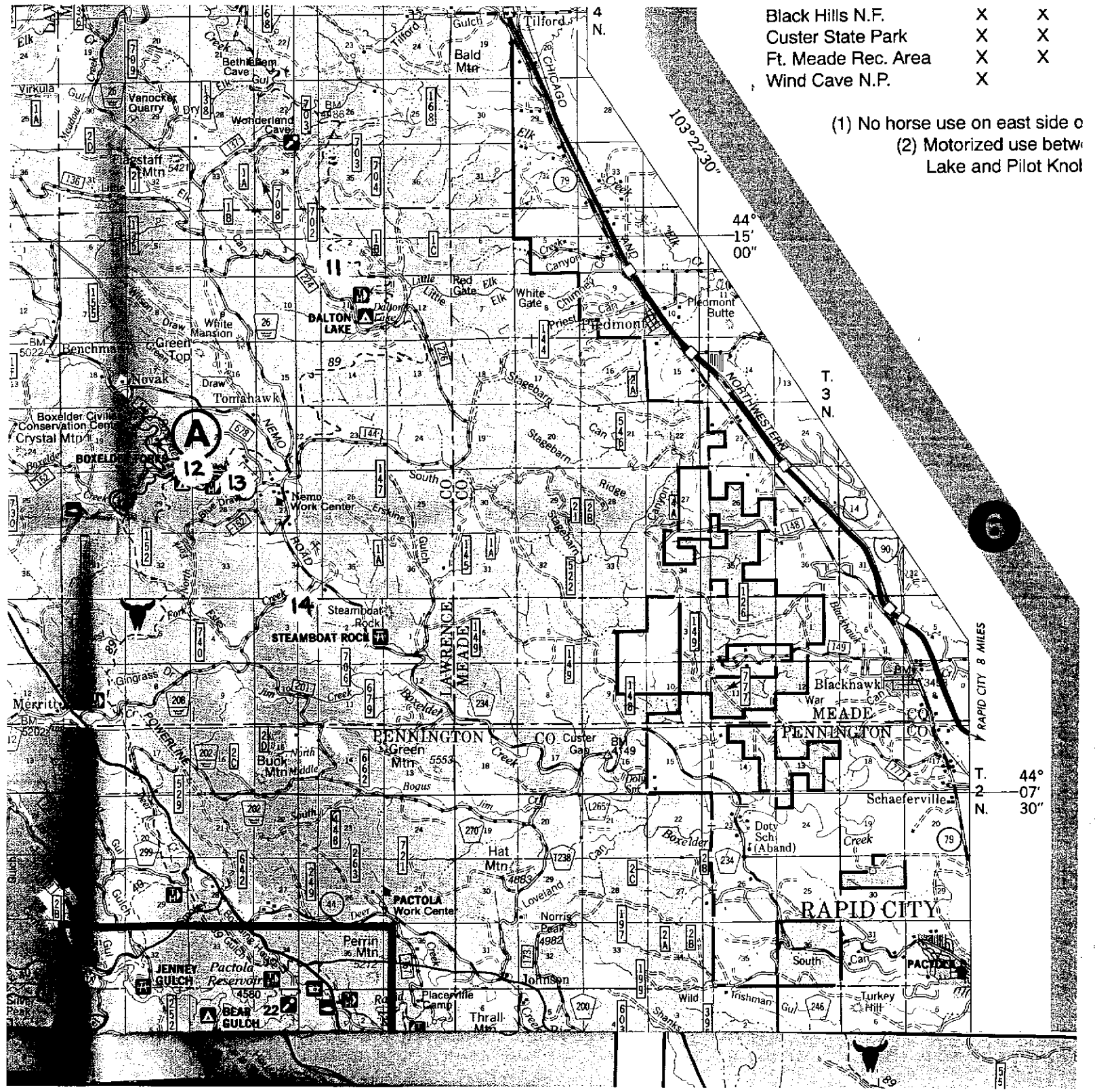
Appendix 2. Map of sites listed in Appendix 1.
Sites 11-14.



Appendix 2. Map of sites listed in Appendix 1.
Sites 18-20.