

ATTACHMENT R-11

ACTION PLAN FOR MANAGEMENT OF BIGHORN SHEEP IN SOUTH DAKOTA



**SOUTH DAKOTA DEPARTMENT OF GAME, FISH AND PARKS
PIERRE, SOUTH DAKOTA**

WILDLIFE DIVISION REPORT 2012-XX

JANUARY 2013

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ACTION PLAN FOR MANAGEMENT OF BIGHORN SHEEP IN SOUTH DAKOTA

INTRODUCTION

The South Dakota Department of Game, Fish, and Parks (SDGFP) manages wildlife and associated habitats for their sustained and equitable use, and the benefit, welfare and enjoyment of the citizens of this state and its visitors. South Dakota's wildlife resources demand prudent and increasingly intensive management to accommodate numerous and varied public demands and growing impacts from people such as habitat loss and fragmentation. This action plan provides important information for the formulation of sound management, to include the current status of bighorn sheep herds, habitat potential for new sheep areas, issues and concerns, management goals, objectives and strategies to guide management of this important resource into the future. This plan is intended to guide managers and biologists, and also aid in the decision-making process of the Division of Wildlife (DOW), Division of Parks and Recreation, and the SDGFP Commission.

CURRENT STATUS

Currently there are approximately 300 bighorn sheep in the state, of which about 200 are in huntable populations. Bighorn sheep in South Dakota are distributed in approximately 4 main herds (Figure 1): 1) Rapid City, 2) Elk Mountain, 3) Custer State Park (CSP), and 4) Badlands National Park.

Bighorn sheep presently occupy about 190,000 acres in the entire State of South Dakota (Table 1), of which 140,000 acres are in the Black Hills and are considered huntable acreages. Acreage estimates are based on habitat use of radio-collared bighorn sheep and field observations. Some areas within herd delineations are not used or used only briefly for seasonal movements and forays, and likely some areas outside of defined ranges are used but currently unknown.

Rapid City Herd

The Rapid City bighorn sheep herd is comprised of 3 sub-herds: Rapid Creek, Spring Creek, and Hill City (Figure 2). The 2012 population estimate is approximately 75-100 bighorn sheep. SDGFP has documented lamb mortalities from pneumonia which has severely impacted recruitment in this herd. Research is currently being conducted to examine lamb and ewe survival, disease prevalence, predation, and other population variables and is near completion. The population goal for this area is 250 bighorn sheep.

Elk Mountain Herd

The Elk Mountain bighorn sheep herd (Figure 3) is currently estimated at approximately 75-100 animals. This herd is the most recently established herd in the Black Hills, with bighorn sheep first being transplanted to Hell Canyon from the Spring Creek herd, but within a year all animals moved west to Elk Mountain in 2001. This area is estimated to be able to hold substantially more bighorn sheep than present but current population estimates suggest the population remains stagnant. The SDGFP and the Wyoming Game and Fish Department began a research project in 2012 to learn more about this population and potential growth limiting factors. The population goal for this area is 200 bighorn sheep.

Custer State Park Herd

The CSP bighorn sheep herd (Figure 4) experienced an all-age pneumonia die-off in the winter of 2004/2005. In 2012, there are currently still 6 lambs alive through mid-November which is the highest recruitment experienced since the die-off. Currently there are approximately 30 bighorn sheep in the Park. Prior to transplanting bighorn sheep and supplementing this herd, potential disease concerns due to several domestic sheep and goat herds adjacent to the Park must first be addressed. The population goal for this area is 200 bighorn sheep.

Badlands National Park Herd

The Badlands herd (Figure 1) on National Park Service property was previously occupied by native herds of bighorn sheep prior to extirpation and was re-established as a potential source herd for other areas in South Dakota. This herd was reduced due to disease in the late 1990s, but has since begun to slowly increase likely in response to a recent augmentation of bighorn sheep in 2004 and an apparent remission of disease issues. Currently, about 100 bighorn sheep comprise this herd. Discussions are scheduled to be held with Park Service personnel to discuss population goals for this area and management objectives.

POTENTIAL NEW BIGHORN SHEEP AREAS AND AUGMENTATIONS

SDGFP has identified 2 areas to evaluate for future potential bighorn sheep herds and 1 area for augmentation (Figure 1). The Deadwood and Angostura sites are potential new areas and are estimated to be about 42,000 acres of suitable bighorn sheep habitat. These areas were identified from field observations and habitat suitability models (Figure 5). In addition, the Elk Mountain herd has been identified for a future augmentation in the adjacent Hell Canyon area which is approximately 5,100 acres.

Deadwood Potential Area

This area encompasses about 8,000 acres and is located immediately adjacent to the Deadwood, Lead, and Central City communities (Figure 6). We estimate this area could hold approximately 100 bighorn sheep. Potential issues that need to be investigated prior to reintroduction include urban interactions, vehicle collisions, habitat/forage assessment, and distance to nearest domestic sheep or goats.

Angostura Potential Area

This area could potentially encompass 2 sub-herds, one each on Horse Trap Mountain and Flagpole Mountain (Figure 7). Suitable habitat is estimated to be about 18,600 acres on Horse Trap Mountain and 15,700 acres on Flagpole Mountain. We estimate this area could hold approximately 300 bighorn sheep. Habitat and forage quality assessments need to be evaluated and issues such as range overlap with domestic sheep and goats and public access need to be addressed prior to establishing these herds.

Hell Canyon Augmentation

The Hell Canyon area immediately adjacent to the Elk Mountain Bighorn sheep herd has been identified as a potential supplemental stocking area (approximately 5,100 acres) and future sub-herd (Figure 3). In 2001, bighorn sheep were transplanted on the southern end of Hell Canyon from the Spring Creek herd, but within a year all animals moved west to Elk Mountain. A short time after reintroduction, the Rogers Shack Fire burned a significant amount of forest in the Hell Canyon area which likely created new sheep habitat. A few bighorn sheep have been documented using this area seasonally. It is estimated this area could hold approximately 50 bighorn sheep. Foreseeable issues that need to be evaluated and addressed include habitat and forage quality assessments, vehicle collisions, and range overlap with domestic sheep and goats.

ISSUES, CONCERNS, AND OPPORTUNITIES

There are many challenges associated with managing bighorn sheep populations in South Dakota. The following issues/actions should be priorities for managing current and future bighorn sheep herds.

Disease

Epizootic pneumonia is the most devastating disease in bighorn populations of South Dakota and throughout the range. Bacterial respiratory pathogens are responsible for the pneumonia and evidence suggests that in at least some instances, this disease is introduced into bighorn sheep populations resulting from contact with domestic sheep or goats.

Separation of domestic sheep and goats from wild sheep populations should be recognized as the most important step in maintaining healthy populations and assessing new areas for potential reintroductions. The Western Association of Fish and Wildlife Agencies (WAFWA) Wild Sheep Working Group (WSWG) defines “effective separation” as spatial or temporal separation between wild sheep and domestic sheep or goats to minimize the potential for association and the probability of transmission of diseases between species (Wild Sheep Working Group 2012).

Habitat

Habitat management for bighorn sheep in the Black Hills consists primarily of maintaining open habitats and managing forage through proper livestock grazing.

Bighorn sheep prefer open grassland habitats near steep terrain (known as escape terrain), and therefore prescribed fires, timber clear-cuts, and other habitat manipulations completed in areas of steep terrain can be beneficial. Adequate forage is needed to maintain healthy populations of bighorn sheep. In some areas water availability is also an important aspect of habitat management for bighorn sheep.

Public Access

Access to bighorn sheep populations for hunting and viewing opportunities is a priority goal of the SDGFP. Most bighorn sheep herds within the Black Hills and the Badlands areas are relatively accessible to the public and provide many recreational opportunities. Some areas being evaluated for potential reintroductions, however, may have substantial parcels of public habitat surrounded by private land with little or no public access. The SDGFP will work with adjacent private landowners to find reasonable solutions to access issues such as establishing public access agreements.

Transplants – new areas and augmentations

Prior to any bighorn sheep transplants into new areas or augmentations to existing herds, disease, habitat, and public access issues will first be evaluated and addressed. Subsequent to those evaluations, bighorn sheep transplants may be necessary to maintain and establish sufficient numbers of bighorn sheep in the state. The SDGFP is an active member and participant of the WAFWA WSWG, and is in constant communication with bighorn sheep biologists from other states and provinces. As source stock of bighorn sheep become available, the SDGFP will secure transplants as needed for potential reintroductions into new areas and augmentations of existing herds.

GOALS, OBJECTIVES & STRATEGIES

The following statements have guided the development of the bighorn sheep management goals and objectives and reflect the collective values of the SDGFP in relation to management of bighorn sheep in South Dakota:

- that wildlife, including bighorn sheep, contributes significantly to the quality of life in South Dakota and therefore must be sustained for future generations.
- that bighorn sheep play an important role in mountain and grassland ecosystems.
- in providing for and sustaining the diversity of our wildlife heritage for present and future generations.
- in management of bighorn sheep in accordance with biologically sound principles.
- in providing accurate and timely information to the public concerning bighorn sheep and recreational opportunities in South Dakota.
- that the future of bighorn sheep in South Dakota depends on a public that appreciates, understands and supports bighorn sheep and their habitats.

BIGHORN SHEEP MANAGEMENT GOAL: The Division of Wildlife will manage bighorn sheep populations and habitats consistent with ecological, social, aesthetic, and economic values of South Dakota citizens while addressing the concerns and issues of both residents and visitors of South Dakota.

Objectives and Strategies

Objective 1: Address disease issues in bighorn sheep herds by maintaining “effective separation” (Wild Sheep Working Group 2012) between bighorn sheep populations and domestic sheep and goats.

- Strategy A.* Work with the United States Forest Service (USFS) and the Bureau of Land Management (BLM) on grazing allotments in bighorn sheep areas to ensure effective separation between bighorn sheep and domestic sheep and goats.
- Strategy B.* By 2014, complete an inventory of domestic sheep and goats in the Black Hills and continue to document areas of known domestics through opportunistic field observations in the future (Figure 5).
- Strategy C.* To accomplish Strategy B, develop partnerships with conservation and agricultural organizations to collect additional data on domestic sheep and goat locations.
- Strategy D.* Promote double-fence construction/modification in bighorn sheep ranges with domestic sheep and goats by providing technical and financial assistance to private landowners through the DOW’s private lands habitat programs.
- Strategy E.* Work with conservation organizations to develop cooperative programs to discourage domestic sheep and goat ownership in areas that impede effective separation, or provide financial incentives or cost-share options towards mitigation such as alternative livestock and double fencing.
- Strategy F.* Work with the South Dakota Animal Industry Board to discuss potential risks to bighorn sheep from domestic sheep and goats in the Black Hills.
- Strategy G.* Monitor bighorn sheep disease by collecting and sampling all reported or observed sick or dead bighorn sheep demonstrating disease symptoms of concern.
- Strategy H.* Implement Department policy (Appendix 2) for the lethal take of bighorn sheep when associated with domestic sheep or goats.

Objective 2: Advocate management of forests and rangelands to enhance quantity and quality of current and future bighorn sheep habitats on private and public lands within the Black Hills and Badlands National Park.

- Strategy A.* Participate and facilitate periodic meetings with personnel from the USFS, BLM, United States Department of Agriculture (USDA), National Park Service (NPS), and other conservation agencies and

organizations to discuss and address grazing and other habitat issues related to bighorn sheep management.

- Strategy B.* Work with personnel from USFS, BLM, USDA, NPS, and other conservation agencies and organizations on habitat manipulations such as logging and prescribed fires that open forested habitats to maintain and increase suitable habitats for bighorn sheep.
- Strategy C.* Continue to develop and ground truth habitat suitability models for bighorn sheep in the Black Hills and portions of western South Dakota.
- Strategy D.* Maintain and improve habitats in the Black Hills for bighorn sheep on state Game Production Areas and other lands with SDGFP management responsibility or long-term habitat/access leases.
- Strategy E.* Implement grazing stewardship practices through department cost-share programs, including managed grazing systems designed to measurably benefit wildlife and long-term sustainable use of native forest and rangelands for livestock production.
- Strategy F.* Support acquisition of conservation easements within the bighorn sheep range from agencies and non-governmental organizations such as the Wild Sheep Foundation, the Safari Club International, and the Rocky Mountain Elk Foundation.

Objective 3: Evaluate and pursue reintroductions of bighorn sheep into new areas within the Black Hills and portions of western South Dakota, and augmentations into existing herds.

- Strategy A.* Reach effective separation between current or potential bighorn sheep herds and domestic sheep and goats.
- Strategy B.* Ensure adequate open habitats, steep escape terrain, and forage habitats are managed on current or potential herd areas.
- Strategy C.* Evaluate public access availability in any newly proposed bighorn sheep habitats.
- Strategy D.* Secure out-of-state transplant stock from similar habitat landscapes.
- Strategy E.* Work with NPS to evaluate and pursue reintroductions and augmentations of bighorn sheep.

Objective 4: Engage and collaborate with the public to manage bighorn sheep populations and determine unit-specific objectives.

- Strategy A.* Annually meet with the SD Bighorn Sheep Working Group, concerned individuals, NGOs, local sportsman's groups, and private landowners to facilitate discussions about bighorn sheep populations and management.

- Strategy B.* By 2014, involve the SDGFP western Regional Advisory Panel with further development of this plan and with future issues related to bighorn sheep management.
- Strategy C.* Annually gather public input on game management unit objectives through Regional Public Open-houses, local press releases, and field staff contacts.
- Strategy D.* Annually evaluate population objectives for all bighorn sheep management units and future established herds.

Objective 5: Manage for a biologically and socially acceptable statewide bighorn sheep population.

- Strategy A.* Assess and monitor population levels and trends by annually completing ground and aerial surveys.
- Strategy B.* Model population changes within units and sub-herds.
- Strategy C.* Annually assess unit management goals and utilize necessary management tools to ensure objectives are met.
- Strategy D.* Based on habitat conditions and population size, in concert with public input, periodically evaluate if adjustments to unit objectives are warranted.
- Strategy E.* Monitor bighorn sheep disease by collecting and sampling all reported or observed sick or dead bighorn sheep demonstrating disease symptoms of concern.
- Strategy F.* Work with personnel from NPS to manage bighorn sheep on National Parks

Objective 6: Evaluate research and management needs and prioritize on an annual basis.

- Strategy A.* Annually collaborate with stakeholders to collect and assess research and management needs and ideas.
- Strategy B.* Periodically review bighorn sheep survey protocol and discuss changes that could improve data collection efficiency and accuracy.
- Strategy C.* The SDGFP will send at least one staff member to the WAFWA annual Bighorn Sheep Working Group meeting. This meeting facilitates the exchange of information between states on survey techniques, harvest regulations, research and habitat management.
- Strategy D.* The SDGFP will consider sending a representative to scientific meetings that will exchange information related to bighorn sheep management.

Objective 7: Promote public, landowner, and conservation agency awareness of bighorn sheep and habitat management issues of highest conservation concern.

- Strategy A.* By March of 2013, provide paper and electronic copies of the “Action Plan for Management of Bighorn Sheep in South Dakota” to all interested conservation partners, the public, private landowners, and all communities and businesses
- Strategy B.* Periodically include articles about bighorn sheep and bighorn sheep habitat in the SD Conservation Digest and other popular magazines, journals, and media outlets.
- Strategy C.* Add a web page about bighorn sheep under the outdoor learning section of the department website which includes information and pictures of bighorn sheep in South Dakota.

IMPLEMENTATION AND COST SCHEDULE (2013-2017)

The potential exists to increase bighorn sheep numbers in South Dakota by supplementing current populations and reintroducing bighorn sheep in new areas. Prior to any reintroduction, at a minimum, disease issues, habitat quality, and public access must be evaluated and addressed. Any bighorn sheep released should be monitored to assess at minimum survival and movements.

When assessing slope habitats alone as the primary variable providing potential bighorn sheep habitat in the Hills (Figure 8), there are several additional potential areas that SDGFP should evaluate. In addition, other areas may exist in the Black Hills if more forests were manipulated into open habitats.

Costs to transplant bighorn sheep will vary depending on the source herd. In some instances state or provincial agencies may charge a flat fee for their services to capture the animals, which could run as high as \$1,200 or more per animal. Other agencies may only require SDGFP staff to assist with the captures, so expenses would be primarily related to staff time, capture, and travel expenditures. Other costs associated with transplants include monitoring expenses (radio collars, staff time) and disease testing. We anticipate augmenting the Elk Mountain by the fall of 2013 or 2014.

An implementation and cost schedule is provided in the Appendix which includes the estimated time and associated costs for each strategy and method per year for the next five years. Most tasks would be coordinated by Sr. Biologists and the Regional Wildlife Manager; however each activity’s estimated time and expenditures include a wide range of SDGFP staff to complete the respective tasks.

Because the current range and potential new areas of bighorn sheep in the Black Hills encompass both public and private land, staff that are engaged in public land management and those that work with partnering federal agencies will play a critical role in accomplishing the tasks. Private land biologists will be used to assist in private land habitat opportunities as well as assisting with the establishment and implementation of cost-share programs that address habitat and diseases related issues.

Many of the outlined strategies and methods are currently in progress and the strategic plan provides a formal approach for the Department in our bighorn sheep management efforts. The plan identifies specific methods and which staff will play a role in coordinating and completing tasks. The combined effort of a coordinated approach and utilization of multiple staff will maximize the opportunities to successfully reach population, habitat, and address items of concern goals.

LITERATURE CITED

Wild Sheep Working Group. 2012. Recommendations for domestic and goat management in wild sheep habitat. Western Associations of Fish and Wildlife Agencies.

TABLES

Table 1. Bighorn sheep herds of South Dakota and associated areas occupied.

	Name	Acres
Current	Spring Creek	63,790
	Elk Mountain	48,170
	Custer State Park	26,160
	Badlands National Park	51,720
	Total current	189,840

FIGURES

Figure 1. Distribution of the 4 current bighorn sheep herds in South Dakota, including the Hell Canyon augmentation, and the 2 potential sights to evaluate for future reintroductions.

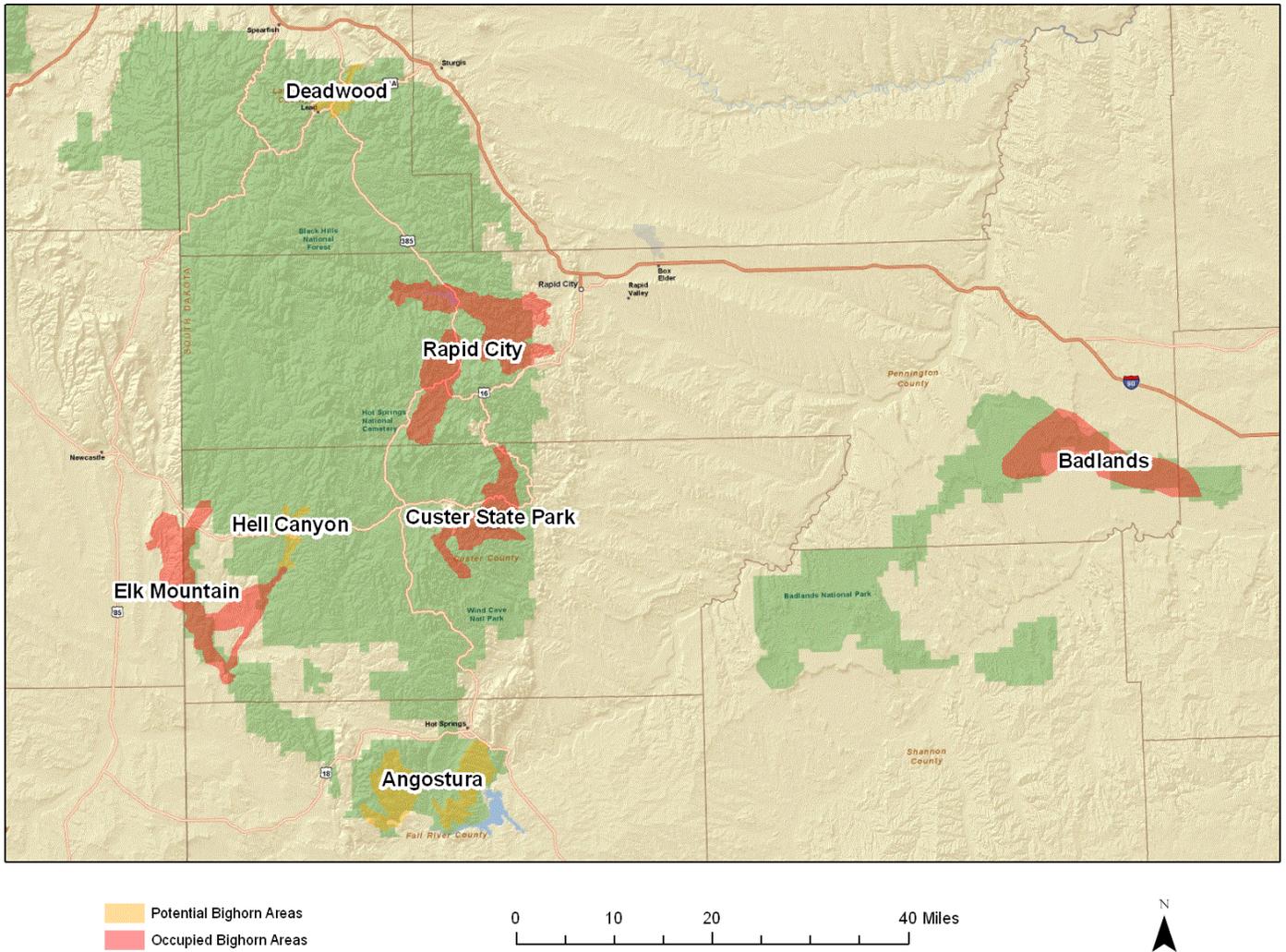


Figure 3. Elk Mountain bighorn sheep herd, which includes the Hell Canyon area where an augmentation may potentially occur.

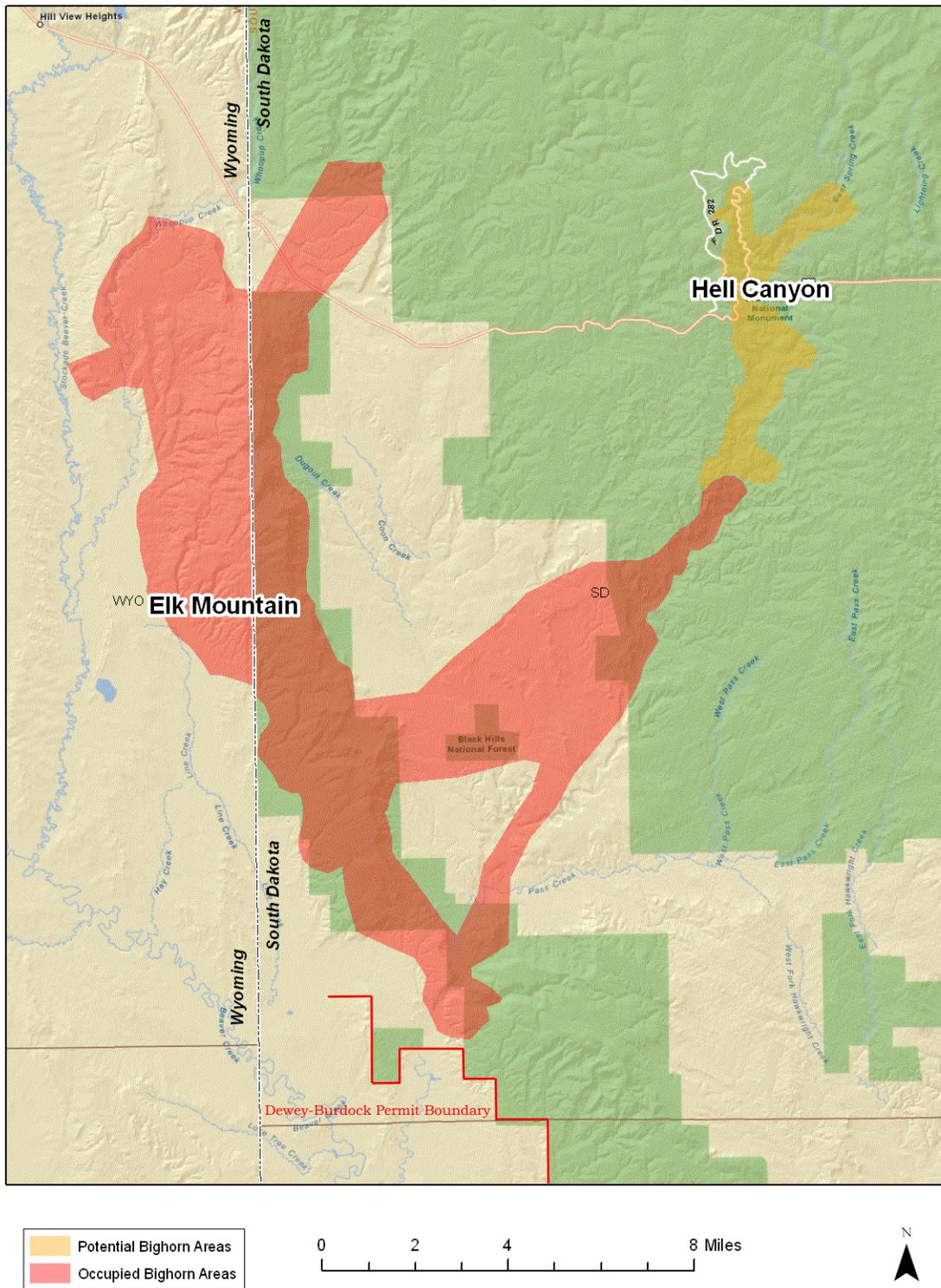


Figure 4. Custer State Park bighorn sheep herd.

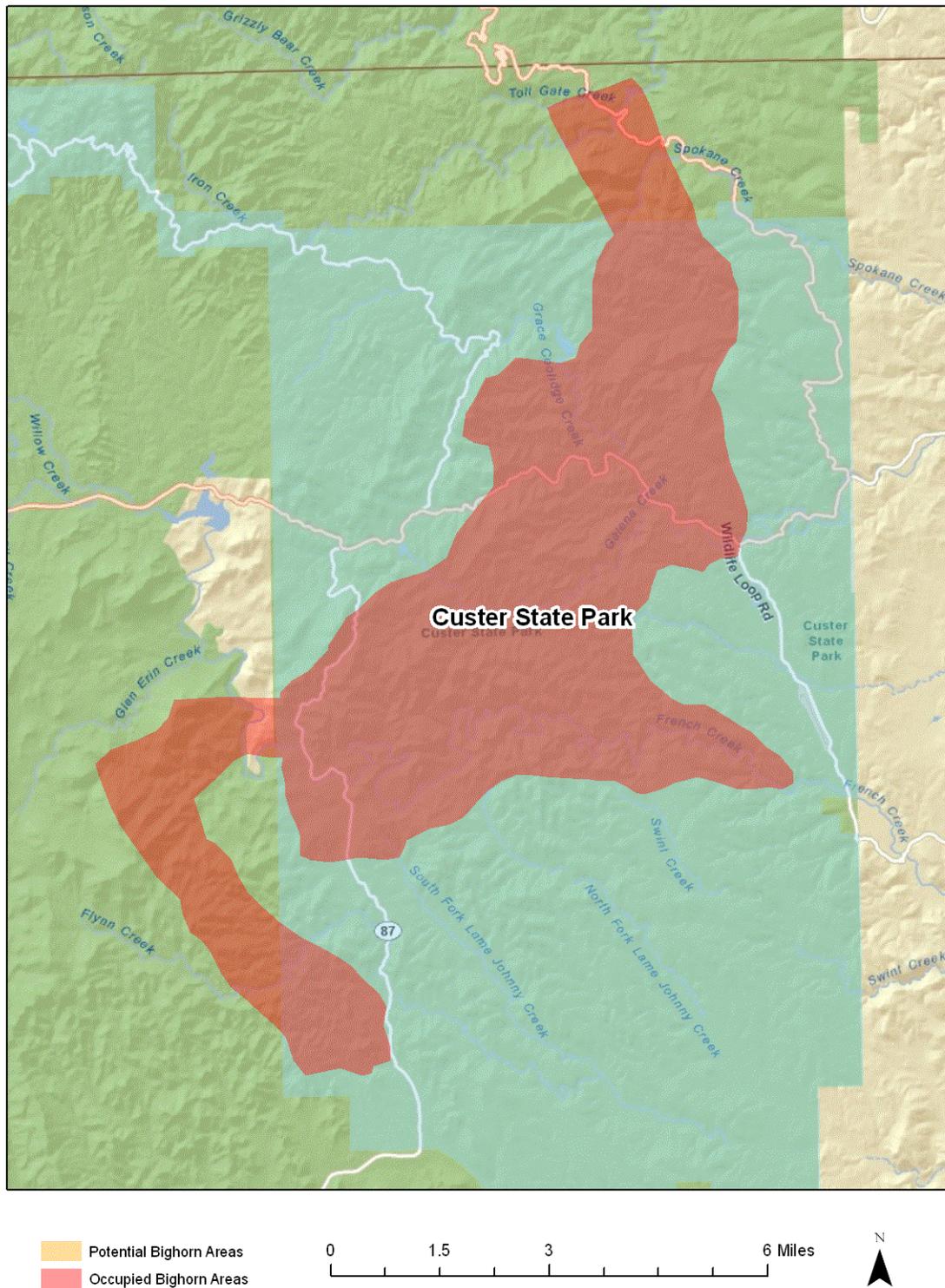


Figure 5. Habitat suitability of the Black Hills for bighorn sheep, based on percent slope and percent canopy cover. Current herds are outlined in black and potential new areas for future herds are outlined in blue. Dots represent areas where SDGFP staff has observed domestic sheep or goats.

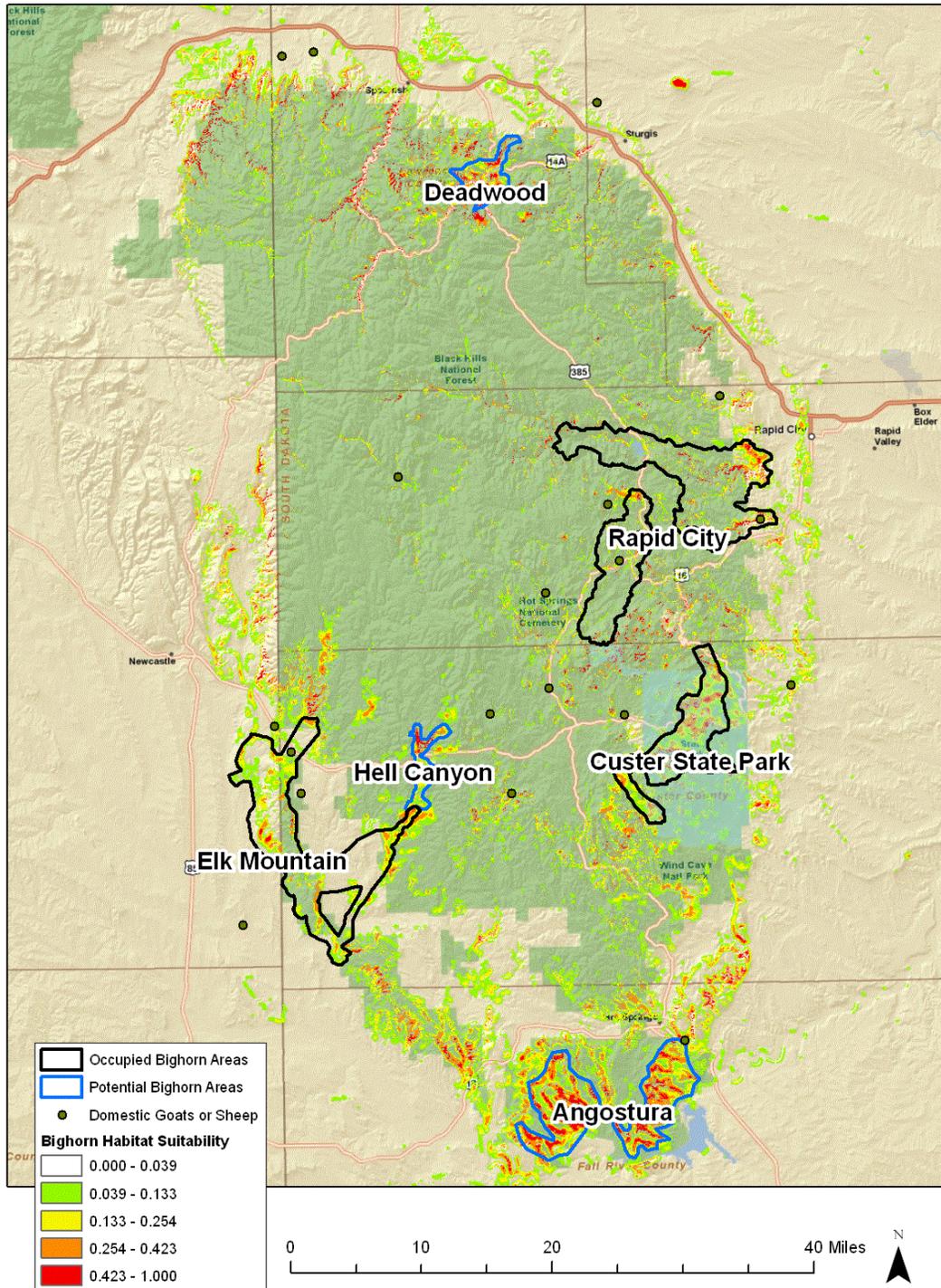


Figure 6. Deadwood potential bighorn sheep area.

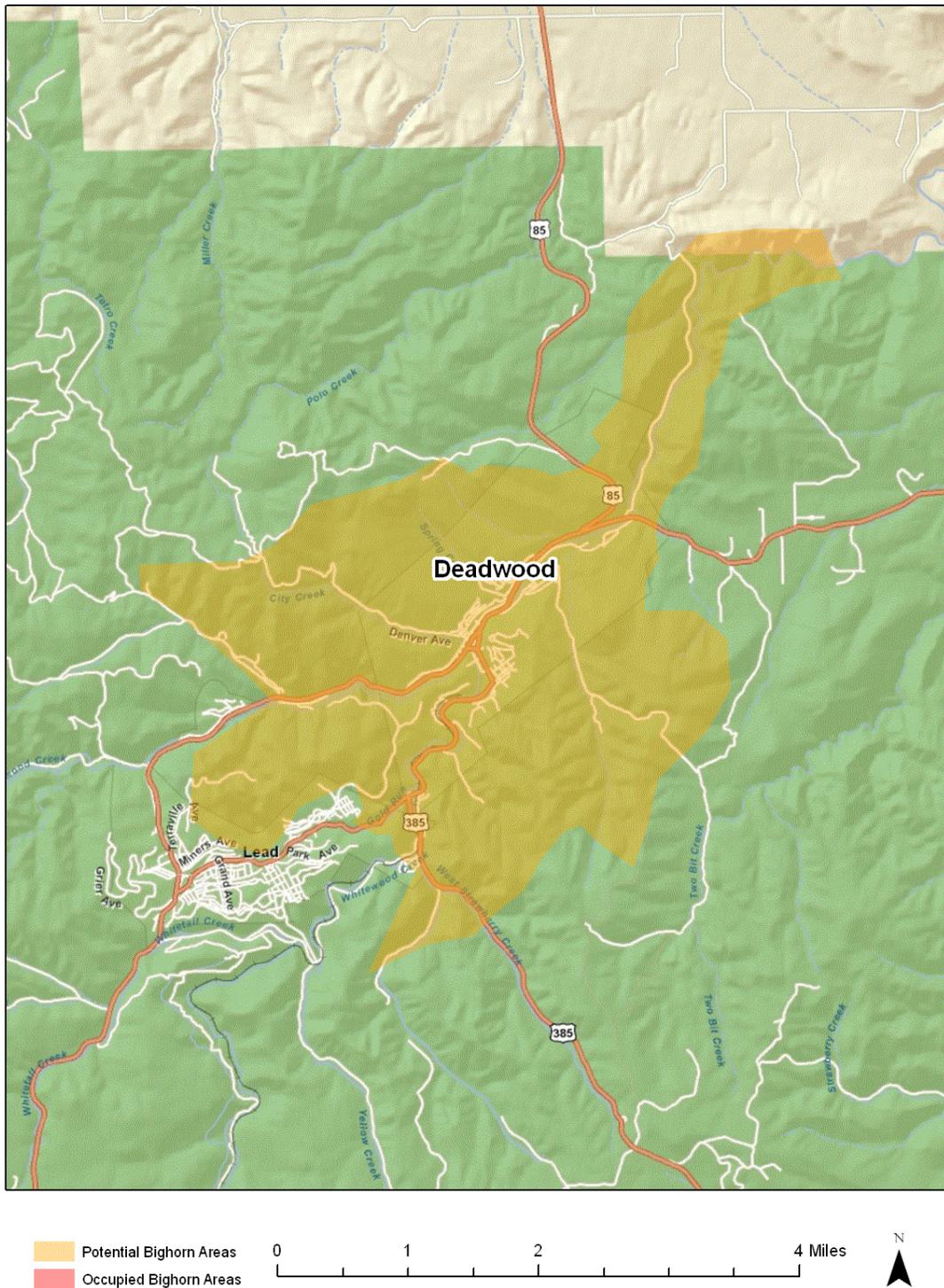


Figure 7. Angostura potential bighorn sheep area, including two potential subherds: one on Horse Trap Mountain and one on Flagpole Mountain.

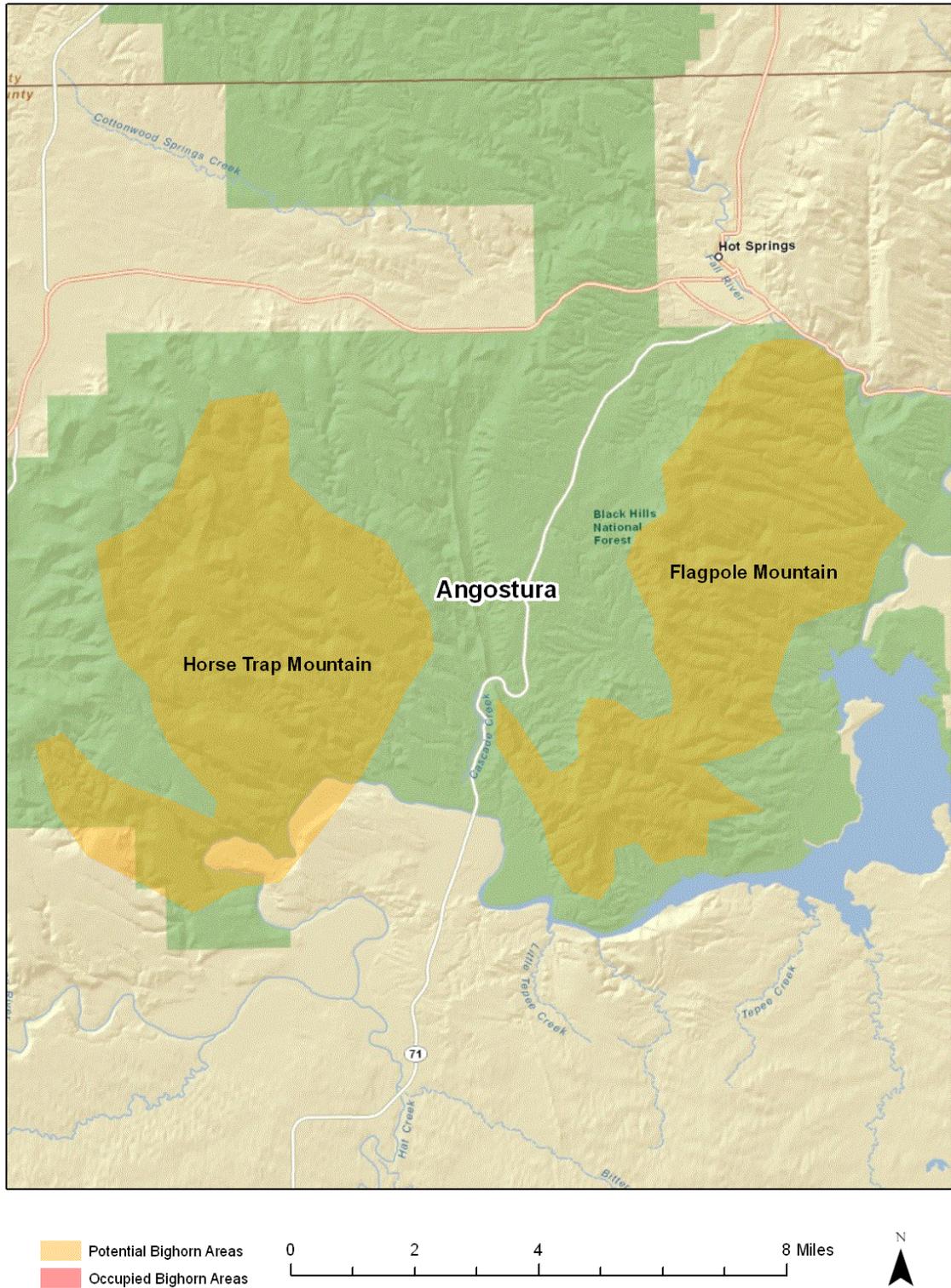
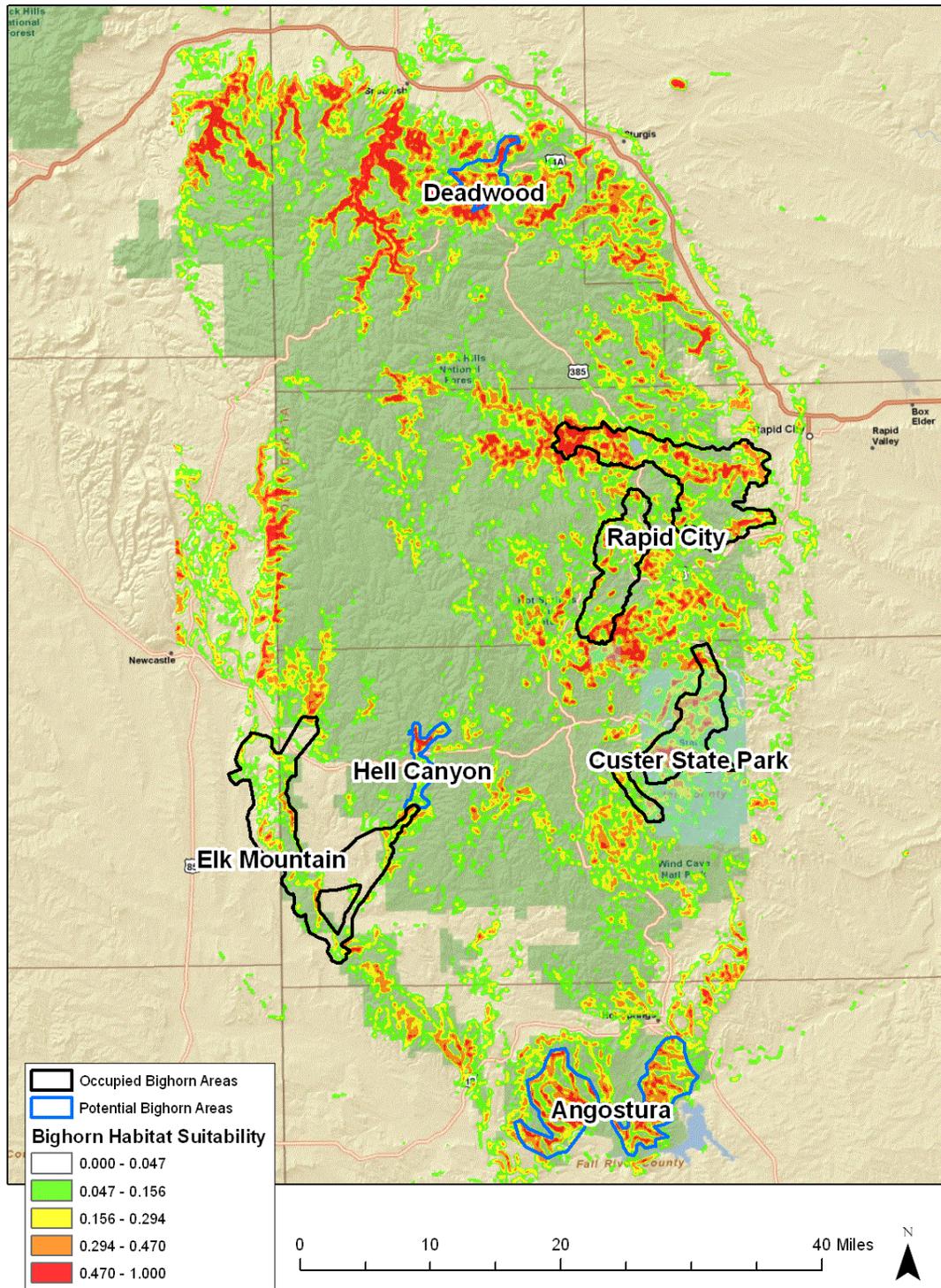


Figure 8. Habitat suitability model within the Black Hills showing areas of at least 40% slope, depicting potential areas that could be more suitable to bighorn sheep if habitats were manipulated to open current forested habitats.



APPENDICES

Appendix 1. Implementation and Cost Schedule 2013-2017.

Action Strategies and Methods	2013		2014		2015		2016		2017		Primary Responsibility		
	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost			
Disease													
Adopt appropriate recommendations and guidelines developed by the WAFWA Wild Sheep Working Group.	X	NA	NA	X	NA	NA	X	NA	NA	X	NA	NA	Wildlife Administration Senior Big Game Biologist Regional Wildlife Manager
Implement Department policy for the lethal take of bighorn sheep when associated with domestic sheep or goats.	X	NA	NA	X	NA	NA	X	NA	NA	X	NA	NA	Wildlife Administration All GFP Staff
Identify and locate all domestic sheep and goats herds in the Black Hills.	X	320	\$6,400	X	160	\$3,200	X	40	\$800	X	40	\$800	Senior Big Game Biologist Big Game Biologists Regional Wildlife Manager
Discuss with South Dakota Animal Industry Board potential and known disease risks to bighorn sheep from permitted domestic sheep and goats in the Black Hills.	X	80	\$1,600	X	40	\$800	X	20	\$400	X	20	\$400	Wildlife Administration Senior Big Game Biologist
Cost share for fencing materials to reduce/eliminate contact between bighorn sheep and domestic sheep and goats.	X	NA	\$90,000	X	NA	\$90,000	X	NA	\$90,000	X	NA	\$90,000	Habitat Program Administrator Habitat Biologist
		400	\$98,000		200	\$94,000		60	\$91,200		60	\$91,200	
Habitat													
Develop and ground truth habitat suitability model.	X	320	\$6,400	X	160	\$3,200		40	\$800	X	40	\$800	Senior Big Game Biologist Big Game Biologists
Collaborate with USFS, BLM, and private landowners on techniques to create, restore, and manage suitable bighorn sheep habitat.	X	480	\$9,600	X	480	\$9,600	X	480	\$9,600	X	480	\$9,600	Wildlife Administration Senior Big Game Biologist Regional Wildlife Manager Regional Habitat Manager USFS Liason
Collaborate with USFS, BLM, and private landowners on grazing allotments.	X	160	\$3,200	X	160	\$3,200	X	160	\$3,200	X	160	\$3,200	Wildlife Administration Senior Big Game Biologist Regional Wildlife Manager Regional Habitat Manager USFS Liason
Evaluate and implement habitat management projects with participating landowners on private land.	X	80	\$16,600	X	80	\$16,600	X	80	\$16,600	X	80	\$16,600	Habitat Program Administrator Habitat Biologist
Evaluate and implement habitat management projects on Game Production Areas and other lands with SDGFP management responsibility.	X	80	\$16,600	X	80	\$16,600	X	80	\$16,600	X	80	\$16,600	Habitat Program Administrator Regional Habitat Manager Senior Big Game Biologist Big Game Biologists
		1,120	\$52,400		960	\$49,200		840	\$46,800		840	\$46,800	

Appendix 1 Continued.

	2013			2014			2015			2016			2017			
Population Monitoring																
Assess and monitor population levels and trends by annually completing ground and aerial surveys. <i>Staff time and contractual flights.</i>	X	120	\$17,400	Senior Big Game Biologist Big Game Biologists Regional Wildlife Manager Resource Biologists												
Model population changes within management units and sub-herds.	X	40	\$800	Senior Big Game Biologist Regional Wildlife Manager												
Monitor bighorn sheep disease by collecting and sampling all reported or observed sick or dead bighorn sheep.	X	80	\$1,600	Senior Big Game Biologist Regional Wildlife Manager												
Conduct trap and transfer projects to establish new populations or augment existing populations. <i>Staff time only.</i>		NA	NA	X	200	\$4,000	X	200	\$4,000		NA	NA		NA	NA	Senior Big Game Biologist Big Game Biologists Regional Wildlife Manager
As determined necessary, develop and conduct research projects to fill information gaps and provide management implications.	X	NA	NA	Senior Big Game Biologist Big Game Biologists Regional Wildlife Manager												
		240	\$19,800		440	\$23,800		440	\$23,800		240	\$19,800		240	\$19,800	
Public Outreach																
Update and maintain department website related to bighorn sheep.	X	20	\$400	Adminstration Staff Senior Big Game Biologist												
Development and completion of formal bighorn sheep management plan.	X	480	\$9,600													Senior Big Game Biologist Other GFP Staff
Annually meet with the SD Bighorn Sheep Working Group, concerned individuals, NGOs, local sportsman's groups, and private landowners.	X	40	\$800	Wildlife Administration Senior Big Game Biologist Regional Wildlife Manager Other GFP Staff												
		500	\$10,000		20	\$400										
TOTAL	X	2,260	\$180,200	X	1,620	\$167,400	X	1,360	\$162,200	X	1,160	\$158,200	X	1,160	\$158,200	

Appendix 2. Department policy for the lethal take of bighorn sheep when associated with domestic sheep or goats.

LETHAL TAKE OF BIGHORN SHEEP WHEN ASSOCIATED WITH DOMESTIC SHEEP OR GOATS

Department of Game, Fish and Parks Policy

Effective: 09-28-07

Replaces: New

PURPOSE STATEMENT

To provide direction to Department staff in dealing with bighorn sheep that have come in direct contact with domestic sheep or goats. To prevent the spread of diseases from domestic sheep and goats back to wild bighorn sheep herds.

BACKGROUND

Scientific research has established that when bighorn sheep have even brief contact with domestic sheep or domestic goats, large numbers of bighorn sheep may die when the contacting bighorn returns to other bighorn sheep. Typically, the cause of death in the bighorn sheep is due to bacterial pneumonia, and the die-offs affect all age and sex classes.

POLICY REQUIREMENTS

It is the policy of the South Dakota Department of Game, Fish and Parks that bighorn sheep observed in close proximity to domestic sheep or goats are to be captured or killed as soon as feasible. Research and management work often dictates collection immediately upon notification or discovery of the encounter. Because time is of the essence and prior approval is impractical, collection may be completed by an employee without prior approval as long as circumstances meet the criteria described above and permission to access private property is acquired as necessary. It is recommended that live capture be attempted first and the animal used for disease research purposes. If live collection is not practical, then lethal means should be used. If lethal removal is accomplished via gunshot, the shot should be to the head to swiftly dispatch the animal and prevent damage to respiratory organs to facilitate collections for research.

Whenever possible, proper collection will be made of samples to include, but not be limited to, blood (both serum and anticoagulant), organs (spleen, liver, lymph nodes, tonsils and if possible the entire thoracic contents to include trachea, lungs, and heart), teeth, and fecals for parasites as required to supplement ongoing research and management projects.

Collected samples will be promptly forwarded to South Dakota State University veterinary diagnostic laboratory or other appropriate laboratory for analysis. Findings shall be relayed to the Department senior game staff, CSP wildlife biologist and the Regional Game Program manager.

ROCKY MOUNTAIN BIGHORN SHEEP

MANAGEMENT PLAN

SOUTH DAKOTA

2007

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INTRODUCTION

PAST

Audubon's bighorn sheep were common in the Black Hills, White River Breaks, and badlands of South Dakota during the early 1800's. In 1833, Maximillian reported that the Manitari Indians went to the Black Hills and surrounding mountainous areas to hunt mountain sheep, killing as many as one hundred or more in one season. In July 1875, members of the Newton-Jenny U.S. Geological Survey shot a sheep along a tributary of Boxelder Creek in the Black Hills. Bighorn sheep were not found very far from the Black Hills, but were reported to be abundant in the badlands near the White River, fifty miles east of the hills.

Due to uncontrolled hunting, the numbers of Audubon's began to decline during the late 1800's. It was reported that by 1887, mountain sheep were virtually gone from the Black Hills. However, a few still remained in the Harney Peak area within the very core of the hills. It was reported that the band was still present in 1895, but no sheep were found when Thompson Seton visited the area in the summer of 1902. Seton did learn of bands of about 200 Audubon's bighorns that still existed in the White River badlands near Pine Ridge at this time, however, it was reported that the last of the Audubon's bighorns in South Dakota were gone even in the rugged badlands by 1910.

With the last of the Audubon's bighorns gone from South Dakota, no mountain sheep existed in the state until a decade later when U.S. Senator Peter Norbeck obtained eight Rocky Mountain bighorns from Alberta, Canada in 1922. These sheep were placed into Custer State Park within the Black Hills (see Appendix I for history of bighorn sheep transplants in South Dakota). This herd grew and sustained itself until a unknown cause reduced the herd to one animal by 1959. Again, South Dakota was without bighorn sheep.

In 1964, Rocky Mountain bighorns from Pikes Peak in Colorado were introduced into Badlands National Park, located in the White River badlands where the last of Audubon's bighorns had existed prior to the turn of the century. This was a result of a cooperative effort between the South Dakota Department of Game, Fish and Parks and the National Park Service. The goal of this effort was to establish a viable herd in suitable habitat within the park, a herd that could serve as a source of transplant stock for transplanting elsewhere in South Dakota. The original 22 bighorns were placed into a 370-acre enclosure within park boundaries to establish a captive herd. However, reduction of animals due to an unknown disease caused the agencies to release the remaining 16 sheep into the park in 1967. A 3-year study conducted by the Department to determine

population status of this herd resulted in an estimated herd size of 133-200 animals during the winter of 1989-1990. The main range of this herd, lies within the Sage Creek Wilderness Area which is devoid of roads and has few recreational hiking trails.

The Badlands National Park herd declined in numbers. Census surveys conducted by the Park Service denoted a drop in herd size between 1994 and 1996 of the main herd in the Sage Creek wilderness area. During 1996, 16 bighorns were relocated from the Sage Creek area to the east side of the park, approximately 13 miles, in an attempt to expand the bighorn range. This group declined in numbers due to an apparent EHD outbreak. In order to rebuild the herd, park officials working with the SD Department of Game, Fish and Parks transplanted 23 bighorns from Wheeler Peak, New Mexico into the park.

Again, a transplant of Rocky Mountain bighorns was attempted in the French Creek area within Custer State Park. This herd was established in 1965 from 22 bighorns obtained from Whiskey Mountain, Wyoming. The herd grew to a population of approximately 150 by 1975 then became static, with no further growth apparent. Research completed in 1992 on the genetic makeup of these animals has indicated limited genetic variability within the herd, and other research has shown low lamb recruitment due to several factors. With that in mind, in 1999 a transplant of 20 bighorns from Alberta, Canada were placed into Bear Gulch within the park to fill that unoccupied range and provide genetic diversity. Past wildfires within the park disturbed about 21,000 acres with over 2,400 acres of bighorn habitat being released, effectively increasing ewe/lamb habitat by 180%. However, pioneering movements by bighorns into the new area has been slow and limited. Once again an all age die-off occurred in the park during the winter of 2004 – 2005. This die-off was due to suspected pasteurilla-related pneumonia and left only 45-50 bighorns alive from an estimated herd of 170-180.

And additional herd in South Dakota is located in the central Black Hills in Spring Creek and Dark Canyons. This herd was established in 1991 with 26 Rocky Mountain bighorns obtained from Georgetown, Colorado. An additional five sheep from the Badlands herd were placed in Spring Creek Canyon in 1992 to supplement the original transplant and provide genetic diversity. Prior to transplanting, extensive habitat work was completed within Spring Creek Canyon. Through a cooperative agreement between the Department and the Black Hills National Forest, approximately 150 acres of dense pine was clear-cut on the canyon rim, and this was followed by a prescribed burn. An additional 200 acres of pine was clear-cut and burned after the original transplant had occurred. This herd divided into three lamb/ewe groups spaced approximately six miles apart, with ram movement between groups.

The Spring Creek Canyon transplant was considered a success. Excellent lamb production and survival had allowed the herd to reach sustainable numbers. Ram movement between the three separate lamb/ewe groups should insure that one group does not get genetically isolated from the whole herd. Management surveys conducted during the winter months will monitor herd status. The environmental assessment of 1987 for the initial habitat improvement plan for the Spring Creek Canyon area indicated a carrying

capacity of 50 bighorns. Additional habitat improvements increased the carrying capacity by 50% to approximately 75 animals. Management surveys conducted in 1999 estimated the number of sheep residing in the canyon at 85 animals. A limited hunting season for two sheep was initiated in 2000.

With the Spring Creek Canyon herd reaching carrying capacity, 20 bighorns were removed in 2001 and transplanted into the Hells Canyon country in the southern Black Hills. That herd established itself on Elk Mountain. An additional 7 ewes from Wheeler Peak, New Mexico were transplanted on Elk Mountain in 2004 for genetic diversity.

PRESENT

The Custer State Park herd continues to have low lamb recruitment due to the suspected pasteurella die-off. No attempts to supplement the herd have occurred to date.

The Badlands National Park herd has increased in numbers due to the 2004 transplant. When herd numbers reach the mid-100's, bighorns will be removed to supplement other herds within South Dakota, or start new herds.

The Spring Creek Canyon herd complex has become stable. Recent suspected predation by mountain lions has reduced lamb survival for the last several years.

The Elk Mountain herd continues to grow and thrive. Recent surveys have indicated this herd has grown to approximately 100 animals.

FUTURE

The future for bighorn sheep within South Dakota depends on many factors. Negative factors that can affect bighorn numbers include habitat changes, urbanization, diseases, predation, and competition for space and forage to name a few. Management options range from preservation of the existing herds, expansion of present herd numbers, to transplants to establish new herds. As expected, budgetary costs, manpower needs, and consumptive and nonconsumptive benefits will dictate management direction. Management of present herds requires the smallest budgetary and manpower expenditure, but also provides the least amount of hunter opportunity and bighorn viewing by the public. Long term management and expansion of existing herds and additional herds would provide expanded consumptive and nonconsumptive benefits. However, budgetary and manpower constraints, plus habitat availability may limit the extent as to the number of additional herds that could be established in South Dakota. Numerous rugged canyons exist within the Black Hills, however extensive habitat work may be required to create the "open" habitat required by bighorns.

Management responsibilities for bighorn sheep within Custer State Park, lies with Custer State Park personnel. Management for bighorn sheep outside of the park lies with Wildlife Division personnel. Both divisions will work together to manage bighorn sheep as a state resource.

The Wildlife Division's Systematic Approach to Management Plan of April, 1994 discussed the objectives and strategies for bighorn sheep within South Dakota. The listed objectives are: 1) To establish a statistically viable herd in Spring Creek Canyon by the year 2000, 2) To evaluate potential sites for at least two additional herds within western South Dakota totaling 100+ animals per site, 3) To develop a census technique for determining herd status in Spring Creek Canyon, 4) To define the future management goals for bighorn sheep in South Dakota, and 5) To incorporate public input into guidelines and management goals.

Custer State Parks Resource Management Plan 1995-2010 addressed the need for investigations of limited recruitment, genetic supplementation through transplant, and habitat improvement in primary bighorn ranges in the park. Habitat modification has been limited. Timber harvest prescriptions bordering occupied bighorn habitats have included bighorn habitat enhancement (clear cut and thinning). However, acreage impacted is limited. A prescribed fire is in the prescription phase for a portion of west French Creek Canyon, primary range of one CSP sub-herd.

OBJECTIVES

Manage existing herds to maintain short-term population viability

Minimum viable population

Historic evidence shows that all bighorn herds declining to less than 50 became extinct within 50 years, whereas herds which exceed 100 have persisted for over 80 years. Herds of less than 50 bighorn sheep exhibit extremely high extinction rates over the relatively short-term. Maintain individual herd in excess of this number. Herds dropping below this minimum will be supplemented.

Habitat carrying capacity

Habitat evaluations will be accomplished every 5 years to assess range carrying capacity. Evaluations will be conducted to indicate AUM production. Grazing pressure on the range must include all large herbivores sharing the range with the bighorns. On ranges where populations exceed carrying capacity, grazing pressure will be reduced. Bighorn herds exceeding the above numbers could be considered for reduction through transplant. However, maintenance of a larger population should be considered. Habitat modification/maintenance projects will be scheduled where appropriate to enhance

carrying capacity. Projects will include timber manipulations, prescribed burning, and native vegetation release. Water development will proceed on sites otherwise suitable.

Manage meta-population for long-term viability

Establish herds on suitable habitat

Evaluate potential transplant sites via topography and water availability. Vegetation analysis (ie. satellite or aerial photography) of sites found suitable based on topography and water criteria will indicate what, if any, habitat modifications are required. Sites will be acceptable and considered for transplant if they are capable of supporting >100 bighorns. Sites should be prioritized based on the maximum population sustainable, habitat quality rating, the habitat modification/maintenance required, and competitors present. The presence of domestic sheep or goats within 30 miles of contiguous habitat of the transplant range will exclude that site from consideration. Appendix II is a map depicting possible bighorn sheep habitat within western South Dakota based on isolated slopes between 27-85 degrees with a 300m buffer around those slopes using a 10m digital elevation model data. This map does not include vegetation data, land ownership or proximity to domestic sheep or goats.

Genetic enhancement

Initial transplants should be sought from sources of stock unrelated to founder herds existing within the state. This will maximize outcrossing potential in the future. Bighorn populations originating from 4 separate bloodlines currently exist in SD; Badlands National Park, Custer State Park, Spring Creek Canyon, and Elk Mountain. Custer State Park has introduced additional genetic material from an Alberta transplant. The Spring Creek Canyon herd has some integration of genetics from the Badlands herd, and Elk Mountain from New Mexico. An additional outsource herd should be located for future transplants.

Genetic maintenance-

To maintain inbreeding coefficients below 1% per year, necessary for long-term population health, effective population size should exceed 50. Effective population size is reduced from total population size by such factors as unequal sex ratios, unequal fecundity, differential breeding, overlapping generations, and small founder populations. These factors all occur in bighorn sheep in South Dakota.

When bighorns are established on at least five sites capable of supporting >100 animals, genetic maintenance transplants will be conducted from other SD herds. This will create genetic flow between herds, and increase genetic variability, and genetic maintenance. Population exchange between herds will occur with each herd donating/ receiving stock once every 10 years. Optimally, transplant composition should include 1/3 rams. Badlands National Park should be integrated into the overall SD sheep management plan and participate in transplants. This will increase effective meta-population size and

benefit all South Dakota herds. Travel corridors will be investigated to create migration/travel corridors.

Population Control-

When individual herd numbers approach habitat carrying capacity, transplants as outlined above should be conducted. When equilibrium levels are reached among herds, surplus animals (primarily ewes and lambs) should be offered to agencies requesting bighorn sheep, or harvested as a last resort. These sheep should be offered to any state or provincial agency that has a comprehensive management plan. Surplus rams should be offered for harvest. Harvest should be designed to provide a median age of harvested ram of 9 years. This will ensure that the rams are of trophy quality and individual herd breeding dynamics are not compromised. Regulations should be structured so those genetic enhancement transplant animals are not subject to harvest. This will ensure maximal benefit from transplant.

Benefits-

Establishment of a long-term viable meta-population of bighorn sheep in SD will decrease threats to individual populations. Bighorn herd quality will be increased. Disease or other mortality factors will be isolated and herds can be restocked. Surplus animals will be made available to enhance other bighorn populations, benefits could include introduction and supplementation of native species from other states to SD in transplant trades. Bighorn sheep will be in much greater number and much more widely distributed through western SD providing vastly increased opportunity for wildlife viewing. A harvest of approximately 2-3 rams/100 population can be expected. This should allow for a minimal annual harvest of 12-18 rams.

Appendix I

History of Rocky Mt. Bighorn Sheep In South Dakota

1922 – 8 bighorns from Alberta, Canada into Custer State Park

1961 – 12 bighorns from Alberta, Canada into the Slim Buttes, transplant failed

1964 – 22 sheep from Pikes Peak Colorado into Badlands Natl Park, transplant succeeded
approx. 160 in late 90's, has since crashed

1965 – 22 bighorns from Whiskey Mountain, Wyoming into Custer State Park

1974 – 26 bighorns from Custer State Park shipped to Colorado

1980 – 6 bighorns from Custer State Park shipped to Nebraska

1981 – 6 bighorns from Custer State Park shipped to Nebraska

1982 – 4 bighorns from Custer State Park shipped to Nebraska

January, 1991 – 26 bighorns from Georgetown Colorado into Spring Creek Canyon, after
5 years of working with the USFS and habitat improvements.

February, 1992 – 5 bighorns from Badlands into Spring Creek
Three sub-herds now exist, Spring Creek, Rapid Creek, Hill City – approx. 230
bighorns in the 3 sub-herds.

1999 – 20 bighorns from Alberta, Canada into Custer State Park

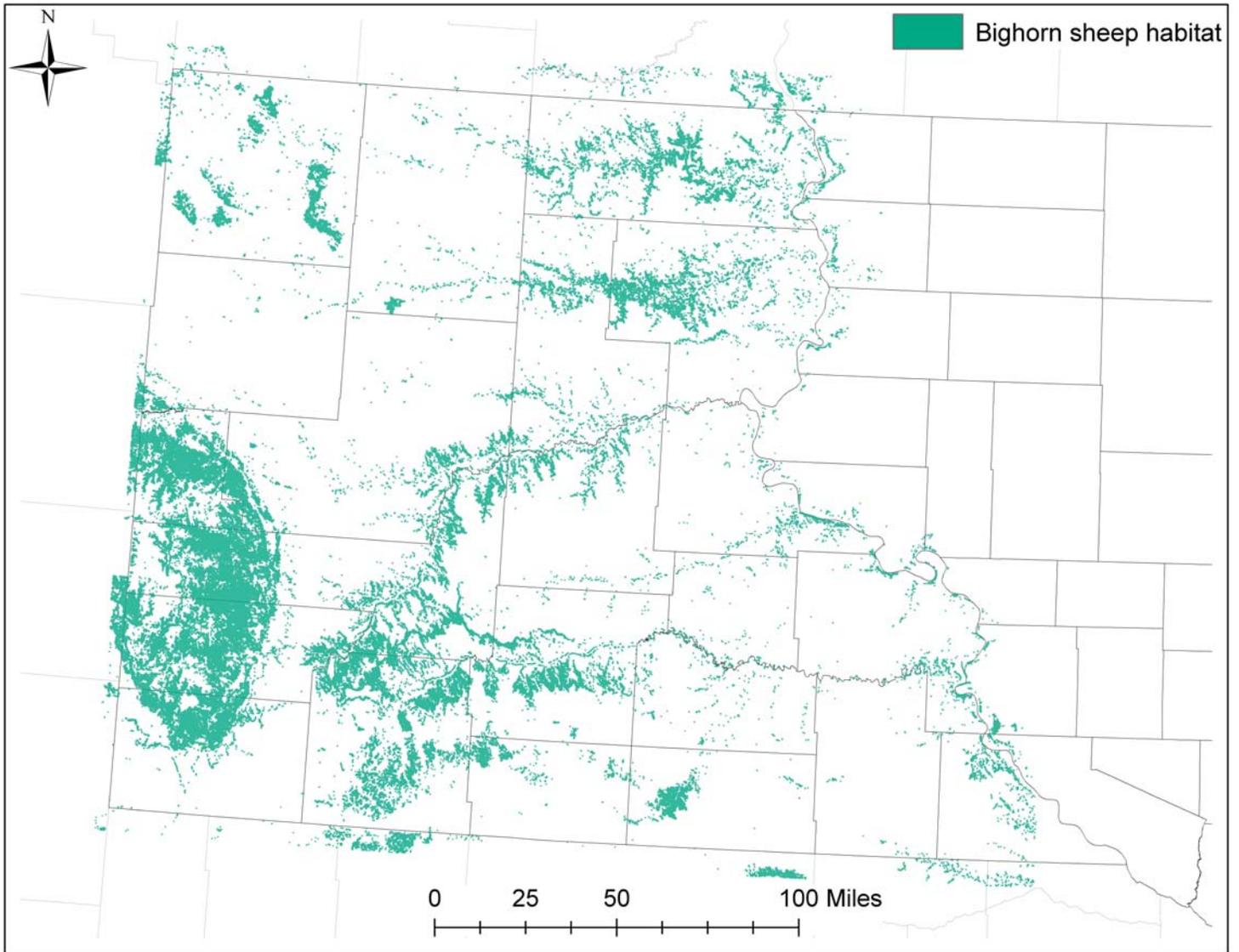
October, 2000 – First established hunting season outside Custer State Park in the Black
Hills, 2 any sheep permits.

January, 2001 – 20 bighorns from Spring Creek into Hell Canyon, herd has established
itself on Elk Mountain.

September, 2004 – 7 bighorns from New Mexico released on Elk Mountain for genetic
diversity. Present herd size is 100 animals.

September, 2004 – 23 Bighorns from Wheeler Peak, New Mexico transplanted into
Badlands National Park

Appendix II



Appendix III

LETHAL TAKE OF BIGHORN SHEEP WHEN ASSOCIATED WITH DOMESTIC SHEEP OR GOATS

Department of Game, Fish and Parks Policy

Effective: 09-28-07

Replaces: New

PURPOSE STATEMENT

To provide direction to Department staff in dealing with bighorn sheep that have come in direct contact with domestic sheep or goats. To prevent the spread of diseases from domestic sheep and goats back to wild bighorn sheep herds.

BACKGROUND

Scientific research has established that when bighorn sheep have even brief contact with domestic sheep or domestic goats, large numbers of bighorn sheep may die when the contacting bighorn returns to other bighorn sheep. Typically, the cause of death in the bighorn sheep is due to bacterial pneumonia, and the die-offs affect all age and sex classes.

POLICY REQUIREMENTS

It is the policy of the South Dakota Department of Game, Fish and Parks that bighorn sheep observed in close proximity to domestic sheep or goats are to be captured or killed as soon as feasible. Research and management work often dictates collection immediately upon notification or discovery of the encounter. Because time is of the essence and prior approval is impractical, collection may be completed by an employee without prior approval as long as circumstances meet the criteria described above and permission to access private property is acquired as necessary. It is recommended that live capture be attempted first and the animal used for disease research purposes. If live collection is not practical, then lethal means should be used. If lethal removal is accomplished via gunshot, the shot should be to the head to swiftly dispatch the animal and prevent damage to respiratory organs to facilitate collections for research.

Whenever possible, proper collection will be made of samples to include, but not be limited to, blood (both serum and anticoagulant), organs (spleen, liver, lymph nodes, tonsils and if possible the entire thoracic contents to include trachea, lungs, and heart), teeth, and fecals for parasites as required to supplement ongoing research and management projects.

Collected samples will be promptly forwarded to South Dakota State University veterinary diagnostic laboratory or other appropriate laboratory for analysis. Findings shall be relayed to the Department senior game staff, CSP wildlife biologist and the Regional Game Program manager.