IN THE OFFICE OF ENDANGERED SPECIES

U.S. FISH AND WILDLIFE SERVICE

UNITED STATES DEPARTMENT OF THE INTERIOR

By Certified Mail

Black Hills Distinct Vertebrate Population Segment of American Dipper (*Cinclus mexicanus unicolor*)

Biodiversity Conservation Alliance PO Box 1512 Laramie, WY 82073 (307) 742-7978	)	**Petition for a Rule to list the Black Hills of South Dakota distinct population segment of American dipper (*Cinclus mexicanus unicolor*), as THREATENED or ENDANGERED under the Endangered Species Act 16 USC § 1531 et seq. (1973 as amended) and for the designation of Critical Habitat; Petition for an Emergency Listing Rule under the Endangered Species Act 16 USC §§ 1533(b)(1)(c)(iii) and 1533(b)(7) and 50 CFR § 424.20** **Dated: March 15, 2003**
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PETITIONERS	)	

American Dipper
(*Cinclus mexicanus unicolor*)

Photo: U.S. Fish and Wildlife Service

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Find a fall or cascade, or rushing rapid, anywhere upon a clear stream, and there you will surely find its complementary ouzel, flitting about in the spring, dining in the foaming eddies, whirling like a leaf among the foam-bells; ever vigorous and enthusiastic, yet self-contained, and neither seeking nor shunning your company…He is the mountain stream's own darling, the hummingbird of blooming waters, loving rocky ripple slopes and sheets of foam as a bee loves flowers, and a lark loves sunshine and meadows. – John Muir, The Mountains of California 1894

Called the dipper, the water ouzel, and other common names, the American dipper (*Cinclus mexicanus*) is an extremely specialized bird species that inhabits mountain streams in the western half of North America. The American dipper has been described as the only true aquatic songbird and is most noted for its odd dipping behavior, as well as its unique ability to live, feed, and play in the rapids and cascades of cool mountain streams throughout western North America. Within its North American range, there are five suggested subspecies of American dipper. *Cinclus mexicanus unicolor*, also called American dipper, inhabits the western United States and northward into Canada and Alaska.

Besides its unique behavior, the dipper is also an important indicator of water quality. Healthy populations of American dipper indicate healthy stream ecosystems, a relationship that is an invaluable tool in assessing the overall health of our environment. As a water quality indicator species, the health of American dipper populations can also signal impending environmental problems and aid in the prevention of human illness, costly environmental cleanup, and environmental catastrophes.

The Black Hills are described as an "island in a sea of plains." The mountain range, located in western South Dakota and northeastern Wyoming, is nearly two million acres in size and is entirely separated and isolated from other mountain ranges to the west by over 150 miles of grasslands. While its geographic isolation is unique, the biological values of the Black Hills are what truly set the ecosystem apart from others. Essentially an ecological "mixing zone," the Black Hills ecosystem is comprised of species from western, eastern, northern, and central North American environments. As such, the Black Hills supports many disjunct and peripheral populations of fish, wildlife, plant, and invertebrate populations. And, as an isolated mountain

ecosystem, the Black Hills have come to support a host of endemic species of fish, mammals, amphibians, reptiles, birds, insects, snails, and plant communities.

Unfortunately, as an isolated mountain ecosystem, the Black Hills are incredibly fragile and extremely sensitive to environmental change. As documented today, over a century of extensive logging, road construction, mining, domestic livestock grazing, private land developments, water developments, and other activities have left the ecosystem on the verge of collapse. Old growth forest is virtually nonexistent, perennial streams suffer from water quality problems, native plants are being replaced by nonnatives, natural disturbance processes are being controlled and/or eliminated, streams have been extensively dammed and diverted, native fish are literally being eaten away by nonnative fish, and developments are replacing large amounts of forest and riparian habitat. These impacts have taken their toll on native species. However, little has been done to curb the ecological destruction.

The American dipper is at the eastern edge of its global distribution in the Black Hills. The bird is also a permanent resident of the Black Hills and has historically been known to inhabit nearly all permanent, fast-flowing streams in the area. It is believed that the presence of American dipper on the Black Hills today is the result of dispersal during the last ice age. At the time, forested water connections between the Black Hills and the Rocky Mountains are believed to have facilitated dipper dispersal. The Black Hills population of American dipper is now believed to be isolated as a result of vicariant events (events that have led to the creation of significant barriers to dispersal). Extensive grasslands, poor quality stream habitat, and the lack of water connections to dipper populations existing west of the Black Hills have all led to the isolation of the species. Research further indicates the American dipper does not normally disperse or migrate long distances and is very unlikely to move between geographically separated areas. Preliminary data for the population of American dipper on the Black Hills indicates that broadscale movements (i.e., between geographically isolated areas) do not occur.

Populations of American dipper have declined sharply on the Black Hills in the past decade. This decline has been attributed to poor water quality, habitat degradation, reduced or erratic flows in streams, and lack of suitable nesting habitat. Much of the bird's formerly occupied habitat on the Black Hills is now considered sink habitat (habitat that is unable to support the long-term survival of populations) thus presenting serious limitations upon the success of local

dispersal and reestablishment. Overall, breeding American dippers have disappeared from nearly 86% of their historical range in the Black Hills. The bird has been listed as Threatened by the State of South Dakota since 1996.

As early as 1993, the U.S. Fish and Wildlife Service ("USFWS") had taken an interest in the status of the American dipper on the Black Hills. The South Dakota Field Office of the USFWS sought to "Conduct status surveys of the American dipper in the Black Hills" in the early nineties. This request was made "…to initiate recovery and management actions for species before the trouble or precipitous declines begin." Similar requests were also made in 1996. However, the agency never completed status surveys for the American dipper on the Black Hills nor did the agency take action before the "trouble" and "precipitous declines" of the American dipper population in the Black Hills.

The Black Hills population of American dipper meets the USFWS's criteria for classification as a distinct population segment ("DPS") under the ESA. The Black Hills population of American dipper is physically and ecologically isolated from other populations to the west and is therefore discrete. Furthermore, the Black Hills population of American dipper persists in an ecological setting that is unique to the species and the loss of the population would result in a significant gap in the range of the taxon. The Black Hills population of American dipper is therefore significant.

Finally, in terms of its status, the Black Hills population of American dipper meets all five criteria for listing under the ESA and further warrants listing on an emergency basis. Substantial habitat destruction and modification have already occurred, and pollution, livestock grazing, logging, road construction, dams, water diversions and other developments, groundwater extraction, extirpation of beaver, mining, and recreational activities continue to pose significant risks to the well-being of the Black Hills population of American dipper. The Black Hills population of American dipper may also be suffering due to the effects of scientific research, human persecution, disease, predation, competition with nonnative trout species, and anthropogenic climate change. Existing regulatory mechanisms are also woefully inadequate to conserve the population. In association with all of the above threats, natural processes such as fires and floods, along with the inherent vulnerability of small populations, seriously threaten the continued existence of the Black Hills population of American dipper.

I. INTRODUCTION

Pursuant to the Endangered Species Act ("ESA"), 16 USC § 1531 et seq. and regulations promulgated thereunder; the Administrative Procedures Act, 5 USC § 553(e); and the First Amendment to the Constitution of the United States, Biodiversity Conservation Alliance, Center for Native Ecosystems, Native Ecosystems Council, Prairie Hills Audubon Society of Western South Dakota, and Jeremy Nichols hereby petition for a rule to list the Black Hills population of American dipper (*Cinclus mexicanus unicolor*) as a threatened or endangered distinct vertebrate population segment ("DPS") under the ESA. Pursuant to 16 USC § 1631 et seq., 5 USC § 553(e), and 50 CFR § 424.14 (1990), petitioners further request that Critical Habitat be designated concurrent with the listing as required by 16 USC § 1533(b)(6)(C) and 50 CFR § 424.12.

In view of the imminently imperiled condition of the DPS, the present petition also includes a request for promulgation of an Emergency Listing Rule to provide a 240-day interval in which the Black Hills DPS of American dipper can receive urgently needed protection while the final listing process proceeds. Petitioners further petition the Secretary and the USFWS use their authority pursuant to 16 USC §§ 1533(b)(1)(1)(c)(iii) and 1533(b)(7), and 50 CFR § 424.20 to immediately promulgate a rule listing the Black Hills DPS of American dipper on an emergency basis.

Petitioners understand this petition action sets in motion a specific process placing definite response requirements on the USFWS and specific time constraints upon those responses. See 16 USC § 1533(b).

A. The Black Hills

The Black Hills is an isolated mountain range located within the plains of western South Dakota and northeastern Wyoming (Raventon 1994, USFS 1996a). See Figure 1. Located between the 43rd and 45th parallels of north latitude and the 103rd and 105th meridians of west longitude, the Black Hills trend roughly northwest to southeast, are approximately 200 km long by 100 km wide, and rise to heights of over 7,000 feet (Raventon 1994, Hall et al. 2002).

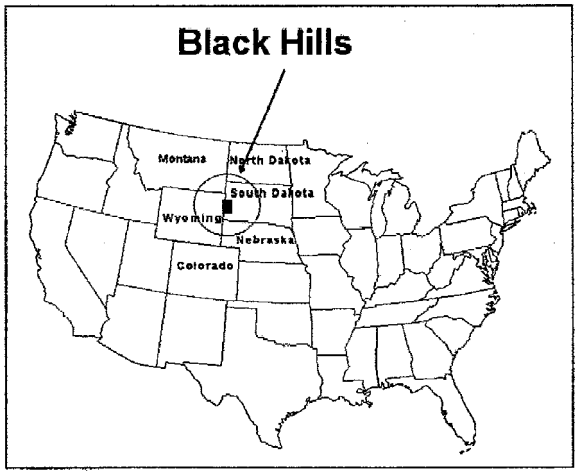

Figure 1. Location of the Black Hills in the United States.

The mountains comprise an area of over two million acres roughly bound to the north and south by the Belle Fourche and Cheyenne Rivers

respectively, and are entirely surrounded by the Great Plains (Hall et al. 2002). At a distance of between 150 and 200 miles, the Big Horn Mountains to the west and Laramie Mountain to the southwest are the next-nearest mountain ranges (Froiland 1978).

This "island in the plains" has given rise to a unique forested ecosystem that is remarkable in many respects. On one hand, because the uplift is isolated from other forest ecosystems by the surrounding plains and has been for thousands of years, a complement of endemic plant and animal species has evolved in the Black Hills (Turner 1974, Frest and Johannes 2002, Hall et al. 2002). On the other hand, because of the location of the mountains as well as patterns of past climate change, the Black Hills have become an ecological "mixing-zone" where species of different ecological provinces are found together (Turner 1974, USFS 1996a, Huntsman et al. 1999, Marriott et al. 1999). Indeed, many plant and animal species of the Black Hills are either widely disjunct or are at the periphery of their range (Huntsman et al. 1999, Fertig et al. 2000). The Black Hills are also considered their own ecoregion, or unit of land and water delineated by unique biotic and environmental factors (Bailey 1995, Hall et al. 2002). Land management/ownership includes U.S. Forest Service, States of South Dakota and Wyoming, U.S. Bureau of Reclamation, Army Corps of Engineers, National Park Service, and private. See Figure 2.

Unfortunately, the Black Hills also have the sad distinction of being one of the most heavily developed and impacted forest ecosystems in North America. Beginning with the onset of European-American gold prospectors in the late 1800's, the Black Hills has experienced extensive mining activity, logging and thinning, road construction, private lands development, water development, domestic livestock grazing, and heavy recreational use (USFS 1996a, Shinneman 1996, Marriott and Faber-Langendoen 2000, Hall et al. 2002). Numerous environmental concerns and problems on the Black Hills have been linked to these activities and include, but are not limited to, stream degradation and pollution, landscape-level habitat fragmentation, loss of riparian and wetland habitat, invasion of nonnative species, declines and loss of populations of native species, alteration of disturbance processes, and loss of habitat (Pettingill and Whitney 1965, Shinneman and Baker 1997, Huntsman et al. 1999, May et al. 2001, Panjabi 2001, Hall et al. 2002). The U.S. Fish and Wildlife Service (1993b) stated:

> The Black Hills represent a small ecosystem, thus making it vulnerable to impacts that would effect change in this environment. The economy of the Black Hills is based upon the environment, including mining, logging, agriculture, and tourism. The economy and ecosystem are delicately linked and are beginning to show signs of stress. (p. 1)

Despite a legacy of adverse ecological impacts, the tide of degradation has yet to subside.

The Black Hills continue to be regarded and managed as an "industrial" forest. For instance, the United States Forest Service ("USFS"), charged with managing 1.2 million acres as the Black Hills National Forest, states:

> The legacy of the past century has left the Black Hills today as a developed forest. It is extensively roaded. There are entire [human] communities within the Forest. Within the proclaimed National Forest boundary, 19 percent of the land is privately owned and much is developed. Private land includes some of the most important habitat components, such as riparian areas.

USFS 1996a, p. III-12. In other words, the ecological impacts of over a century of extensive development have been accepted by the USFS as irreversible consequences on the Black Hills. Similar attitudes have been expressed by other agencies, organizations, and individuals, a mindset that only exacerbates the ecological crisis facing the Black Hills today and continues to leave countless native species imperiled.

B. The American Dipper

The American dipper (*Cinclus mexicanus*) is an extremely specialized bird species that inhabits mountain streams in the western half of North America (Kingery 1996). The subspecies *C. m. unicolor*, also called American dipper, inhabits western Canada and western United States, including the Black Hills (Tyler and Ormerod 1994, Anderson 2001). The American dipper is considered the "only truly aquatic songbird" (Osborn 1999).

The American dipper is important in that it is an indicator of water quality (Tyler and Ormerod 1994, Feck 2002). Healthy populations of American dipper indicate healthy stream ecosystems, a relationship that is an invaluable tool in assessing the overall health of our environment. As a water quality indicator species, the health of American dipper populations can also signal impending environmental problems and aid in the prevention of human illness, costly environmental cleanup, and environmental catastrophes.

Researchers believe the overall population of American dipper cannot be large due to the species' extremely specialized habitat needs (Turbak 2000). There is a general concern over the status of the American dipper due to extensive declines in water quality. Indeed, while rangewide trends are considered stable, populations have declined significantly in the Southern Rocky Mountains (Sauer et al. 2001).

The American dipper is at the eastern edge of its global distribution in the Black Hills (Panjabi 2001). The dipper is a permanent resident of the Black Hills and has historically been known to inhabit nearly all permanent, fast-flowing streams in the area (Pettingill and Whitney 1965).

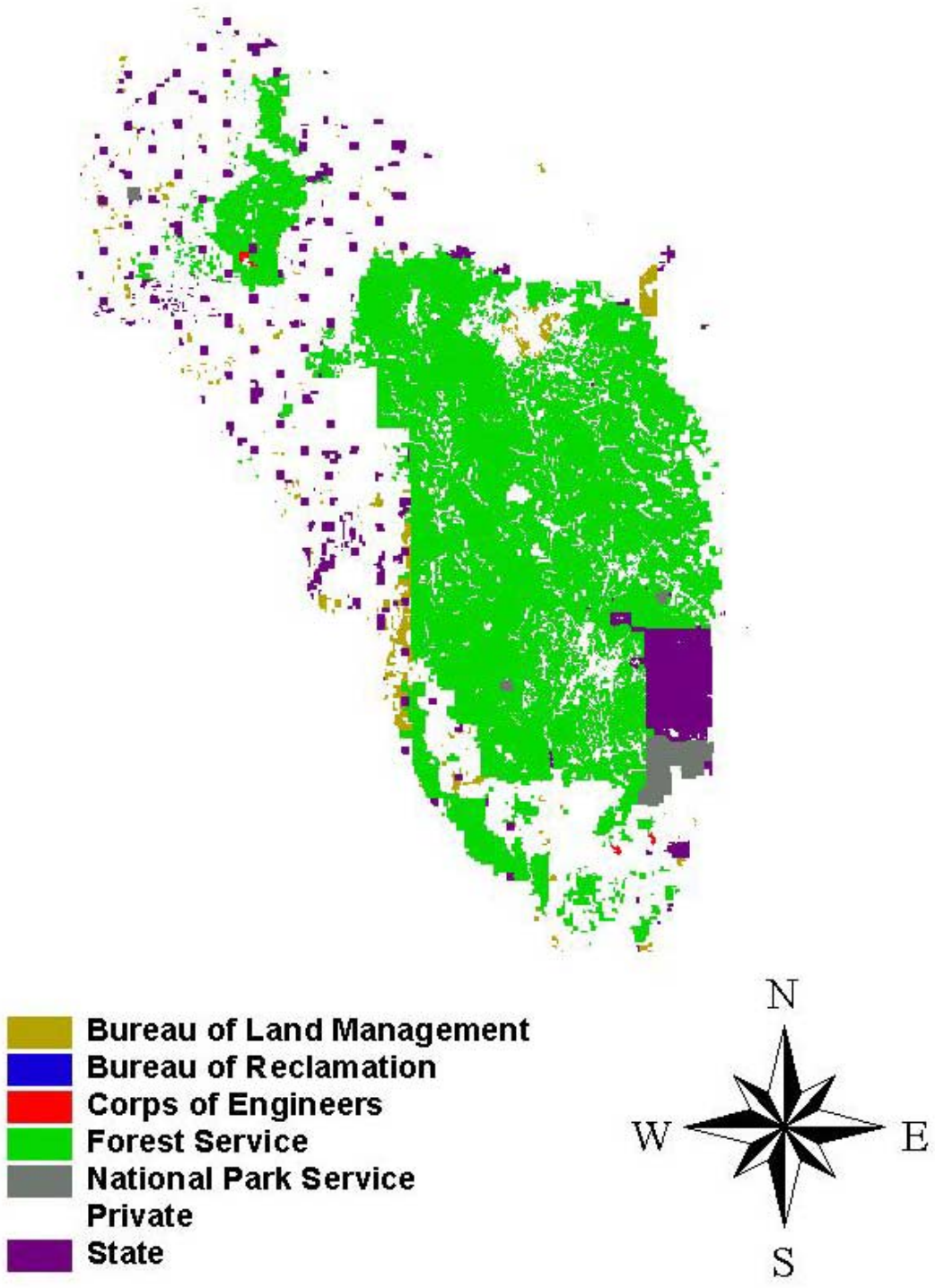

Figure 2. Land ownership/management in the Black Hills Ecoregion (Hall et al. 2002)

It is believed that the presence of the Black Hills population of American dipper is the result of dispersal during the last ice age, which ended over 10,000 years ago (Backlund 2001). At the time, forested water connections between the Black Hills and the Rocky Mountains are believed to have facilitated dipper dispersal and persistence in the Black Hills, leading to the establishment of a viable population. The dipper population on the Black Hills is now believed to be isolated as a result of vicariant events, or events that have led to the creation of significant barriers to dispersal in the form of extensive grasslands, poor quality stream habitat, and the lack of water connections to dipper populations existing west of the Black Hills. Research strongly indicates the American dipper does not normally disperse or migrate long distances and is very unlikely to move between geographically separated areas (Price and Bock 1983, Tyler and Ormerod 1994). Preliminary data for the population of American dipper on the Black Hills indicates that broadscale movements (i.e., between geographically isolated areas) do not occur (Backlund 2003).

Populations and distribution of American dipper have declined sharply on the Black Hills in the past decade (Hays et al. 1996, Hays and Hays 1997a, Hays and Hays 1997b, Hays and Hays 1998, Backlund 2001). This decline has been attributed to poor water quality, habitat degradation, reduced or erratic flows in streams, and lack of suitable nesting habitat (Backlund 2001). Much of the bird's formerly occupied habitat on the Black Hills is now considered "sink" habitat (habitat unable to support the long-term survival of populations), thus presenting serious limitations upon the success of local dispersal and reestablishment (Backlund 2002a). Overall, breeding American dippers have disappeared from nearly 86% of their historical range on the Black Hills. The American dipper has been listed as Threatened by the State of South Dakota since 1996 (Backlund 2001).

As early as 1993, the USFWS had taken an interest in the imperiled status of the American dipper on the Black Hills (USFWS 1993b). The South Dakota Field Office of the USFWS (1993b) sought to "Conduct status surveys of the American dipper in the Black Hills" (p. 2). This request was made "…to initiate recovery and management actions for species before the trouble or precipitous declines begin" (p. 1). Similar requests were also made in 1996 (Larson 2003). However, the agency never completed status surveys for the American dipper on the Black Hills, nor did the agency take action before the "trouble" and "precipitous declines" in the Black Hills population of American dipper (Larson 2003).

The Black Hills population of American dipper remains imminently threatened with extirpation, meets all five criteria for listing under the ESA, and warrants listing on an emergency basis. Substantial habitat destruction and

modification have already occurred, and pollution, livestock grazing, logging, road construction, dams, water diversions and other developments, groundwater extraction, extirpation of beaver, mining, and recreational activities, continue to pose significant risks to the well-being of the Black Hills population of American dipper. The population may also be suffering from the effects of scientific research, human persecution, disease, predation, competition with nonnative trout species, and climate change. Existing regulatory mechanisms are also woefully inadequate to conserve the Black Hills population of American dipper. In association with all of the above threats, natural processes such as fires and floods, along with the inherent vulnerability of small populations, seriously threaten the Black Hills population of American dipper.

II. PETITIONERS

Biodiversity Conservation Alliance is a Laramie, Wyoming-based nonprofit conservation organization dedicating to protecting and restoring native species of plants and animals in the Rocky Mountain Region, including the Black Hills of South Dakota and Wyoming. Using outreach, education, science, comments, administrative appeals, and litigation, Biodiversity Conservation Alliance works to protect and restore biodiversity, prevent the loss of native species and their habitat, and raise the threshold of public knowledge and appreciation of biodiversity and ecological health.

The Center for Native Ecosystems is a Paonia, Colorado-based non-profit, science-based conservation organization dedicated to protecting and recovering native and naturally functioning ecosystems in the Greater Southern Rockies and Great Plains. Using the best available science, the Center for Native Ecosystems participates in policy and administrative processes, legal actions, and public outreach and education programs to protect and restore imperiled native plants and animals.

Native Ecosystems Council is a Rapid City, SD-based, unincorporated, non-profit, science-based conservation organization dedicated to protecting and restoring the health of the Black Hills ecosystem. Members and supporters of Native Ecosystems Council use and enjoy the Black Hills for wildlife viewing, recreation, and scientific study.

Prairie Hills Audubon Society of Western South Dakota is a South Dakota-based, nonprofit organization with almost 200 members in the Black Hills region. Members of Prairie Hills Audubon Society use and enjoy the Black Hills for, among other things, bird-watching and have been involved with efforts to protect and restore wildlife on the Black Hills for many years.

Jeremy Nichols is a Laramie, Wyoming resident who has worked to protect and restore the natural values of the Black Hills of South Dakota and Wyoming for over two years. Mr. Nichols and his family use and enjoy the Black Hills primarily for viewing wildlife, hiking, and

camping and have expressed numerous concerns over the American dipper, as well as other imperiled species, on the Black Hills.

III. SPECIES AND POPULATION INFORMATION

Among the dippers, there are five accepted species: *C. mexicanus*, or American dipper, of western North America and Central America; *C. leucocephalus*, or white-capped dipper, of the Andes in South America; *C. schulzi*, or rufous-throated dipper, of the Andes of southwest Bolivia and northwest Argentina in South America; *C. cinclus*, or white-throated dipper, of Eurasia and North Africa; and *C. pallasi*, or brown dipper, of China and Japan in Asia. According to Tyler and Ormerod (1994), "All five species are remarkably similar in general appearance, behaviour and nesting habits, and all inhabit fast-flowing upland streams in different parts of the world" (p. 3).

A. Description

The American dipper is a gray passerine with a slightly brown head (Phillips et al. 1964, National Geographic Society 1987, Kingery 1996, Sibley 2000). The subspecies *C. m. unicolor* is generally paler than other *C. mexicanus* subspecies and has a grey-brown head. White feathers on the species' eyelids create a characteristic flash of white when they blink (Tyler and Ormerod 1994). Immature birds have a lighter colored breast and underbelly (National Geographic Society 1987). Juvenile American dippers also have a paler colored bill and pale edgings on wings (Tyler and Ormerod 1994, Kaufman 2000). In winter, some birds may exhibit white coloring on the wing feathers (Ridgeway 1904). Mature birds of both sexes look the same, although females are slightly smaller (Sclater 1912, Dunning 1993)., with shorter wings (Price and Bock 1983). Males average 61.0 g while females are 54.6 g on average (Dunning 1993). Length is given as 17.5 cm to 21.0 cm by Ealey (1977), 19 cm by National Geographic Society (1987), and 14 to 20 cm long by Kingery (1996). The American dipper is larger than the South American *C. leucocephalus*, but generally smaller than other dipper species (Dunning 1993).

The common name, dipper, describes the birds' characteristic bobbing movement (Tyler and Ormerod 1994, Turbak 2000). Other common names associated with the American dipper include water ousel or ouzel, water thrush, and teeter-bird (Muir 1894, Tyler and Ormerod 1994, Turbak 2000).

B. Taxonomy

There are five suggested subspecies of American dipper (*Cinclus mexicanus*): *C. m. unicolor* of western Canada and western United States; *C. m. mexicanus* of northern Mexico; *C. m. anthonyi* of southern Mexico and Guatemala; *C. m. dickermani* of southern Mexico; and *C. m. ardesiacus* of Costa Rica and Panama (Tyler and Ormerod 1994). All apparently called American

dipper (Tyler and Ormerod 1994). Adults of these subspecies exhibit varying degrees of darkness and juveniles exhibit varying amounts of white and mottled plumage (Kingery 1996). There is no indication that any subspecies other than *C. m. unicolor* resides in the Black Hills (Pettingill and Whitney 1965, Anderson 2001). However, due to the geographic isolation of the subspecies on the Black Hills and its persistence in a unique ecological setting, experts have noted it is entirely likely the population is genetically, morphologically, and behaviorally distinct from other populations of this subspecies (Mengel 1970, Brown 1978, Lesica and Allendorf 1995, Backlund 2002a, Voelker 2002).

C. Adaptations and Behavior

The American dipper is uniquely adapted to live in and around cold, mountain rivers (Tyler and Ormerod 1994; Osborn 1999). The plumage of dippers is very dense, which helps insulate them against low air and water temperatures and also helps with evaporative cooling in hot weather. American dippers also cool themselves by standing in water to increase the loss of heat through their uninsulated legs and feet (Murrish 1970b). Dipper feathers are also heavily waterproofed and water rolls easily off their plumage upon emerging from streams. The dipper maintains its waterproofed plumage by frequent preening, in which the bird coats its feathers with oil from an unusually large preen gland situated at the base of the tail (Tyler and Ormerod 1994). The dipper has a strong, stout bill, which enables the bird to probe and forage among rocks for prey, primarily aquatic insects. The dipper does not have webbed feet, but rather large feet with strong toes and claws that enable the bird to grip rocks and pebbles on streambeds. The legs of dippers are long and strong and are used to swim in a paddling motion. Dipper wings are short, but have a very well-developed musculature that enables the bird to use its wings as flippers when foraging underwater. Like other aquatic birds, dippers have nasal flaps to prevent water from entering the nostrils (Tyler and Ormerod 1994).

American dippers have many physiological adaptations seen in other aquatic birds (Murrish 1970a). Upon submersion, dippers exhibit an immediate drop in heart rate, followed by a further gradual decline. Upon emerging from water, the heart rate rapidly increases. The blood of American dippers also has high hemoglobin concentration and therefore a greater capacity to store oxygen (Murrish 1970b, Tyler and Ormerod 1994). Dippers also have a highly developed sphincter muscle in the iris of the eye, similar to that found in other aquatic animals such as cormorants and marine turtles (Goodge 1960).

Two characteristic behavior patterns can be seen in American dippers: dipping and blinking (Tyler and Ormerod 1994). American dippers exhibit their characteristic dipping movement in a variety of situations, including during resting, foraging, territorial disputes, courtship and alarm. Dipping behavior is shared by other riparian

species of birds, although the behavior is not entirely similar to that of dippers. Frequent blinking of the eyes is a behavior unique to the dippers (Tyler and Ormerod 1994). The movement of the American dipper's white, feathered eyelids produces a striking white flash (Goodge 1960, Tyler and Ormerod 1994).

The calls of American dippers are similar to those of other species of dippers (Tyler and Ormerod 1994). Both sexes sing the dipper song (Fite 1984). The calls are loud and high-pitched and are concentrated within a narrow frequency belt above that of background streams noise, thus enabling long-distance communication between birds (Martens and Geduldig 1990). Stream noise is most intense at 3.0 to 3.5 kHz while most dipper call notes are at 4 kHz or more (Fite 1984). The voice of the American dipper is best described by naturalist John Muir (1894):

> The more striking strains are perfect abaresques of melody, composed of a few full, round, mellow notes, embroidered with delicate trills which fade and melt in long slender cadences. In a general way his music is that of streams refined and spiritualized. The deep booming notes of the falls are in it, the thrills of the rapids, the gurgling of margin eddies, the low whispering of level reaches, and the sweet tinkle of separate drops oozing from the ends of mosses and falling into tranquil pools.

American dippers are also unique in their underwater behavior (Price and Bock 1983, Tyler and Ormerod 1994, Osborn 1999). Dippers are excellent swimmers and have long fascinated observers by their ability to forage in water too deep and too swift for humans to stand upright (Muir 1894). Dippers dive underwater for several seconds (Tyler and Ormerod 1994), using their wings to maintain their position and to propel themselves and their legs to assist in foraging, cling to the bottom, and for paddling or swimming closer to the water surface (Goodge 1959). Dippers usually make a series of dives before moving to other foraging areas or resting (Tyler and Ormerod 1994).

D. Breeding

American dippers typically begin to establish breeding territories and initiate courtship early in the year, depending on where the birds wintered and the severity of the preceding winter (Price and Bock 1983). American dippers that winter in areas of open water with suitable breeding habitat attempt to establish territories on these wintering grounds, while nonwintering birds arrive and attempt to establish territories as ice melts from streams. Adult dippers exhibit high territory fidelity (Price and Bock 1983). The timing of the breeding cycle varies with geographical location and elevation (Kingery 1996). Winter and spring weather also affect the timing of the breeding cycle, as well as when ice melts off (Ealey 1977, Price and Bock 1983). Breeding territory establishment and courtship begins before spring runoff due to a decrease in food supply associated with runoff stream flows (Mecom 1969, Price and Bock 1983, Feck 2002). Egg formation by female

birds expends a large amount of energy and early breeding means that most clutches are laid before runoff, when food abundance is lower (Price and Bock 1983). In a Colorado study, courtship and territory establishment occurred in February and March, but in one year began in January due to a mild winter (Price 1975, Price and Bock 1983).

American dippers establish linear territories along a river and, unless forced to move by streams freezing over, usually remain in or near their territories most of the year (Sullivan 1973, Price and Bock 1983). Hahn (1950) described American dipper territories to be 732 to 1609 meters in length in Colorado. Bakus (1959a, b) described American dipper territories to be an average of 653 to 687 meters in length. The size of territories is strongly inversely related to the availability of food, primarily benthic macroinvertebrates, with territories of larger size indicating lower food availability and abundant food related to smaller territories (Price and Bock 1983, Tyler and Ormerod 1994). Territory size and establishment is also limited by territorial behavior and the presence or absence of neighboring territories (Price and Bock 1983).

American dippers aggressively defend territories, especially during the breeding season (Sullivan 1973, Price and Bock 1994). However, American dippers may or may not defend territories in the winter (Bakus 1959a, Sullivan 1973, Price and Bock 1983). The amount of stream cover and stream width also affects territory size, as well as the impacts of direct human disturbance (Price and Bock 1983). However, these factors have been described as of "secondary importance" given that they directly or indirectly affect food availability for dippers (Price and Bock 1983, Tyler and Ormerod 1994). The availability of suitable nest sites are also believed to affect territory size (Price and Bock 1983, Backlund 1994). The Black Hills population is at risk due to a limited number of nest sites (Backlund 2001). Dipper breeding habitat on the Black Hills is described as "swift mountain streams" by Pettingill and Whitney (1965).

There are four main phases of American dipper courtship behavior: 1) The Proximity Tolerance phase begins in December where potential mates allow feeding within the same winter territory; 2) The Courtship Feeding phase where begging females are fed by males; 3) The Singing phase where both males and females vocalize; and 4) The Flight-Chase phase where pairs jointly fly and maneuver over water (Sullivan 1973).

After territory establishment and courtship, the females choose a nest site and perform most of the nest construction (Price and Bock 1983). In the Black Hills, nest construction has been known as early as March 23, although nesting typically occurs from late April through July (South Dakota Ornithologists' Union 1991). Pettingill and Whitney (1965) describe nesting as occurring from late April through July. On the Black Hills, the male helps construct the nest (Backlund 2001).

Dipper nest sites are found at streamside rock cliffs, waterfalls, on large rocks in midstream, or on bridges (Pettingill and Whitney 1965, Sherman 1979, Price and Bock 1983, Osborn 1999, Backlund 2001, Feck 2002). Nest boxes are sometimes used by American dippers, although with varying degrees of success (Price 1975, Price and Bock 1983, Hawthorne 1979, Carty 1994, Backlund 2001). Population increases on the Spearfish Creek in the Black Hills have been attributed to the placement of nest boxes, although nest boxes on other streams in the Black Hills remain unused (Backlund 2001). Quality nest sites are based on four criteria: 1) height above water; 2) width of rock ledge; 3) presence of an overhang; 4) and security from predators (Sullivan 1973, Price and Bock 1983). Dipper nest sites are typically sheltered from weather (Price and Bock 1983). Dipper nests consists of a dome of moss lined with grass or pine needles (Tyler and Ormerod 1994, Backlund 2001), usually over water (Pettingill and Whitney 1965; Sullivan 1966, Sherman 1979, Backlund 2001, Feck 2002).

After nest construction, three to five eggs are laid in March or April and the female incubates them while the male usually feeds her (Sullivan 1973, Price and Bock 1983, Backlund 2001, Feck 2002). Following two weeks of incubation and about four weeks to fledging, pairs on the Black Hills may begin a second brood in May or June (Backlund 2001). Price and Bock (1983) documented that double brooding occurred in 40% of the pairs observed. However, this figure includes pairs that re-laid following a failed first nest, so the incidence of double broods is less than reported (Tyler and Ormerod 1994). Double brooding occurs among dipper populations on the Black Hills, although this behavior has not been quantified yet (Backlund 2001, Backlund 2003). This may explain the later nesting season documented on the Black Hills by Pettingill and Whitney (1965), Backlund (2001), and the South Dakota Ornithologists' Union (1991). Dippers are usually monogamous, but may be polygynous if nest sites are limited and concentrated and/or if food availability is low (Price and Bock 1973, Price and Bock 1983, Backlund 2001). A 12.8% rate of polygyny among American dippers in the Front Range of Colorado has been documented (Price and Bock 1973). Mate switching and itinerant breeding has also been observed among dippers (Osborn 2000).

E. Post-Breeding and Movements

Nest success is dependent upon many variables (Price and Bock 1983, Anderson 2001). Known causes of nest failure include: nest abandonment or death of adults, flooding, nest destruction, genetically damaged birds, starvation, disease, or death from other dippers (Price 1975, Price and Bock 1983). Ealey (1977) described nesting productivity dropping in a year with heavy flooding. Reproductive success of American dippers is influenced by habitat quality (Price and Bock 1983, Feck 2002). Backlund (2001) describes dipper populations on Spearfish Creek

in the Black Hills dropping significantly after a severe winter and heavy spring runoff. Osborn (1999) described most nests failing due to predation and flooding in Montana. Birds that lose their first nest may re-nest (Sullivan 1973, Price and Bock 1983).

The number of American dipper fledglings is determined by clutch size, precipitation during the nestling stage, and territory quality (Price and Bock 1983, Tyler and Ormerod 1994). American dipper fledging periods have been recorded at 24 and 25 days by Bakus (1959a) and at 23-28 days for 10 broods by Price and Bock (1983). Post-fledging mortality among American dippers is typically high (Price and Bock 1983, Tyler and Ormerod 1994). Fledglings are not independent for about 14 to 15 days after leaving the nest, during which they learn survival skills and continue to be fed by their parents (Sullivan 1973, Price and Bock 1983). Eventually, juveniles are forced from their parents' territory (Price and Bock 1983).

Upon independence, most juvenile dippers disperse upstream or between drainages (Price 1975, Price and Bock 1983, Ealey 1977). This dispersal is believed to be the result of juveniles searching for better foraging areas (Price and Bock 1983). Price and Bock (1983) documented juvenile dipper movements of between 2 and 75 km, with 10 km being the median distance and 17.8 the mean. However, they report it was difficult to determine whether juveniles moved or died. Price and Bock (1983) believe that, although water connections existed between drainages in their study area, both juvenile and adult dippers flew over ridges between drainages to other streams. Out of 558 individual dippers banded in their study, they observed 58 on other drainages. Juvenile dipper movements documented on Spearfish Creek thus far range from 0 to 9.66 km, although none have yet been observed on any other streams in the Black Hills (Backlund 2002b, Backlund 2003).

Most adults also leave their territories after breeding and move upstream and possibly between drainages to search for better foraging areas and to seek out refuges for molting (Price and Bock 1983). Price and Bock (1983) documented the longest adult movement in their study to be 25 km and also documented cross-drainage movements among adults. Adult movements on Spearfish Creek are much shorter and none have yet been observed on any other stream drainages in the Black Hills (Backlund 2002b, Backlund 2003).

In late summer (July through September), adult dippers undergo a complete molt phase during which they lose their flight feathers and cannot fly for 5-14 days (Sullivan 1973, Price and Bock 1983). During this molt phase, adult dippers seek out refuges among tangled logs and brush (Price and Bock 1983). Adult dippers spend much time hiding among roots and rocks at the river edge where they forage for food (Tyler and Ormerod 1994). Dippers are relatively inactive during molting, expending little energy foraging

(O'Halloran et al. 1990). Predation risk may be greater among foraging molting dippers (Bryant and Tatner 1988).

In fall and winter, juvenile and adult American dippers may migrate from higher elevations downstream in search of open water (Bakus 1959b, Price and Bock 1983, Backlund 2001). Pettingill and Whitney (1965) describe dippers on the Black Hills wintering on streams at lower elevations when those at higher elevations freeze over. Dippers that breed on streams that do not freeze in the winter tend to remain as residents (Price and Bock 1983). Price and Bock (1983) state, "[I]t is most probable that there was no regular, long-distance winter migration by our population" (p. 30). Winter mortality is higher than other seasons among American dippers due to winter stress (Ealey 1977, Price and Bock 1983).

In discussing seasonal movements of American dippers, Price and Bock (1983) explain that, "Altitudinal movements in spring (up) and fall (down) are of obvious adaptive value: they enable Dippers to avoid frozen habitat in winter, yet disperse as widely as possible for breeding" (p. 22). Seasonal movements of American dippers follows freezing and thawing of streams and often follows elevational gradients (Kingery 1996). Movements of American dippers to different elevations for breeding and wintering has also been documented by Bakus (1959a, b), who described dippers moving upstream in March when breeding began and downstream in October. Pettingill and Whitney (1965) describe seasonal movements in dippers on the Black Hills.

In terms of more broadscale movements of American dippers, Price and Bock (1983) state of populations in the Front Range of Colorado:

> Taking into account the strong tendency of many birds to remain on the study areas, the short-distance wandering observed in others, the short duration of many absences, and the large number of unbanded birds in the area, it is most probable that there was no regular, long-distance winter migration by our population. (p. 30)

Price and Bock (1983) observed two dippers had moved 55 and 75 km from their study area, the longest movement documented. Both observations were made within the same geographic area (Price and Bock 1983). They concluded, "Our fledglings initially tended to move upstream, but eventually dispersed randomly to an effective distance of probably over 20 km." (p. 34). They believe dispersal among dippers is facilitated by the existence of variable, patchy habitats. However, effective dispersal among American dippers does not appear to occur over long distances (>75 km) (Price and Bock 1983, Tyler and Ormerod 1994, Anderson 2001). Tyler and Ormerod (1994) believe American dippers are very unlikely to move between geographically separated areas. Price and Bock (1983) hypothesize that the reason there is only one subspecies of dipper north of Mexico is due to high dispersal rates. However, this situation could

also be attributed to the lack of taxonomic research or genetic comparisons among populations. Preliminary data suggests the dipper population on the Black Hills is relatively sedentary, with little to no interdrainage movements reported as of the date of this petition (Backlund 2003). Backlund (2001, 2002a) postulates that interdrainage movements among dippers must occur on the Black Hills, but that the success of these movements (i.e., the survival of the dispersing dipper) has been severely limited by habitat degradation and the existence of sink and other unsuitable habitats within the Black Hills.

While some report dippers only fly over water, American dippers have been observed flying over land (Skinner 1922, Bakus 1959b, Price and Bock 1983). Pettingill and Whitney (1965) describe dippers on the Black Hills flying within two or three feet above water. Extralimital records of American dippers are rare and consist of sparse, individual sightings (Bent 1948, Muelhausen 1970, Green 1970, Johnsgard 1997, Sibley 2000). There is no indication that extralimital records of American dippers are representative of regular movements, dispersal, or the establishment of new populations (Price and Bock 1983, Sibley 2001, Backlund 2002b). The fitness of dippers flying such long distances is questionable (Backlund 2001, Backlund 2002b). There are no extralimital records of American dippers between the Black Hills and the next-nearest populations of American dipper in the Big Horn Mountains of north-central Wyoming and the Laramie Range of east-central Wyoming (Luce et al. 1999, Cerovski 2002). Existing information strongly indicates broadscale movements (i.e., to other geographic areas and populations) of American dipper individuals to and from the Black Hills do not occur. The American dipper population on the Black Hills is disjunct from adjacent populations (Hall et al. 2002).

F. Foraging and Food

Foraging activity of dippers is divided into diving, swimming, wading at the river margins, turning stones and leaves, and gleaning stone surfaces (Tyler and Ormerod 1994). Dippers more frequently forage by wading in shallow water with heads submerged and by making short dives into slightly deeper water from perches on emergent rocks (Price and Bock 1983) Dippers may flycatch or glean prey from streamside rocks, but most foraging occurs in water (Goodge 1959, Sullivan 1973, Price and Bock 1983, Tyler and Ormerod 1994).

Dippers primarily feed on aquatic insect larvae, or benthic macroinvertebrates (Price and Bock 1983). Mayflies (Ephemeroptera) and caddisflies (Trichoptera) dominate dipper diets, with stoneflies (Plecoptera) and Diptera also comprising a significant portion of the diets of American dippers (Tyler and Ormerod 1994). Mayflies and caddisflies dominate dipper diets during breeding while caddisflies, mayflies, and diptera dominate dipper diets in the winter. (Mitchell 1968, Tyler and Ormerod 1994).

Nestlings are fed a much larger proportion of Ephemeroptera (Sullivan 1973). Ealey (1977) found dipper stomach contents contained mainly Ephemeroptera, Plecoptera, and Trichoptera, with some Chironomidae, Formicidae, Mymenoptera, and Diptera. Feck (2002) found dipper gut contents contained a high abundance of unidentified Ephemeroptera, Trichoptera, Ephemeroptera (*Drunella* spp., Heptageniidae), and predatory Plecoptera. Dippers occasionally feed on other invertebrates, small fish, and mollusks (Bakus 1959b, Mitchell 1968, Sullivan 1973, Price and Bock 1983, Tyler and Ormerod 1994). Larger prey are utilized more often (Mitchell 1968). The abundance of important dipper prey determines dipper presence (Feck 2002).

Aquatic insects preyed upon by American dippers are pollution intolerant (Price and Bock 1983, Tyler and Ormerod 1994, Osborn 1999, Feck 2002). Ephemeroptera, Trichoptera, and Plecoptera are especially sensitive to stream pollution, such as fine sediment and acidity (McCafferty 1978, Lemly 1982, Price and Bock 1983, Tyler and Ormerod 1994). Mayflies and caddisflies are intolerant of acidic waters (Ormerod et al. 1986, Ormerod and Tyler 1991, Ormerod et al. 1991, Tyler and Ormerod 1992, Tyler and Ormerod 1994). Sediment in streams can reduce benthic macroinvertebrates and has been documented to reduce fish reproduction and spawning (Crouse et al. 1991, Waters 1995, Magee et al. 1996). Benthic macroinvertebrates are used as reliable indicators of water quality (Wingett and Mangum 1979, Hilsenhoff 1988, Jackson and Resh 1989, Plafkin et al. 1989, Rosenberg and Resh 1993, The Xerces Society 1997, Stribling et al. 2000).

Trichoptera species and Ephemeroptera (*Drunella* spp. and Heptageniidae) live on cobble substrates (Merritt and Cummins 1996). Stoneflies (Plecoptera) on the Black Hills primarily inhabit cold, lotic stream habitats (Huntsman et al. 1999). Dippers are usually found in streams with rock, sand, and rubble substrates (Kingery 1996), which are also associated with the highest levels of aquatic invertebrates. (Pennak and van Gerpen 1947).

G. Habitat

American dipper habitat is universally accepted to be found along permanent, clean, cold, and swift mountain streams (Price and Bock 1983, Tyler and Ormerod 1994, Kingery 1996, Feck 2002). Tyler and Ormerod (1994) state:

> …Dippers prefer permanent rivers, with a steep gradient and with clear, fast-flowing well-oxygenated, unpolluted water with plentiful benthic macroinvertebrates (particularly caddis larvae and mayfly nymphs) for food; mid-stream rocks as perches, areas of riffles, pools and shallow water in which they can forage, and safe nest and roost sites in banks, on cliffs or in or on walls and under bridges. (p. 47)

Such habitat also provides for abundant and healthy populations of benthic macroinvertebrates (Pennak and van Gerpen 1947, Price and Bock

1983, Tyler and Ormerod 1994, Feck 2002). Tyler and Ormerod (1994) aptly state, "Healthy dipper populations on upland rivers throughout the world indicate healthy river ecosystems" (p. 201). Price and Bock (1983) elucidate, "Dippers are totally dependent on the productivity of streams and rivers" (p. 2). The presence of dippers is related to stream substrates, especially low levels of silt, gravel, and more boulders, and also the abundance of important dipper prey (Osborn 1999, Feck 2002). Dipper territories have more areas of whitewater than unused areas and a combination of riffles and glides in streams is important in the overall model of habitat (Tyler and Ormerod 1994, Osborn 1999, Feck 2002).

Streamside vegetation may impact dipper presence by influencing the availability and abundance of prey (Tyler and Ormerod 1994). Tyler and Ormerod (1994) state, "…broadleaved trees overhanging a stream contribute leaves and other organic matter which is broken down by shredding and grazing invertebrates, themselves prey for dipper" (p. 45). On the Black Hills, streamside vegetation varies. Forested riparian and wetland plant communities include box-elder (*Acer negundo*)/chokecherry (*Prunus virginiana*) forest, paper birch (*Betula papyrifera*)/hazel (*Corylus cornuta*) forest, ash-elm (*Fraxinus pennsylvanica-Ulmus americana*)/wolfberry (*Symphoricarpos occidentalis*) forest, white spruce (*Picea glauca*) alluvial forest, narrowleaf cottonwood (*Populus angustifolia*)/ red-osier dogwood (*Cornus sericea*) forest, cottonwood (*Populus deltoides*) - peach-leaf willow (*Salix exigua*) floodplain woodland, cotton wood/western snowberry floodplain woodland, aspen (*Populus tremuloides*)/chokecherry forest, bur oak (*Quercus macrocarpa*)/ironwood (*Ostrya virginiana*) forest, and peach-leaf willow woodland. There are a variety of shrubland and herbaceous riparian and wetland plant communities on the Black Hills (Marriott and Faber-Langendoen 2000). There is currently no information on the effects of streamside vegetation on American dippers in the Black Hills.

Nocturnal roosting habitats are an important component of American dipper habitat (Hendricks 2000). Sites selected by diurnal birds for nocturnal roosting are no less important for survival than sites they choose for nesting (Skutch 1989). American dippers on the Black Hills may use nest sites as shelters after the breeding season, especially in winter (Pettingill and Whitney 1965). Perching in vegetation, including trees along streams, has been reported occasionally for American dippers (Drew 1881, Merriam 1899, Bakus 1959, Osborn pers. comm. cited in Hendricks 2000). A juvenile American dipper was observed roosting in a black cottonwood tree at the tip of a branch overhanging a creek (Hendricks 2000). Hendricks (2000) states, "Use of nocturnal roosts in trees and shrubs overhanging moving water could be a more prevalent behavior among American dippers than previously suspected, particularly among fledglings and juveniles where predation is

potentially great" (p. 149). Roost sites may be an important habitat component on the Black Hills.

H. Population Ecology

Price and Bock (1983) have probably conducted the most intensive study of American dipper population dynamics to date. They documented seventeen important factors that regulate American dipper populations in different seasons. See Figure 3. In winter, American dipper populations were influenced by weather and ice, number of adults and juveniles surviving from breeding season, food availability, aggression, and roost availability. During breeding (spring and early summer), the number of survivors from the previous year, nest site quality, nest site dispersion, food availability, territoriality, and weather influenced populations. In summer, food and the availability of molt refuges influenced populations. Disease, competition from trout, predation on juveniles, and genetic composition of population were also thought to be of importance (Price and Bock 1983). Other studies of American dipper, as well as other dipper species, reach similar conclusions, suggesting that the general ecology of American dippers does not vary by geographic area, climate, or by population (Bakus 1959a, Bakus 1959b, Sullivan 1973, Ealey 1977, Ormerod et al. 1985, Vickery and Ormerod 1990, Vickery 1991, Tyler and Ormerod 1992, Tyler and Ormerod 1994, Osborn 1999, Sorace et al. 2002, Feck 2002, Marzolin 2002).

The American dipper population on the Black Hills is threatened with extirpation by stochastic events such as flooding, fires, and severe winter weather., as well as by the impacts of habitat degradation and the subsequent reduction in food abundance and availability (Backlund 2001).

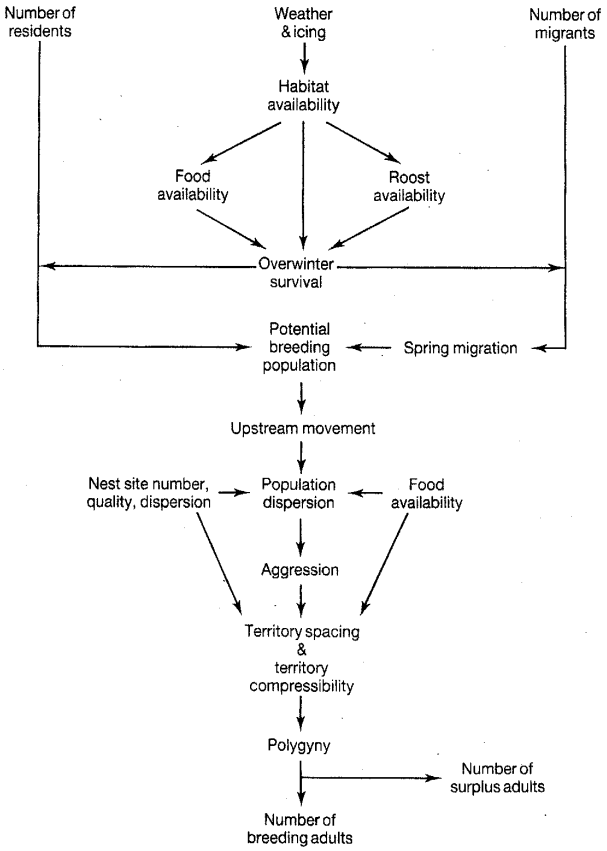

Figure 3. Factors suspected of having effects on American dipper population size (Price and Bock 1983).

Overall mortality rates of American dipper have been documented at 60.0% and 70.9% among dipper populations in two respective years (Price and Bock 1983). Juvenile mortality rates among dippers are higher than for adults (Galbraith and Tyler 1982, Price and Bock 1983). Mortality rates

of up to 77.3% for juvenile American dippers have been documented (Price and Bock 1983). Tyler and Ormerod (1994) state, "We estimate that around 16-20% survival of young birds is necessary to keep the population stable" (p. 142). While there is no information on survival rates of American dippers in the Black Hills, the Black Hills population is imminently threatened with extirpation (Backlund 2001, 2002a). Given the low population, recent overall declines, existence of numerous sink habitats, and the lack of stability among the dipper population (Backlund 2001), the survival rate of the American dipper population on the Black Hills may be less than 16%.

I. Population Status

The rangewide population of American dipper is unknown, but there is a general concern over its status in the western United States (Turbak 2000). Turbak (2000) states, "[R]esearchers suspect the birds' numbers cannot be large, due to their unusual habitat demands. With development in the western United States often occurring near water, biologists sometimes worry about the dipper's future" (p. 30). While overall American dipper population trends have remained stable according to Breeding Bird Survey data, dipper population trends in the Southern Rockies have experienced significant declines between the years 1966 and 2000 (Sauer et al. 2001).

On the Black Hills, much more is known about the status of the American dipper population. The dipper is a permanent, year-round resident of the Black Hills (Pettingill and Whitney 1965, Backlund 2001). Its populations have declined dramatically in recent years (Backlund 2001). Backlund (2001) states, "…the fact that the [dipper] population is declining is not [speculative]" (p. 2). Verified historic American dipper reports have been recorded on six streams and/or their tributaries in the Black Hills: French Creek; Rapid Creek; Box Elder Creek; Elk Creek; Whitewood Creek; and Spearfish Creek. See Figure 4. Pettingill and Whitney (1965) document that while the dipper was most numerous along Spearfish Creek in Spearfish Canyon, a few occurred along nearly all perennial, fast-flowing streams in the Black Hills However, Spearfish Creek is now identified as the only stream capable of sustaining a population of American dipper on the Black Hills (Backlund 2001). Other streams are unable to support self-sustained populations of dipper due to habitat degradation, erratic water flows, loss of water flow, poor water quality, and other impacts (Backlund 2001, Backlund 2002a). Backlund (2001) states, "Until it can be shown that Spearfish Creek is not the only source population of dippers in the Black Hills, the dipper population must be considered at high risk of extirpation" (p. 9).

i. French Creek

Backlund (2001) states that dippers "once thrived on French Creek" (p. 4). In 1924, six dipper nests, four with young, were reported on French Creek in a one mile section of stream in

early June (Patton 1924). According to Backlund (2001), this is a very high density for nesting dippers. Since 1996, when consistent monitoring first began, no dippers have been found on French Creek (Backlund 1994, Hays et al. 1996, Hays and Hays 1997b, R. Draeger and L. Johnson pers. comm. cited in Backlund 2001, Backlund, 2001). Portions of French Creek were checked in 1999 as well and found no American dippers (Backlund 2001).

ii. Rapid Creek

The Rapid Creek watershed is the largest on the Black Hills (Stewart and Thilenius 1964). Backlund (2001) states, "The American dipper was once common on Rapid Creek in Dark Canyon and in the Pactola area" (p. 4). Many reports of American dippers on Rapid Creek exist in South Dakota Bird Notes (Backlund 2001). Pettingill and Whitney (1965) describe several nest sites along Rapid Creek. As of 1991, the South Dakota Ornithologists' Union (1991) considered the American dipper to be found on Rapid Creek and intervening streams. Dippers were also regularly (1 to 2 per year) seen along Rapid City Christmas Bird Counts, which were conducted since 1954, until 1985. In recent years, there have been little to no sightings of dippers on Rapid Creek (Backlund 2001). Hays et al. (1996, 1997b) found no dippers or evidence of nesting. No evidence of nesting has been reported in recent years (Backlund 2001). Draeger and Johnson (pers. comm. cited in Backlund 2001) found no dippers in 2001 on Rapid Creek, but found old dipper nests at Thunderhead Falls, a tourist attraction. According to the owners of the tourist attraction, dippers nest every year at the falls, but this has not been confirmed. Thunderhead Falls is believed to be the only site left on Rapid Creek that provides suitable winter habitat for American dippers (Backlund 2001). Low winter flows and erratic flows out of Pactola Dam on Rapid Creek may have eliminated dippers from Rapid Creek and the stream is now considered a population sink for American dippers on the Black Hills (Backlund 2001).

iii. Box Elder Creek

While American dippers have rarely been reported from Box Elder Creek, there are indications the stream has supported and can support breeding populations (Pettingill and Whitney 1965, Backlund 2001). Box Elder Creek is heavily silted and consequently provides poor dipper habitat, although abundant suitable nest sites exist (Hays et al. 1996, Hays and Hays 1997b). One nesting pair of dippers were discovered on Box Elder Creek in 1993 (Backlund 2001). However, since 1996, no dippers have been found on the stream (Hays et al. 1996, Hays and Hays 1997b, Draeger and Johnson pers. comm. cited in Backlund 2001). Box Elder Creek is now considered a population sink for American dippers (Backlund 2001).

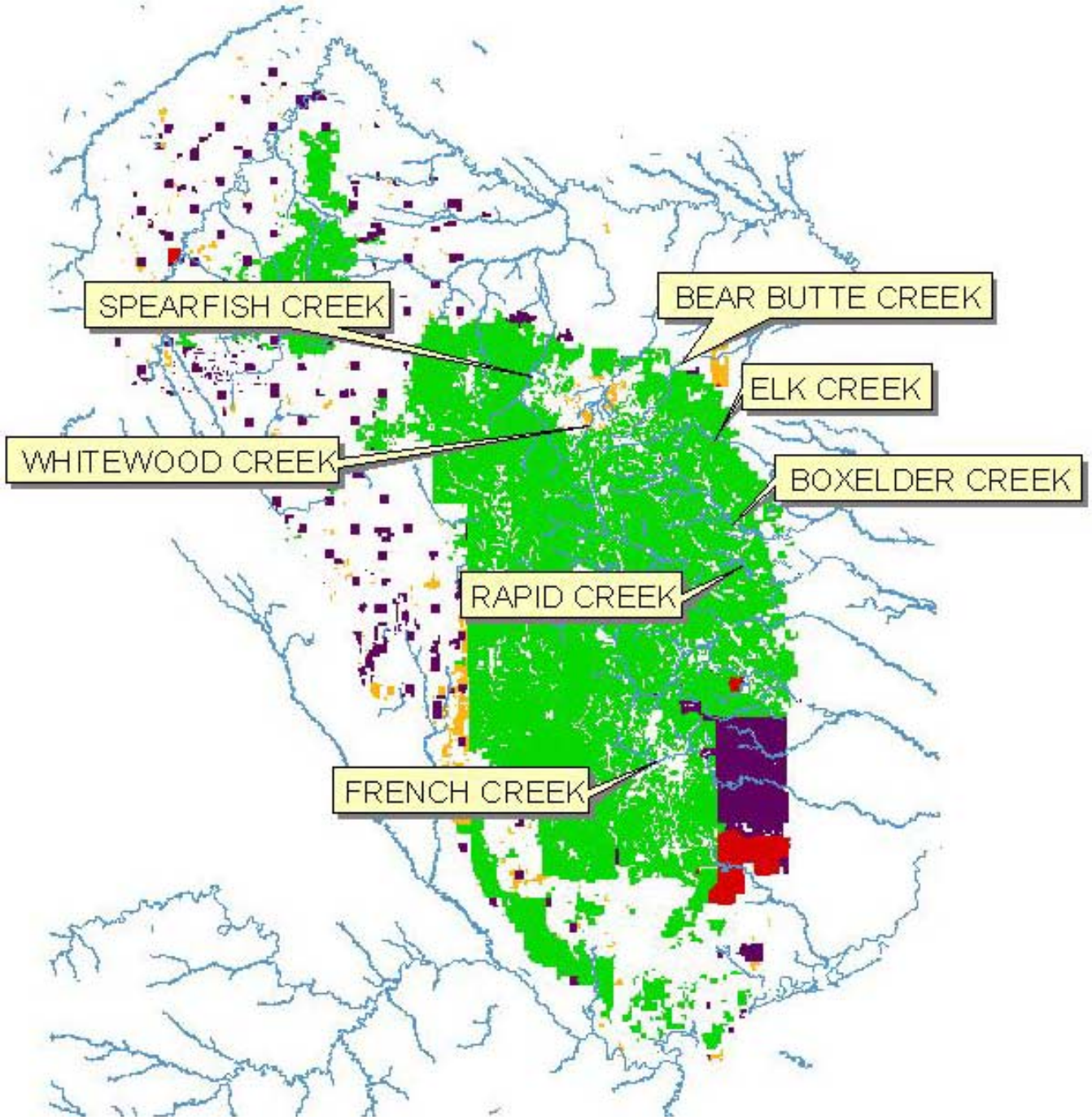

Figure 4. Location of streams that have historically supported or presently support American dipper in the Black Hills(Backlund 2001, Hall et al. 2002). Spearfish Creek appears to be the only stream still capable of sustaining a population of American dippers.

iv. Elk Creek

American dippers were first identified in the Black Hills on Elk Creek in 1874 (Ludlow 1875). Although individual dippers are occasionally seen on Elk Creek, surveys since 1996 have had negative results (Hays et al. 1996, M. Melius pers. comm. cited in Backlund 2001). Elk Creek provides poor dipper habitat due to sediment problems and low flows (Hays et al. 1996, Draeger and Johnson pers. comm. cited in Backlund 2001, Backlund 2001). Elk Creek is now considered a population sink for American dippers (Backlund 2001).

v. Bear Butte Creek

Dippers were not historically reported on Bear Butte Creek, although the stream has good dipper habitat and potential for nesting dippers (Hays et al. 1997b, Backlund 2001). Surveys in 1997 found no dippers. Two nests and at least one dipper were found on this stream in the summer of 2001 downstream of the town of Galena (Backlund 2001). One of the nests may have been successful. There were periodic sightings of dippers on Bear Butte Creek in 2000. While Backlund (2001) postulates Bear Butte Creek "has the potential to hold a small breeding population of dippers" (p. 6), Bear Butte Creek is impacted by mining pollution and sediment (Sorenson 1998; May et al. 2001, SDDENR 2002a).

vi. Whitewood Creek

Whitewood Creek downstream of Lead/Deadwood was historically dry by late summer and therefore incapable of supporting American dippers. Mining operations in the area now divert water from other streams and discharge into Whitewood Creek. Over the years, the mine tailings have filled in the swallow zones of the streambed and now the creek runs year-round. Dippers and evidence of dipper nesting have been reported on Whitewood Creek. Backlund (2001) states "this stream has so many environmental problems that it cannot be considered good long term habitat for dippers" (p. 6). This assertion is corroborated by the results of research on other dipper populations (Tyler and Ormerod 1994, Strom 2000, Strom et al. 2001, Feck 2002, Sorace 2002). However, while this stream is currently described as incapable of providing good long term habitat due to the extensive mine pollution (Backlund 2001), dippers do nest and winter along Whitewood Creek, indicating a potential for restoration.

vii. Spearfish Creek

American dippers have long been known to occur on Spearfish Creek (Pettingill and Whitney 1965, Backlund 2001). Backlund (1994) reports dippers occurring on Spearfish Creek and three tributaries to Spearfish Creek: Iron Creek; Little Spearfish Creek; and East Spearfish Creek. Out of concern over the dipper populations on the Black Hills, monitoring of populations began in 1993 and monitoring was standardized in 1997

(Backlund 1994, Hays et al. 1996, Hay and Hays 1997b). In 1993, 22 dippers and 10 nest sites were reported. Dipper populations on Spearfish Creek dropped in 1997 to 10 individuals, with only one nest site reported. The population declines were attributed to the winter of 1996 to 1997, one of the worst in history, and the spring flooding that followed. See Figure 5. Since then, dipper populations have reached a high on Spearfish Creek, with 28 birds and 15 nest sites reported in 2001. However, population trends on Spearfish Creek between the years 1993 and 2001 are anything but stable, exhibiting declines of up to seven birds between the years 1993 to 1996, 1996 to 1997, and 1998 to 1999. See Figure 5.

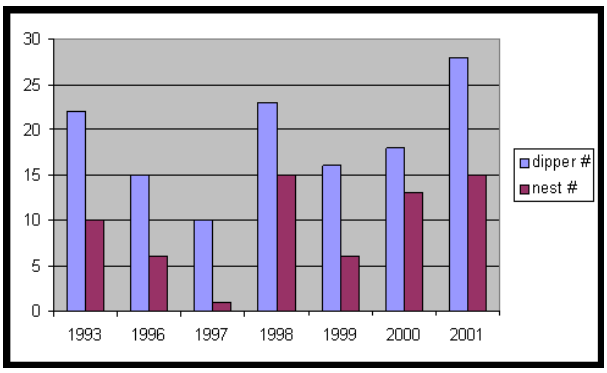

Figure 5. American dipper population on Spearfish Creek, 1993-2001 (Backlund 2001).

Portions of Spearfish Creek are identified as heavily silted and incapable of supporting American dippers (Backlund 2001, USFS 2002d). Spearfish Creek is also suffering from numerous other water quality problems, such as excessive sediment, low flows, septic system pollution, and mining pollution (USFS 2002d, May et al. 2001). The USFS (2002d) states, "The cumulative effects of sewage, low water and sediment delivery could be significant" (p. 8).

Recent increases in populations have been attributed to the placement of nesting boxes through a program initiated by the South Dakota Game, Fish and Parks ("SDGFP") in 1997 (Backlund 2001). Backlund (2001) hypothesizes nest boxes helped elevate dipper populations in two ways: 1) nest boxes provided good nest sites that are easier to locate and 2) the increase in available nest sites encouraged dippers to remain on Spearfish Creek, rather than seek out new territories in sink habitats (e.g., Elk Creek, Box Elder Creek, and Rapid Creek). However, studies of American dipper use of nest boxes show mixed results in other areas (Price 1975, Price and Bock 1983, Hawthorne 1979). Carty (1994) describes 6 of 26 nest boxes used in one year in Colorado.

Unfortunately, increased dipper populations on Spearfish Creek have not translated to other streams on the Black Hills. With the possible exception of Bear Butte Creek, surveys in 2001, as well as preliminary 2002 banding studies, found no evidence of dippers reestablishing breeding populations on any other streams in the Black Hills (Backlund 2001, Backlund 2003). Additionally, nest boxes placed on Rapid Creek, French Creek, and Box Elder Creek have not been utilized by dippers, and natural nest sites have remained unoccupied (Backlund 2001). With Spearfish Creek as the only stream capable of supporting a self-sustaining population of American dipper on the Black Hills, the

population is now extremely susceptible to extirpation by stochastic events and other human-caused impacts (Lande 1993, Hanski and Moilanen 1996, Backlund 2001).

viii. Other streams

There are no verifiable reports of American dipper on Spring Creek, Battle Creek, Iron Creek in the southern Black Hills, or Beaver Creek in the southern Black Hills (Backlund, 2001). There are also no verified reports of dippers or dipper nesting on Sand Creek in the northwestern Black Hills of Wyoming or the Bear Lodge Mountains in northeastern Wyoming (Cerovski 2002; Luce et al. 1999). One dipper sighting was reported on Beaver Creek in the west-central Black Hills. While dippers undoubtedly visit other small streams in the Black Hills when searching for new territories, these dippers probably perish in the winter or from other causes, or may return to their original streams (Backlund 2001).

IV. CRITERIA FOR CLASSIFYING THE BLACK HILLS POPULATION OF AMERICAN DIPPER AS A DISTINCT POPULATION SEGMENT

The USFWS's policy on classifying a population as a DPS under the ESA states:

> Three elements are considered in a decision regarding the status of a possible DPS as endangered or threatened under the Act. These are applied similarly for addition to the lists of endangered and threatened wildlife and plants, reclassification, and removal from the lists:
>
> 1. Discreteness of the population segment in relation to the remainder of the species to which it belongs;
> 2. The significance of the population segment to the species to which it belongs; and
> 3. The population segment's conservation status in relation to the Act's standards for listing (i.e., is the population segment, when treated as if it were a species, endangered or threatened?).
>
> Discreteness: A population segment of a vertebrate species may be considered discrete if it satisfies either one of the following conditions:
> 1. It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.
> 2. It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.
>
> Significance: If a population segment is considered discrete under one or more of the above conditions, its biological and ecological significance will then be considered in light of Congressional guidance (see Senate Report 151, 96th Congress, 1st Session) that the authority to list DPS's be used "sparingly" while encouraging the conservation of genetic diversity. In carrying out this examination, the Services will consider available scientific evidence of the discrete population segment's importance to the taxon to which it belongs. This

consideration may include, but is not limited to, the following:
1. Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon,
2. Evidence that loss of the discrete population segment would result in a significant gap in the range of a taxon,
3. Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range, or
4. Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.
Because precise circumstances are likely to vary considerably from case to case, it is not possible to describe prospectively all the classes of information that might bear on the biological and ecological importance of a discrete population segment.

Status: If a population segment is discrete and significant (i.e., it is a distinct population segment) its evaluation for endangered or threatened status will be based on the Act's definitions of those terms and a review of the factors enumerated in section 4(a). It may be appropriate to assign different classifications to different DPS's of the same vertebrate taxon.

61 Fed. Reg. 4721-4725 (February 7, 1996). As Petitioners describe below, research strongly indicates the Black Hills population of American dipper is not only discrete and significant, but that this species' status on the Black Hills meets the criteria for listing as threatened or endangered under the ESA. Therefore, the American dipper on the Black Hills warrants classification and consideration as a DPS and listing as threatened or endangered under the ESA.

A. Discreteness

The Black Hills DPS of American dipper is markedly separated from other populations of American dippers as a consequence of physical and ecological factors.

i. The Black Hills population of American dipper is physically separated from other populations.

Dippers (*Cinclus*) are believed to have originated in Eurasia 4 million years ago (Voelker 2002). Shortly after, the species moved into North America during a Beringian interglacial period, leading to the establishment and development of *Cinclus mexicanus*, as well the South American species of dipper (*C. schulzi, C. leucocephalus*). It is believed that movement of the American dipper into the Black Hills occurred during the Wisconsin glaciation 13,000 to 30,000 years before the present (Backlund 2001). At that time, direct water connections between the Rocky Mountains and the Black Hills existed and much of the central portion of the United States was covered with boreal forest (Bailey and Allum 1962, Cross et al. 1989 and Huntsman et al. 1999). Also during this period of glaciation, the cordilleran-montane zone of the Rocky Mountains was depressed about 1200-1400 m, extending the range of biota within this zone from the Laramie and Big Horn Mountain Ranges of Wyoming

eastward to the Black Hills (Turner 1974, Huntsman et al. 1999).

Sometime between 10,500 and 13,000 years before the present, the ice sheet of the Wisconsin glaciation period begin receding. As the ice sheet retreated, the boreal forests followed and were replaced by the steppe habitat of the Great Plains (Hoffman and Jones 1970). The montane species that had expanded into the Black Hills became isolated in the refuge formed there, unable to disperse across or survive on the grasslands (Turner 1974). It is believed this vicariant event is responsible for the disjunct dipper population on the Black Hills today (Backlund 2001). Indeed, this event has been linked to the origin and establishment of disjunct species of stoneflies, mayflies, mammals, plants, and fishes on the Black Hills (Bailey and Allum 1962, Turner 1974, Van Bruggen 1985, McCafferty 1990, Huntsman et al. 1999). Similar vicariant events have also been linked to dipper speciation in other areas of the world. For instance, the uplift of the northern Andes, the creation of coastal lowlands, and the subsequent climatic and habitat shifts in coastal Colombia are believed to have led to the split between the ancestral North and South American species of *Cinclus*. The coastal lowlands of northwestern Colombia today appear to form a barrier to the southern expansion of the American dipper (*C. mexicanus*) and the northern expansion of white-capped dipper (*C. leucocephalus*) (Voelker 2002). This area is also believed to be a barrier to dispersal and interchange among pipits (Voelker 1999). Similarly, the region of southern Bolivia also serves as a disjunction between the northern white-capped dipper (*C. leucocephalus*) and the southern rufous-throated dipper (*C. schulzi*). This region also has a long history of vicariant events (Sébrier et al. 1988, Seltzer 1990, Voelker 2002). A similar barrier, formed by the same vicariant events that are responsible for dipper population isolation and speciation in the Americas, exists today between the Black Hills and montane ecosystems to the west.

Existing information strongly indicates the Black Hills population of American dipper is now physically separated and isolated from the next nearest populations in the Big Horn Mountains of north-central Wyoming and the Laramie Mountains of eastern Wyoming. The Black Hills are separated from these mountain ranges by over 240 km of rolling grasslands with little change in elevation (Hall et al. 2002, Backlund 2001). This area is incapable of supporting American dippers and is a barrier to dispersal and interchange (Backlund 2001, Backlund 2002a). Indeed, the USFWS (1993b) has noted, “The isolated location of the Black Hills is an obstacle to migration or perhaps even the survival of a slow, highly specialized type of animal” (p. 1). A similar geographic barrier is believed to prevent the American dipper from dispersing into South America (Voelker 2002).

The grasslands surrounding the Black Hills are marked by streams that are “typically silt-laden, turbid, alkaline, and subject to erratic

fluctuations" (Smith and Hubert 1989, p. 27). Such stream conditions are contributing to the decline and endangerment of the Black Hills population of American dipper (Backlund 2001). The presence of dippers is related to stream substrates, especially low levels of silt and gravel and more boulders, and to the abundance of important prey (Osborn 1999, Feck 2002). The Powder River, which drains 34,300 square kilometers in northeastern Wyoming and southeastern Montana is characterized as a "meandering, highly braided stream with an unstable sand and silt bottom. It flows through highly erodable sedimentary material and the water is naturally turbid and saline…" (Smith and Hubert 1989, p. 28-29). Both the Belle Fourche and Cheyenne Rivers, which bound the Black Hills to the north and south respectively, flow through the same geologic province and exhibit similar water qualities and flow characteristics (Bureau of Land Management 2002, 2003). Dippers are usually found in areas with rocks, sand, and rubble bottoms (Kingery 1996). Dippers also utilize unpolluted, fast-flowing streams with rocks in the water column (Tyler and Ormerod 1994). Streams that support dippers are typically of higher gradient and are marked by riffles and shallow pools (Tyler and Ormerod 1994, Osborn 1999). Aquatic insects that are the primary prey of American dipper, require cold, clean streams with rocky streambeds to complete their life cycles (Huntsman, et al. 1999 and Feck 2002). The availability of aquatic insect prey significantly limits populations of American dipper (Price and Bock 1983, Tyler and Ormerod 1994, Feck 2002).

American dippers rarely wander from water and are rarely seen outside their preferred habitat (Pettingill and Whitney 1965, Backlund 2001). The Black Hills population of American dipper is permanent and resides year-round in the Black Hills (Backlund 2001). The Black Hills population of American dipper is considered disjunct from adjacent populations (Hall et al. 2002).

There have been no reports or sightings of an American dipper or dippers on the grasslands and streams between the Black Hills and the Big Horn and Laramie Mountain Ranges (Luce et al. 1999, Cerovski 2002). While extralimital accounts of American dippers exist, these records are extremely rare and do not seem to represent dipper dispersal or regular migration (Sibley 2000, Backlund 2002b). In 1970 for example, a dipper was seen on the northwest shore of Lake Superior, Minnesota, nearly 1400 km from the next nearest population in the Black Hills (Green 1970 and Muelhausen 1970). Additionally, since 1960 there have been at least four records of individual dippers in Nebraska (Johnsgard 1997). These accounts are characterized as "extremely rare" (Backlund 2002a). There is no indication that such movements are in any way regular, predictable, sustainable, or healthy to the individual dipper reported (Price and Bock 1983, Tyler and Ormerod 1994, Backlund 2002b). It is

entirely unlikely that such sparse, broadscale movements could lead to the establishment of a sustained dipper population in unoccupied, but potentially suitable habitats further east than the species' current range. Indeed, the movement of one dipper, when not followed by the regular movement of others, cannot possibly lead to the establishment of a population.

It is also difficult to view such movements as representing or supporting the notion or possibility of interchange and interaction between the Black Hills population of American dipper and populations in the Laramie and Big Horn Mountain Ranges of Wyoming (Backlund 2002a). It is very unlikely that American dippers move between geographically separated areas (Tyler and Ormerod 1994). While research of American dipper populations have documented movements between watersheds of up to 55 and 75 km, this is nowhere near the distance separating the Black Hills from the Big Horn Mountains (Price and Bock 1983). Additionally, these movements were documented within the same geographical area, indicating the movements were representative of dipper dispersal between drainages. Such interdrainage movement and dispersal has been documented among American dippers (Price and Bock 1983, Kingery 1996). Finally, preliminary studies of dipper movements on Spearfish Creek, which is now the only stream on the Black Hills capable of supporting a self-sustaining dipper population, suggests individuals on the Black Hills are relatively sedentary, often remaining at or near breeding territories and nest sites throughout the year (Backlund 2001, 2002b). As of the date of this petition, of the 25 dippers banded in early to mid-2002, none have been observed on streams outside the Spearfish Creek watershed. The greatest movement documented by a dipper on Spearfish Creek to date has been a downstream migration of 6 miles (9.66 km) (Backlund 2003). These results, while preliminary, indicate a lack of broadscale movement among the Black Hills population of American dipper. Such geographic and physical isolation has led the USFWS to consider listing other populations, such as those of the western gray squirrel in the State of Washington, under the ESA (USFWS 2002b, 67 Fed. Reg. 65931-65933).

Even if sparse, accidental movements between the Black Hills and the Big Horn or Laramie Mountains may be occurring, such movements are not representative of a regular interchange or interaction between populations (Backlund 2002b). The Black Hills population of American dipper has suffered significant declines over the years, strongly indicating the Black Hills population of dipper is not maintained or replenished by distant populations (Backlund 2001, Panjabi 2001). Additionally, even if sparse, accidental movements of dippers may be occurring between the Black Hills and the Big Horn Mountains, this does not preclude consideration and classification of the population as discrete for the purposes of listing as a DPS under the ESA. The USFWS's DPS policy

explicitly states that complete reproductive isolation is not required to recognize discreteness of a population (61 Fed. Reg. 4721-4725). The agency states:

> The Services do not consider it appropriate to require absolute reproductive isolation as a prerequisite to recognizing a distinct population segment. This would be an impracticably stringent standard, and one that would not be satisfied even by some recognized species that are known to sustain a low frequency of interbreeding with related species.

61 Fed. Reg. 4724 (February 7, 1996). Indeed, the USFWS recently determined the population of yellow-billed cuckoo west of the Rocky Mountain crest warranted listing under the ESA, despite a lack of complete reproductive isolation among the population (USFWS 2001b, 66 Fed. Reg. 38611-38626). The agency stated:

> …yellow-billed cuckoos within the described DPS are not wholly isolated from eastern yellow-billed cuckoo populations by the Rocky Mountain crest in west Texas, and to a lesser extent, further north…..Although the Rocky Mountains may not wholly prevent movements of yellow-billed cuckoos across the Rocky Mountain crest, the available information indicates that the Rocky Mountains substantially separate yellow-billed cuckoo populations occurring east and west of their crest.

66 Fed. Reg. 38618-38619 (July 25, 2001). Similarly, available information strongly indicates the plains of northeastern Wyoming substantially separates – if not completely separates –the Black Hills population of American dipper from populations in the Big Horn and Laramie Mountain Ranges of Wyoming.

ii. The Black Hills population of American dipper is ecologically separated from other populations

The ecosystem of the Black Hills is separated and isolated from other ecosystems that support American dipper populations. The Black Hills ecosystem comprises one of 64 ecoregions in the continental United States (Bailey 1995, Hall et al. 2002). The Black Hills ecoregion is further unique in that it is the smallest ecoregion and is the only ecoregion entirely surrounded by another ecoregion, the Northern Great Plains Steppe (Northern Great Plains Steppe Ecoregional Planning Team 1999, Hall et al. 2002). The next nearest populations of American dipper exist in entirely different ecoregions, including the Middle and Southern Rockies ecoregions (Bailey 1995, Luce et al. 1999, Welp et al. 2000, Backlund 2001).

Additionally, the Black Hills are well-known for their unique ecological attributes, which are separated from other montane ecosystems to the west. The USFS (1996a), quoting Froiland (1990), states:

> Nowhere else on the continent can be found an area of such diversity within such a relatively restricted space. The fact that the Hills are a relatively small, isolated upthrust surrounded by high, dry plains, means that the environment is very

> fragile, at best. As a result, changes become critical and more pronounced than in larger, more uniform, ecosystems. Moreover, what may appear to be minor or subtle changes at the present time, often have an impact that results in much greater changes and environmental problems over a period of time. (p. III-8)

Agencies like the USFS, USFWS, and the South Dakota Game, Fish, and Parks have also recognized the unique ecosystem of the Black Hills and its importance as an ecosystem disjoined from forested ecosystems to the west (USFS 1996a, Backlund 2001).

B. Significance

The Black Hills population of American dipper is significant because it persists in an ecological setting that is unique for the taxon and because the loss of the population would result in a significant gap in the range of the American dipper.

i. The Black Hills population of American dipper persists in a unique ecological setting

The Black Hills supports a unique ecosystem that is found nowhere else in North America (Froiland 1978, 1990, Raventon 1994). The USFWS has stated, "This isolated forest among the prairie provides a unique ecosystem" (p. 1). Froiland (1978) states:

> The Black Hills area is in many respects one of the most fascinating in North America from the biological, particularly biogeographic and taxonomic standpoints. Several factors have contributed towards making the Hills unique biologically. The climatic variability; their geographic location, near the center of the continent; their isolation as a mountainous upthrust surrounded on all sides by the High Plains; and variable topography, have combined in this relatively restricted area to produce an extremely interesting and diverse flora and fauna. (p. 78)

The Black Hills are also their own ecoregion (Bailey 1995, Hall et al. 2002). Ecoregions were classified by the USFS as an "essential tool" for ecosystem management that recognized ecological units with similar climate, physiography, water, soils, air, hydrology, and vegetation (McNab and Avers 1995). The USFS (1996a) states:

> In the hierarchical ecological mapping system of ecosystems used by the Forest Service, the Black Hills is in the "Dry domain, Temperate-steppe Regime of the Mountain Division" (USDA Forest Service 1994). Because the Black Hills is clearly distinct from the surrounding prairie, the Black Hills exclusively comprises the next two smaller subdivisions: the "Black Hills Province" and the "Black Hills Section." This is significant because provinces often comprise an entire state or several states and often cover several national forests. (p. III-5).

The fact that the Black Hills are their own ecoregion strongly indicates the Black Hills population of American dipper persists in a unique ecological setting.

The Black Hills are also considered a biogeographical island and support a host of

endemic species and/or subspecies of animals (Turner 1974, USFWS 1993b, USFS 1996a, Hall et al. 2002). Examples of endemic species on the Black Hills include:

- Black Hills red-bellied snake (*Storeria occipitomaculata pahasapae*), an endemic snake subspecies that is found in mesic environments with abundant ground cover on the Black Hills (Hall et al. 2002);
- Black Hills red-backed vole (*Clethrionomys gapperi brevicaudus*), an endemic subspecies of red-backed vole that is found in cool, mesic conifer stands of the Black Hills (Hall et al. 2002);
- Black Hills red squirrel (*Tamiasciurus hudsonicus dakotensis*), an endemic subspecies of red squirrel that is found in coniferous forests of the Black Hills (Hall et al. 2002); and
- Bear Lodge mountainsnail (*Oreohelix* n. sp. 2), Black Hills mountainsnail (*Oreohelix cooperi*), and Pahasapa mountainsnail (*Oreohelix* n. sp. 1), all endemic species of land snails in the Black Hills that inhabit mesic environments primarily in the northern Black Hills (Frest and Johannes 2002).

There is no other population of American dipper that inhabits the same ecosystem as these endemic species and/or subspecies (Hall et al. 2002).

The Black Hills also support a host of disjunct species and/or subspecies of plants and animals, some separated from the next nearest populations by nearly 600 km (Turner 1974, McCafferty 1990, USFWS 1993b, Huntsman et al. 1999, Hall et al. 2002). These disjunct populations are usually representative of the extreme range limit of their species (Turner 1974, Van Brugen 1985, McCafferty 1990, Huntsman et al. 1999, Hall et al. 2002). This faunal "mixing" in the Black Hills is unique in that many species distributed in the eastern United States have their westernmost range limits in the Black Hills (Turner 1974, McCafferty 1990, Huntsman et al. 1999, Hall et al. 2002). Examples of these "eastern" species in the Black Hills include:

- Eastern smooth green snake (*Liochlorophis vernalis vernalis*), an eastern subspecies of smooth green snake with its western-most distribution in the Black Hills (Baxter and Stone 1985);
- Tawny Crescent (*Phyciodes batesii*), an eastern butterfly species with its westernmost distribution in riparian areas of the Black Hills (Hall et al. 2002);
- Keen's myotis (*Myotis keenii*), a bat species with its westernmost distribution in the Black Hills (Turner 1974);
- Foxtail sedge (*Carex alopecoidea*), a plant species with its westernmost distribution in the northern Black Hills (Hall et al. 2002);
- Blunt-broom sedge (*Carex tribuloides*), a plant species with its westernmost distribution along French Creek in the Black Hills (Hall et al. 2002);

- Longstalk sedge (*Carex pedunculata*), a plant species with its westernmost distribution near Spearfish Creek in the Black Hills (Hall et al. 2002);
- Bloodroot (*Sanguinaria Canadensis*), a plant species with its westernmost distribution near Spearfish Creek in the Black Hills (Hall et al. 2002);

Because its range is entirely in western North America, the American dipper typically does not inhabit the same ecosystem as these "eastern" species. Therefore, the existence of these "eastern" species in the Black Hills strongly indicates the Black Hills population of American dipper persists in an ecological setting unique to the taxon.

The existence of "eastern" species is further significant in terms of the aquatic insects that exist within Black Hills streams. Certain species of mayflies and stoneflies that typically inhabit the eastern United States have their westernmost distribution in the Black Hills (McCafferty 1990, Huntsman et al. 1999). Research has shown that stoneflies and mayflies, as well as other aquatic insects, are preyed upon extensively by American dipper (Tyler and Ormerod 1994, Feck 2002). Therefore, the Black Hills population of American dipper most likely exploits prey that are entirely unique to the taxon. See Table 1.

The Black Hills are also considered a botanical melting pot and an "ecological crossroad," with strong floristic ties to four of the North American biomes – cordilleran forest, grassland, eastern deciduous forest, and northern coniferous forest (USFS 1996b, Marriott et al. 1999, Fertig and Oblad 2000). Roughly 30% of the plant species on the Black Hills are Rocky Mountain species, 17% are Great Plains species, 9% are eastern deciduous species, 6% are northern (i.e., boreal) species, 4.5% are southwestern, and the remainder are widespread species (Froiland 1978, Marriott et al. 1999, Fertig and Oblad 2000). This botanical "mixing zone" exists nowhere else in North America (Froiland 1990). Thus, the Black Hills population of American dipper persists in a unique botanical setting.

Table 1. "Eastern" Mayfly and Stonefly Species of the Black Hills (McCafferty 1990, Huntsman et al. 1999)

	"Eastern" mayfly and stonefly species in the Black Hills	**American dipper streams in the Black Hills (historically and presently inhabited) where species is reported**
MAYFLIES:	*Baetis brunneicolor*	French Creek
	Baetis intercalarias	Box Elder Creek, Rapid Creek
	Paraleptophlebia mollis	Box Elder Creek, Rapid Creek
STONEFLIES:	*Neomoura trispinosa*	Whitewood Creek, Spearfish Creek
	Isoperla transmarina	Rapid Creek

The USFWS has determined other DPSs warrant listing because of a population's persistence in unique or different ecological settings. For example, in an affirmative 12-month finding on a petition to list the Washington population of western sage grouse, the agency stated:

> [W]e conclude the Columbia Basin represents a unique ecological setting due to its geologic, climatic, edaphic, and plant community components. In addition, the unique elements of the Columbia Basin ecosystem affect the essential habitat requirements of western sage grouse. Necessarily, the population segment of western sage grouse occupying the Columbia Basin must differentially exploit the resources that are available, as compared to the population segment within the ecosystems of central and southern Oregon.

66 Fed. Reg. 22991 (May 7, 2001). The agency subsequently determined the Washington population of western sage grouse warranted listing under the ESA.

Similarly, the Black Hills represents a unique ecological setting. As Table 2 shows, the Black Hills ecosystem differs markedly from the ecosystems of the Laramie and Big Horn Mountain Ranges of Wyoming in many regards. When compared to these nearby ecosystems, which also support American dipper, one finds differences in elevations, geology, climate, riparian vegetation communities, and ecoregional settings. See Table 2. For instance, elevations in the Black Hills are typically lower than those in the Laramie and Big Horn Mountains of Wyoming. Indeed, elevations along Spearfish Creek range from 3,600 – 5,400 feet (USFS 1996a), whereas this elevation range is near the lowest elevations of the Laramie and Big Horn Mountain Ranges. Major differences in riparian plant community composition are also evident. While some similar communities exist in each mountain range, the Black Hills support many distinct communities that are not found in the Big Horn and Laramie Mountain Ranges. For instance, white spruce, paper birch, and bur oak riparian vegetation communities exist along streams only in the Black Hills. Additionally, the Black Hills do not support Engelmann spruce or subalpine fir communities, whereas the Laramie and Big Horn Mountain Ranges of Wyoming do. This indicates the Black Hills population of American dipper most likely utilizes unique streamside habitats in the Black Hills. Finally, the Laramie and Big Horn Mountain Ranges occur in entirely different ecoregions, a strong indication that there are major differences in climate, physiography, water, soils, air, hydrology, and vegetation between these mountains and the Black Hills (Bailey 1995, McNab and Avers 1995 Hall et al. 2002).

Table 2. Ecological Components of Big Horn Mountains, Laramie Range, and Black Hills

Location of American dipper population	**Elevations (ft)** (USFS undated pub., Packer 2000, Hall et al. 2002)	**Geological Conditions** (von Ahlefeldt 1996, Welp et al. 2000, Hall et al. 2002)	**Climate** (USFS undated pub., von Ahlefeldt 1996, Packer 2000 Hall et al. 2002)	**Major Forest and Shrub Riparian Plant Communities** (von Ahlefeldt 1996, Welp et al. 2000, Marriott and Faber-Langendoen 2000)	**Ecoregion** (von Ahlefeldt 1996, Welp et al. 2000, Hall et al. 2002)
Big Horn Mountains	4,000 - 13,175	Precambrian igneous and metamorphic/ limestones and dolomites/ sandstones/ shales	Variable/10-~40" precipitation/ year	Engelmann spruce-red-osier dogwood/ Engelmann spruce-soft horsetail/ narrowleaf cottonwood-red-osier dogwood/ narrowleaf cottonwood/chokecherry narrowleaf cottonwood/Wood's rose aspen-Candaian reedgrass ponderosa pine-red-osier dogwood water birch-red-osier dogwood	Central-Northern Rocky Mountains
Laramie Range	4,210 - 10,272	Late Archaen plutonic rocks	Variable/dry/ 13-16" precipitation/ year	subalpine fir-sweetscented bedstraw/ Englemann spruce-field horsetail/ ponderosa pine-red-osier dogwood/ narrowleaf cottonwood-water birch/ narrowleaf cottonwood-red-osier dogwood/ aspen-Wood's rose/ mountain maple-red-osier dogwood/ thinleaf alder-water birch-water sedge/ chokecherry-western snowberry/ shrubby cinqefoil-tufted hairgrass/ willow-bluejoint reedgrass/ willow-beaked sedge	Southern Rocky Mountain Steppe
Black Hills	3,000-7,242	Precambrian igneous and metamorphic/ limestone plateau/ sandstones/ tertiary volcanics	Variable/ continental/ 14-29" precipitation/ year	paper birch-hazel/ white spruce alluvial/ narrowleaf cottonwood-red-osier dogwood/ ash-elm-wolfberry forest/ bur oak-ironwood/ water birch-red-osier dogwood/ black hawthorne shrubland/ bebb (beaked) willow scrub/ sandbar willow shrubland/ western snowberry shrubland	Black Hills

The unique ecological setting of the Black Hills also suggests the Black Hills population of American dipper may have adopted unique behavioral and/or physiographical adaptations. Indeed, in listing the Peninsular bighorn sheep as a DPS, the USFWS noted the sheep occurs "in an area that has marked climatic and vegetation differences as compared to most other areas

occupied by bighorn sheep," which "suggests unique behavioral and/or physiographical adaptations." 63 Fed. Reg. 13134, 13136.

Additionally, the USFWS has determined that disjoined suitable habitats represent a unique or unusual ecological setting. In determining the Jarbidge River population of bull trout warranted listing as threatened under the ESA, the USFWS stated:

> [S]ince the Jarbidge River possesses bull trout habitat that is disjunct from other patches of suitable habitat, the population segment is considered significant because it occupies a unique or unusual ecological setting, and its loss would result in a substantial modification of the species' range.

64 Fed Reg. 17113 (April 8, 1999). Similarly, suitable dipper habitat on the Black Hills is highly disjoined from other suitable habitats to the west by over 240 km of unsuitable habitat. The Black Hills population of American dipper is significant in this regard.

ii. The Loss in the Black Hills population of American dipper would result in a significant gap in the range of the American dipper.

The Black Hills population of American dipper is at the eastern edge of its global distribution and is also geographically and physically isolated from other dipper populations (Panjabi 2001, Backlund 2001). The American dipper population on the Black Hills is also disjunct from adjacent populations (Hall et al. 2002).

As an isolated and peripheral population, the Black Hills population of American dipper is most likely extremely important for the survival and evolution and to the overall conservation of the taxon. A number of studies have addressed the characteristics of peripheral and isolated populations and their potential influences on and importance to the remainder of a taxon. Peripheral and isolated populations may experience increased directional selection due to varied habitats or species compositions, exhibit adaptations specific to these different selective pressures, demonstrate genetic consequences of reduced gene flow, and have different responses to human impacts (Levin 1970, MacArthur 1972, Morain 1984, Lacy 1987, Hengeveld 1990, Saunders et al. 1991, Hoffman and Blows 1994, Furlow and Armijo-Prewitt 1995, Garcia-Ramos and Kirkpatrick 1997). Recent studies have also addressed the importance of isolated and peripheral populations to conservation of a species (Lesica and Allendorf 1995, Pennock and Dimmick 1997, Waples 1998, Ruggiero et al. 1999). And finally, Congress has recognized that:

> [S]pecies of fish, wildlife, and plants have been so depleted in numbers that they are in danger of or threatened with extinction [and that] these species of fish, wildlife, and plants are of esthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people[.] 16 USC § 1531(a)(2) and (3)

According to the ESA, the definition of species includes DPSs. Therefore, significance is implied by the Act.

The best available information therefore strongly suggests that the Black Hills population of American dipper is not only of "esthetic, ecological, educational, historical, recreational, and scientific value," but is significant because the population is isolated and at the periphery of its range in the Black Hills. The isolation and peripheral nature of the Black Hills population of American dipper makes it likely that the population is experiencing increased directional selection due to differences in species composition in the Black Hills, exhibiting adaptations specific to the Black Hills ecosystem, demonstrating genetic consequences of reduced gene flow due to its isolation from other dipper populations to the west, and responding differently to anthropogenic influences in the Black Hills (Levin 1970, MacArthur 1972, Morain 1984, Lacy 1987, Hengeveld 1990, Saunders et al. 1991, Hoffman and Blows 1994, Furlow and Armijo-Prewitt 1995, Garcia-Ramos and Kirkpatrick 1997). These unique qualities most likely found in the Black Hills population of American dipper have been identified as important to the conservation of a species (Lesica and Allendorf 1995, Waples 1998, Pennock and Dimmick 1997, Ruggiero et al. 1999). Thus, it is highly likely that the loss of the Black Hills population of American dipper would lead to the loss of a unique population with attributes unique to the environment of the Black Hills ecosystem and would lead to a significant gap in the range of the species.

The USFWS has similarly determined other peripheral populations are significant and warrant listing as a DPS under the ESA, thus recognizing the importance of such populations in the conservation of species. For example, in listing the southern California population of the mountain yellow-legged frog as endangered, the agency stated:

> The mountain yellow-legged frogs of southern California comprise the southern limit of the species' range, and the loss of the southern California frogs on the periphery of the species' range could have significant conservation implications. Peripheral populations may be genetically and morophologically divergent from central populations. As such, distinct traits found in peripheral populations may be crucial to the species, allowing adaptation to environmental change. Peripheral populations often are important for the survival and evolution of species and will often have high value for conservation.

67 Fed. Reg. 44385 (July 2, 2002). Additionally, the agency has recognized the overall importance of populations existing at the extreme ranges of their distribution. In listing the Sierra Nevada population of the bighorn sheep, the UWFS found that the loss of the population "would result in the total extirpation of the bighorn sheep from the Sierra Nevada," leading to a "significant gap in bighorn sheep population distribution." 65 Fed. Reg. 20, 22 (January 3, 2000). The loss of the

Black Hills population of American dipper would similarly result in the total extirpation of the species from the Black Hills and consequently a significant gap in the species' distribution. Finally, in proposing to list the population of lynx in the United States as a DPS, the USFWS noted that, "Canada lynx in the contiguous United States might be considered biologically and/or ecologically significant simply because they represent the southern extent of the species' range." 62 Fed. Reg. 28653, 28654 (May 27, 1997). The same argument applies here as the loss of the Black Hills population of American dipper would mean the loss of the easternmost population of the species in North America.

C. Status

As will be discussed below, the status of the Black Hills population of American dippers meets at least four and most likely all five of the required criteria for listing this population as threatened or endangered. The Black Hills population of American dipper is imperiled and in danger of becoming extinct. Population declines have been well-documented and the causes of these declines are, "not speculative," as Backlund (2001) states (p. 2).

V. CRITERIA FOR LISTING THE BLACK HILLS DPS OF AMERICAN DIPPER AS THREATNED OR ENDANGERED

Several sections of the regulations implementing the ESA (50 CFR et seq.) are applicable to this petition. Those concerning the listing of the Black Hills DPS of American Dipper as a threatened or endangered:

> 424.02(e) "Endangered species" means a species that is in danger of extinction throughout all or a significant portion of its range."…(k) "species" includes any species or subspecies that interbreeds when mature.
> "Threatened species" means a species that "is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" (16 USC § 1532(20)

> 424.11(c) "A species shall be listed…because of any one or a combination of the following factors:
> 1. The present or threatened destruction, modification, or curtailment of habitat or range;
> 2. Overutilization for commercial, recreational, scientific, or educational purposes;
> 3. Disease or predation;
> 4. The inadequacy of existing regulatory mechanisms; and
> 5. Other natural or manmade factors affecting its continued existence.

At the very least, four of these and, as will be demonstrated below, probably all five of the factors set forth in § 424.11(c) are applicable to the present status of the Black Hills DPS of American Dipper.

A. Present and Threatened Destruction, Modification, or Curtailment of Range or Habitat.

American dippers and other dipper species are extremely sensitive to stream degradation and pollution (Price and Bock 1983, Tyler and Ormerod 1994, Sorace et al. 2002, Feck 2002). American dippers may be vulnerable to habitat degradation because of their specialized habitat needs and food requirements (Osborn 1999). A significant relationship between the absence of American dippers on streams in the Wind River Mountain Range of Wyoming and low populations of benthic macroinvertebrates has been documented (Feck 2002). Dippers were documented on streams with higher abundances of benthic macroinvertebrates (especially *Drunella* spp.), lower pH, and lower fine sediment pollution (Feck 2000). After a large amount of sand moved downstream due to sediment removal in an upstream reservoir, Price and Bock (1983) observed that "Heavy silting significantly reduced Dipper productivity on the South Boulder study area" (p. 72).

Accordingly, healthy dipper populations are believed to be indicative of healthy river ecosystems (Tyler and Ormerod 1993, Tyler and Ormerod 1994, Osborn 1999, Sorace et al. 2002, Feck 2002). Given this premise and with support from the best available science, stream ecosystems that provide American dipper habitat in the Black Hills, with the possible exception of segments of Spearfish Creek, are severely impaired. This is due to many activities that have caused and continue to cause significant adverse impacts to the habitat of the Black Hills population of American dipper.

The Black Hills population of American dipper is adversely impacted by pollution, including sediment in streams, streamside habitat degradation, irregular stream flows, and loss of streamflow (Backlund 2001). Marriott and Faber-Langendoen (2000) state, "With heavy human use of riparian systems in the Black Hills, few riparian areas remain that are relatively undisturbed" (p. 21).

Activities that affect the habitat of the American dipper population on the Black Hills occur primarily on National Forest System lands managed by the USFS as the Black Hills National Forest ("BHNF") and also on some private lands. The BHNF is characterized as a "developed forest" that is "extensively roaded" (USFS, 1996a). Threats to the Black Hills population of American dipper in the BHNF include livestock grazing, silviculture activity (or logging and other vegetation treatments such as thinning), road construction and reconstruction, road use, dams, other water developments, mining (recreational and commercial), and recreational activities (USFS 1996a, Backlund 2001, Anderson 2001). These ongoing activities have left and continue to leave dipper habitat severely imperiled (Backlund 2001). Activities on private lands are much the same and possibly pose greater threats to the American dipper. As the USFS (1996a) states, "[A] large proportion of the land actually bordering the major streams and tributaries [of the

Black Hills] is privately managed" (p. III-96). Activities that threaten the habitat of the Black Hills population of American dipper on private lands include livestock grazing, logging, water developments, and permanent developments such as mines, or homes that may discharge pollution into streams or disrupt dipper nesting, foraging, or winter habitat (USFS 1996a, Backlund 2001).

i. Pollution

Pollution at some level, either from mining, septic tanks, sewage, or other sources, has impacted or is currently impacting the Black Hills population of American dipper and its prey on French Creek, Whitewood Creek, Rapid Creek, Elk Creek, and Bear Butte Creek (Backlund 2001). Pollution associated with human activities has led to the extirpation of some populations of aquatic insects, the primary prey for American dipper (Huntsman et al. 1999).

Studies of the Eurasian dipper and other dipper species have shown pollution is detrimental (Tyler and Ormerod 1994). Acute discharges of PCBs, iron, lead, zinc, nickel, aluminum, and copper restrict invertebrates upon which dippers feed and have been linked to dipper declines in Europe and South America (Tyler and Ormerod 1994). DDE, HEOD, and PCB has also been found in Eurasian dipper eggs (Tyler and Ormerod 1992). Organic pollution caused a decrease in dipper density (Edwards 1991). Breeding density and abundance decreases on streams with low pH (Ormerod et al. 1985, Vickery and Ormerod 1990, Vickery 1991, Vickery 1992). Lower pH levels cause delayed egg-laying (Vickery and Ormerod 1990, Tyler and Ormerod 1992, Ormerod and Tyler 1993), a need for longer territories (Vickery and Ormerod 1990, Vickery 1991), reduced clutch size (Vickery and Ormerod 1990), significantly smaller body mass, lower blood calcium levels, smaller egg mass, no second clutches (Tyler and Ormerod 1992), and more time spent foraging and feeding and less time spent resting (O'Halloran et al. 1990). Low pH also adversely impacts benthic macroinvertebrates, thus impacting dippers (Ormerod et al. 1985, Ormerod et al. 1986, Ormerod and Tyler 1993, Vickery 1992, Tyler and Ormerod 1992, Ormerod and Tyler 1993, Tyler and Ormerod 1994). Heavy metal pollution on a stream in Colorado impaired liver function in American dippers (Strom 2000, Strom et al. 2001). Excessive selenium concentrations in the Spearfish Creek and Whitewood Creek watersheds of the Black Hills indicates "a high hazard for dietary toxicity and reproductive failure in fish and birds" (May et al. 2001, p. 8, emphasis added).

In 1998, 2000, and 2002 the South Dakota Department of Environment and Natural Resources ("SDDENR") (1998, 2000, 2002b) reported elevated pH levels on Box Elder Creek, French Creek, Rapid Creek, and Spearfish Creek. French Creek has a history of pollution from city sewage and in combination with other factors (e.g., diversions, Stockade Lake), this pollution has contributed to the loss of the dipper

population on this stream (Backlund 2001). French Creek has also violated and is violating State of South Dakota water quality standards (USFS 1996a, SDDENR 1998, 2000, 2002a, b). Whitewood Creek was once severely polluted and still suffers from periodic releases of arsenic, heavy metals, cyanide and other harmful materials when high flows wash out old tailings (Backlund 2001, USFS 1996a, SDDENR 2000, 2002a, b). Concentrations of arsenic, cadmium, copper, mercury, nickel, lead, and zinc in sediments were found to exceed EPA Ecotox thresholds in one or more of the Spearfish Creek, Whitewood Creek, and Bear Butte Creek watersheds (May et al. 2001). May et al. (2001), citing the U.S. EPA (1996), state, "Ecotox thresholds were developed by the U.S. Environmental Protection Agency to identify media-specific contaminant concentrations above which there is sufficient concern regarding adverse ecological effects to warrant further site investigation" (p. 4). Excessive selenium concentrations in the Spearfish Creek and Whitewood Creek watersheds have been identified, potentially causing reproductive failure in birds (May et al. 2001). Elk Creek has suffered from excess fecal coliform colonies as a result of livestock grazing (USFS 1996a). Excess fecal coliform has been a problem on Rapid Creek (SDDENR 1998, 2000, 2002b). Excessive stream temperatures have caused problems on Box Elder Creek, French Creek, Bear Butte Creek, and Whitewood Creek (SDDENR 1998, 2000, 2002b). Strawberry Creek, a tributary to Bear Butte Creek, is seriously polluted by mining activities, both historic and recent (USFS 1996a, SDDENR 2000).

Excess sediment on streams is the most serious and widespread threat to the Black Hills population of American dipper and its habitat in (Backlund 2001). Backlund (2001) states that "Sedimentation and pollution of streams must be reduced or prevented" (p. 10) in order to protect the dipper from extirpation on the Black Hills.

Excessive sediment reduces habitat complexity in stream channels (U.S. EPA 1999). The USFWS has noted that excessive siltation on streams was the most important factor adversely affecting fisheries habitat in the United States (Judy et al. 1984). Sedimentation in streams destroys the habitat of most aquatic insects including mayflies, caddisflies, stoneflies, which are the major prey of dippers (McCafferty 1978, Lemly 1982, Price and Bock 1983, Tyler and Ormerod 1994, Waters 1995, Osborn 1999, Feck 2002). These insects are also essential to the survival of young dippers during the nesting season (Sullivan 1973, Tyler and Ormerod 1994). Most natural and artificial nest sites on heavily silted stream reaches are not used (Price and Bock 1983, Backlund 2001). Attempts by American dippers to nest along a section of Spearfish Creek that is heavily silted have failed (Backlund 2001). Although stream sections with high gradients are less impacted by deposition of sediment, even small amounts of silt can smother the aquatic organisms that dippers rely on to feed themselves

and their young (Tyler and Ormerod 1994, Backlund 2001, Feck 2002).

Sedimentation in streams on the Black Hills has increased due to excessive livestock use of streams and riparian areas, road construction, road reconstruction, road use, mining, and logging (Stevens et al. 1992, USFS 1996a, SDDENR 1998, 2000, 2002b, Backlund 2001). Whether these activities occur on private land or USFS managed land, the environmental effects are the same (USFS 1996a). Sedimentation is adversely impacting the habitat of the Black Hills population of American dipper in French Creek, Box Elder Creek is heavily silted, Elk Creek has serious problems with sediment; sediment is a problem on Bear Butte Creek; and portions of Spearfish Creek are heavily silted (USFS 1996a, Backlund 2001, USFS 2002d). In 1998, 2000, and 2002, the SDDENR (1998, 2000, 2002b) reported Rapid Creek, Castle Creek, a tributary to Rapid Creek, French Creek, Box Elder Creek, Whitewood Creek, and Spearfish Creek as impaired from excessive total suspended solids. Bear Butte and Rapid Creek are listed as impaired due to excessive sediment levels (SDDENR 2002a). Excessive sediment levels in streams may be contributing to mountain sucker (*Catostomus platyrhynchus*) and lake chub (*Couesius plumbeus*) declines on the Black Hills (Backlund 1996, Hall et al. 2002, Erickson 2002, Wydoski and Wydoski 2002).

ii. Livestock Grazing

American dippers are rare or absent on streams that flow through areas of high livestock use (Osborn 1999). Livestock grazing threatens the Black Hills population of American dipper because of stream channel alteration, reduction in streamside vegetation, increased water temperature, and sedimentation (Backlund 2001).

Livestock use of streams and riparian areas has a severe negative impact on most aquatic species of animals, including the American dipper, other dipper species, and their habitat (Tyler and Ormerod 1994, Fleischner 1994, Waters 1995, Belsky et al. 1999, Osborn 1999, Backlund 2001). Livestock grazing in riparian areas has been linked to decreased water quality, including increased levels of sediment, throughout western North America (Platts 1991, Fleischner 1994, Waters 1995, Belsky et al. 1999). Marriott and Faber-Langendoen state, "Livestock tend to congregate in riparian areas, and can cause bank sloughing, increased sedimentation and increased soil compaction" (p. 21). Livestock trample stream banks, cause streams to become wider and shallower, and increase sedimentation (Fleischner 1994, Belsky et al. 1999). The USFS (1996a) states, "…uncontrolled livestock grazing caused approximately 6 times as much gross bank erosion as occurred on a protected stream reaches (sic)" (p. III-73). Livestock use also reduces riparian vegetation and shading of streams increasing the temperature of streams, thereby reducing the availability of prey for the American dipper (Rinne 1988, Fleischner 1994, Tyler and Ormerod

1994, Black 1998, Belsky et al. 1999, Backlund 2001). As the USFS (1996a) states, "Cattle often congregate near streams and in wetlands, and use drainages as pathways. Overuse of a riparian area by cattle can set off a chain of events in motion, which may result in channel scour and a change in flow regime."

The USFS (1996a) states, "Cattle graze large potions of the [Black Hills National] Forest and there is considerable potential for erosion and a decrease in water quality from this activity" (p. III-92). Livestock grazing has significantly and adversely impacted the Beaver Creek watershed in the Bear Lodge Mountains of northeastern Wyoming, which are primarily managed by the USFS as part of the BHNF (Black 1998). Livestock grazing has been identified as a source of water quality problems and impairment on many streams in the Black Hills (USFS 1996a, SDDENR 2000 and 2002a, b). SDDENR (2002b) reported that livestock grazing of streamside vegetation "continues to be a problem in a number of Black Hills streams" (p. 114). Both SDDENR's 1998 and 2000 reports voice the same concerns over grazing (SDDENR 1998, 2000). SDDENR (2002b) identified Castle Creek, a tributary to Rapid Creek, as suffering sediment impairments from "grazing related sources" (p. 117). The USFS (1996a) states, "During 1996, cattle were observed trampling stream-bank vegetation in the headwaters [of Castle Creek], leading to sediment in-filling of the creek" (p. III-82). Box Elder Creek is suffering sediment impairments from "agriculture" (SDDENR 2002b). Grazing related sources have been identified as causing impairments on Rapid Creek above Pactola Reservoir (SDDENR 2002b). The USFS currently allows up to 128,000 animal unit months ("AUMs") of cattle to graze the BHNF in many allotments (USFS 1996a). See Figure 6. The amount of livestock grazing private lands is unknown, although any grazing that does occur on private lands along streams poses threats to the habitat of the Black Hills population of American dipper (Backlund 2001). The USFS has determined that only 205,115 acres, or approximately 17 percent, of the entire BHNF is unsuitable for livestock grazing due to management decisions, capability concerns, and site-specific management decisions. The rest of the Forest is open to livestock grazing (USFS 1996a).

Livestock grazing occurs on BHNF lands and private lands along and in all or parts of the French Creek, Rapid Creek, Box Elder Creek, Elk Creek, Bear Butte Creek, and Spearfish Creek watersheds of the Black Hills (USFS 1996a). See Figure 6 and Table 3. This activity is adversely impacting riparian areas and contributing to sediment problems on these streams (USFS 1996a, USFS 1996b, SDDENR 1998, 2000, 2002b, Marriott and Faber-Langendoen 2000, Backlund 2001). Livestock grazing on private lands in the Black Hills is essentially unrestricted and impacts to riparian areas and streams are most likely of higher intensity (USFS 1996a).

Livestock grazing on the Black Hills poses significant threats to the well-being of the Black Hills population of American dipper. As Figure 6 and Table 3 show, there are numerous USFS grazing allotments where grazing is occurring and impacting the Spearfish Creek, Whitewood Creek, Bear Butte Creek, Elk Creek, Box Elder Creek, Rapid Creek, and French Creek watersheds.

Table 3. USFS grazing allotments that impact the Spearfish Creek, Whitewood Creek, Bear Butte Creek, Elk Creek, Box Elder Creek, Rapid Creek, and French Creek watersheds. The Castle Creek watershed drains into the Rapid Creek watershed and thus is included as the Rapid Creek watershed. Names in caps indicates an active allotment, lower case indicates "vacant" allotment (USFS data).

SPEARFISH CREEK	**WHITE-WOOD CREEK**	**BEAR BUTTE CREEK**	**ELK CREEK**	**BOXELDER CREEK**	**FRENCH CREEK**
DEADMAN	BUSKALA	BEAR BUTTE	BEAR BUTTE	BEAR BUTTE	CICERO
HIGGINS	CROOK MOUNTAIN	Bulldog	BOXELDER	BOXELDER	FRENCH CREEK
LITTLE SPEARFISH	DUMONT	Pillar PeakK	Bulldog	CORRAL CREEK	JUNCTION
PETTIGREW	Polo Peak	Polo Peak	Cave	CUSTER PEAK	LIMESTONE
PLATEAU	UPPER ELK CREEK	UPPER ELK CREEK	CUSTER PEAK	LITTLE ELK	NORTH CUSTER
Ragged Top	WILDCAT		ELK	PACTOLA	SOUTH CUSTER
STEARNS PARK			LITTLE ELK	PASTURE	TENDERFOOT
STOVEHOLE			RUNKLE	SILVER CITY	
TOLLGATE			UPPER ELK CREEK	WOLFF	
WILDCAT					
RAPID CREEK					
BALD HORSE	CLINTON	DITCH CREEK	GUDAT	REDFERN	SOHOLT LYONS
BASELINE	COLD CREEK	DUMONT	HORSETHIEF	RIMMER	TIGERVILLE
BITTER-SWEET	CROWS NEST UPPER BEAVER	DUTCHMAN	MEDICINE MOUNTAIN	SILVER CITY	WOLFF
BUSKALA	CUSTER PEAK	EAST RAPID	NEWTON FORK	SIXMILE	
CASTLE CREEK	DEERFIELD	GILLETTE PRAIRIE	PACTOLA	SLATE PRAIRIE	

Figure 6. USFS grazing allotments on the BHNF and Spearfish Creek, Whitewood Creek, Bear Butte Creek, Elk Creek, Box Elder Creek, Rapid Creek, and French Creek watersheds. The Castle Creek watershed drains into the Rapid Creek watershed (USFS data).

As the USFS continues to graze livestock in these allotments and as private landowners continue to graze livestock in streams and riparian areas, the Black Hills population of American dipper and its habitat continue to suffer.

iii. Silviculture Activities

Anderson (2001) states, "Harvesting near waterways used by dippers is likely to have a negative effect on the water quality and dippers themselves" (p. 35).

The USFS (1996a) states:

> Harvesting timber affects soils through such activities as skidding, decking, site preparation and machine piling of slash. These activities will result in various degrees of soil displacement, soil compaction, and disturbance to vegetative ground cover within cutting units. (p. III-25)

The agency further concludes that, "Ground disturbance increases soil erosion rates by leaving areas of unprotected soil." (USFS 1996a, p. III-73). Waters (1995) states, "The relative contribution of sediment appears to be moderate from clear-cutting (i.e., higher than from selective cutting or patch-cutting), moderately high from skid trails, minimal from yarding (higher if heavy machinery is used near streams), and moderate from site-preparation." The USFS (2002e) discloses that logging and other silvicultural treatments on slopes greater than 30% and in severe erosion areas lead to "localized areas of rilling and gullying" (p. 3-14). The USFS (2002e) defines "Rillying and gullying" as, "the movement of water over the soil surface, creating small, surface flows of water that carry sediment with them" (p. C-21). Many timber sales authorized by the USFS include logging on slopes that are greater than 30% (USFS 2002a, b, e, j). In the Rapid Creek watershed, the USFS (2002j) generally states that that, "The cumulative effects of all land uses have resulted in sedimentation of streams and concerns about nutrient enrichment in downstream reservoirs" (p. 118).

Every acre of the BHNF has been logged at least once in the past century, with most parts logged three to four times (Mehl 1992, Shinneman 1996, Shinneman and Baker 1997). The USFS has allowed and currently allows logging (in the form of a various silvicultural treatments) to occur in the French Creek, Box Elder Creek, Elk Creek, Bear Butte Creek, Whitewood Creek, and Spearfish Creek watersheds (USFS 1996a, USFS 1996b). See Table 4, Figure 7. The USFS is planning on implementing or is currently implementing numerous logging projects within these watersheds. See Table 4. The SDDENR has attributed water quality problems on the BHNF, especially excessive sedimentation with, among other things, silviculture activities (SDDENR 1998, 2000, 2002b). Logging and associated activities on the Black Hills create and have contributed to sediment problems on streams

that could be or are capable of supporting American dipper on the Black Hills.

While extensive logging is currently underway in the French Creek, Box Elder Creek, Elk Creek, Bear Butte Creek, Whitewood Creek, and Spearfish Creek watersheds, there are proposed logging activities that imminently threaten the continued existence of the Black Hills population of American dipper. The Peak, Power, Mineral, and Riflepit timber sales are all proposed to be implemented in the Spearfish Creek watershed. Existing science strongly suggests these timber sales, and the erosion and sedimentation impacts inherent in silviculture activities on the Black Hills, pose imminent and significant risks to the well-being of the American dipper on Spearfish Creek and thus poses risks to the continued existence of the dipper on the Black Hills (Price and Bock 1983, Waters 1995, USFS 1996a, Backlund 2001, USFS 2002b, Feck 2002). Combined with the impacts of past, present, and proposed timber sales in the Spearfish Creek watershed, these sales place the population at a significant risk of extirpation on the Black Hills.

Additionally, other proposed timber sales threaten to further degrade the health of American dipper habitat on Whitewood Creek, Bear Butte Creek, Elk Creek, Box Elder Creek, and Rapid Creek. See Table 4. Due to their size and potential impacts, the Prairie timber sale and the Elk Bugs and Fuel timber sale are by far the most imminent and serious threats to the well-being of the American dipper on the Black Hills. The USFS has already concluded that an environmental impact statement will be prepared for both the Prairie and Elk Bugs and Fuel timber sales, indicating both timber sales will significantly impact the environment. Cumulatively, both timber sales will affect over 23,000 acres of land in the Bear Butte Creek, Elk Creek, Box Elder Creek, and Rapid Creek watersheds. A final decision for the Prairie timber sale is expected to be issued in April of 2003 and a final decision for the Elk Bugs and Fuel timber sale is expected to be issued in July of 2003 (USFS 2002l). Other proposed timber sales that pose significant risks to the well-being of the American dipper include the Canyon/Nest, Mercedes, Mineral, Research/Rochford, and Riflepit timber sales. There are also numerous other timber sales that are currently underway and already posing significant risks to the well-being of the dipper on the Black Hills. See Figure 7.

Figure 7. Active timber sales in the Spearfish Creek, Whitewood Creek, Bear Butte Creek, Elk Creek, Box Elder Creek, Rapid Creek, and French Creek Watersheds. The Castle Creek watershed drains into the Rapid Creek watershed (USFS data).

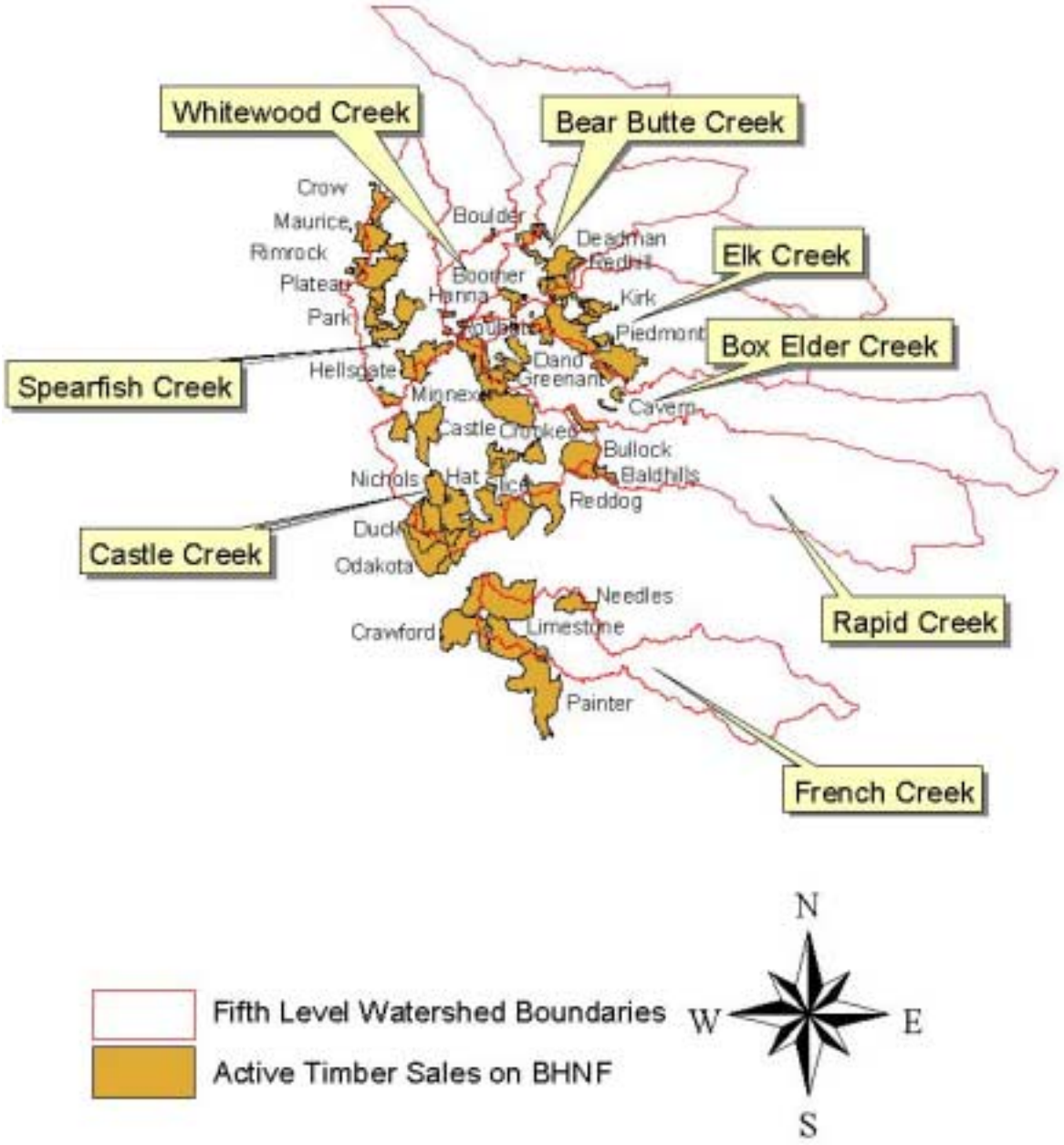

Table 4. USFS Timber Sales That Have Impacted or Will Impact American dipper Streams on the Black Hills since adoption of the 1997 BHNF Land and Resource Management Plan.

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Timber Sale or NEPA Document Name	Year	Acres Impacted By Silviculture Activities	Miles of Road Construction and Reconstruction[1]	Watershed(s) Impacted	Status	Reference
Bigmac	1998	1548	14.3	Spearfish, Rapid Creek	Underway	USFS 1998d
Binford	1998	5583	64.5	French Creek	Underway	USFS 1998f
Blackhawk	1997	5367	20.3	Box Elder Creek	Underway (possibly completed)	USFS 1997a
Boxelder	1998	2059	8.5	Box Elder Creek	Underway	USFS 1998e
Canyon/ Nest	2002	5390	26.8	Rapid Creek	Analysis	USFS 2002e
Crawford	1998	2326	41.5	French Creek	Underway	USFS 1998c
Crooked/Uncle	1997	4772	30.6	Rapid Creek	Underway	USFS 1998a
Dalton/ Piedmont	1997	4406	58.5	Box Elder, Elk Creek	Underway	USFS 1997d
Elk Bugs and Fuel	2002	15305	76.5	Bear Butte, Elk, Box Elder, Rapid Creek	Analysis	USFS 2002g
Jasper Fire Value Recovery	2001	11067	232	Rapid Creek	Underway	USFS 2001a
Kirk	1997	2127	8.4	Bear Butte, Elk, Box Elder Creek	Underway	USFS 1997f
Lakes	2001	6854	38.2	Rapid Creek	Underway	USFS 2002a
Marble	1997	1643	11	French Creek	Underway	USFS 1997b
Mercedes	2002	5498	38.8	Rapid Creek	Authorized	USFS 2002j
Mineral	2002	4560	15-22	Spearfish, Whitewood, Bear Butte Creek, Box Elder, Elk, Rapid Creek	Analysis	USFS 2002f
Peak	2002	1862	7.9	Spearfish, Whitewood, Bear Butte, Box Elder, Elk, Rapid Creek	Authorized	USFS 2002b
Power	2002	4067	7	Spearfish Creek	Analysis	USFS 2002o

Prairie	2002	8000	Unknown	Rapid Creek	Analysis	USFS 2002c
Reddog/ Slice	1998	5442	18.4	Rapid Creek	Underway	USFS 1998b
Research/ Rochford	2002	Unknown	Unknown	Box Elder, Rapid Creek[2]	Analysis	USFS 2002l
Riflepit	2002	2665[3]	15.2	Spearfish Creek	Analysis	USFS 2002k
Roubaix	1999	2500	44	Box Elder Creek	Underway	USFS 1999a
Soholt	1997	1605	15.6	Rapid Creek	Underway	USFS 1997c
Veteran/ Boulder	1998	2921	38.5	Whitewood, Bear Butte, Elk Creek	Underway	USFS 1998g

1. When Documented in NEPA Documents, Mileage Includes Temporary Road Construction and Conversion of User-created Roads to Forest System Roads
2. Estimated location of timber sale based on rough map in USFS 2002l
3. Estimated acreage

iv. Roads

Roads contribute sediment to streams, thereby posing serious threats to the well-being of the Black Hills population of American dipper and its habitat (Backlund 2001). Citing the USFS (1996a), Anderson (2001) states that, "Roads can severely impact streams and riparian habitat through erosion, sedimentation, change in vegetation, and changes in stream morphology." She continues, "Such changes could have a large negative impact on the dippers" (p. 37).

The Black Hills are covered with an extensive road system (USFS 1996a). See Figure 8. The USFS estimates there are "5,204 miles" of total Forest Service System Roads (USFS 1996a, p. III-426). Additionally, the agency estimates there are an additional "3,430" miles of user-created roads (USFS 1996a, p. III-426). Extensive road construction has been undertaken to facilitate silviculture activities, as well as access to mining activities, private lands, and for other reasons (USFS 1996a). The USFS (1996a) states, "Roads can result in more erosion than any other single management activity" (p. III-30). The USFS (1996a) further states:

> Roads undergo a great amount of erosion. While this is especially true in the first 1-3 years after construction, continual usage of the road causes continual erosion. Roads provide miles of unvegetated, often unsurfaced, dirt. Because of the quantity of area they cover, and because many of them are adjacent to or cross stream channels, roads are the greatest source and delivery system of sediment to channels. (p. III-73)

(emphasis added). Most recently, roads have been identified as the primary source of sediment

problems in the Lakes timber sale area (USFS 2002a), Mercedes timber sale area (USFS 2002j), Canyon/Nest timber sale area (USFS 2002e), and Peak timber sale area (USFS 2002b), all of which are impacting or will very soon impact streams that presently support or have historically supported American dipper. In the Mercedes timber sale area, the USFS (2002j) states, "County road 231 will continue to contribute large quantities of sediment to Rapid Creek" (p. 120). The SDDENR (1998, 2000, 2002b) identifies "silviculture activities," which includes road construction associated with logging, as a source of impairment on many Black Hills streams. In 2002, French Creek, Rapid Creek, and Castle Creek, a tributary to Rapid Creek, were identified as suffering water quality problems from silviculture activities (SDDENR 2002b).

Waters (1995, citing Cederholm et al. 1981) states:

> The density and length of logging road distribution can be major factors in determining the level of sediment production. For example, the greatest accumulation of fine sediments in streambeds occurred when the road area exceeded 2.5% of the total basin area. The authors also calculated that total road lengths of 2.5 km of road per square kilometer of the basin produced sediment more than four times natural rates. (p. 35)

The USFS (2002e) elucidates, "Road density is an indicator of potential problems with sediment, compaction, or other soil concerns" (p. 3-7). The USFS (1996a) discloses road densities on the BHNF often exceed 5.0 miles per square mile on the BHNF (8.05 km/km^2), with some reaching 8.0 miles per square mile (12.88 km/km^2) (USFS 1996a). This strongly indicates roads are contributing excessive amounts of sediment into Black Hills streams.

In addressing road densities, the USFS oftentimes claims to reduce road-related impacts by placing gates in front of roads (see e.g., USFS 2002a, j). However, in many instances, gates are ineffective on the BHNF in alleviating road-related impacts. The USFS (2002a) states, "Previous attempts to close roads have not been entirely successful" (p. 84). The USFS (1997e) also states, "While closure will allow revegetation and reduce sediment travel due to vehicular use, it does not in itself solve any problems related to ditches or stream crossings" (p. 26). In another instance, the USFS (1998c) states, "Gentle terrain makes some of the [Crawford] area difficult to close" (p. 52). The USFWS (1993c) has also documented how roads that are closed with gates or signs are ineffective in eliminating road-related environmental impacts. The agency further documented that roads used only for administrative purposes often fail to eliminate road-related impacts due to continued use (USFWS 1993c). It is highly questionable whether road-related environmental impacts are effectively addressed by placing gates in front of roads.

User-created roads are also a problem on the BHNF (see e.g., USFS 2002a, b, e, j). According

to the USFS (1996a), there are approximately 3,430 miles of user-created roads on the BHNF. The USFS notes that sediment sources in the Lakes timber sale area in the Rapid Creek watershed are system roads, unclassified roads, or channel alterations due to roads (USFS 2002a). The USFS has recently documented the existence of many miles of user-created roads in the Lakes, Peak, Canyon/Nest, and Mercedes timber sale areas, all of which impact streams that presently support or have historically supported American dipper (USFS 2002a, b, e, j).

Many miles of roads (paved, gravel, dirt, primitive) have been constructed and reconstructed within the French Creek, Box Elder Creek, Elk Creek, Bear Butte Creek, and Spearfish Creek watersheds, many adjacent to or crossing these streams (USFS 1996a). See Table 4, Figure 8. Marriott and Faber-Langendoen state, "Roads [on the Black Hills] have been constructed in many drainage bottoms causing rechannelling of creeks, increased sedimentation, and increased access" (p. 21). Roads have caused and are currently causing sediment problems on segments of Spearfish Creek (USFS 2002d). The USFS is planning on constructing or reconstructing many miles of roads within these watersheds. See Table 4. There continues to be regular use and varying degrees of maintenance of roads in these drainages and consequently continued sources of sediment in these streams.

Since 1997 alone, at least 838.5 miles of road construction and reconstruction on the BHNF has been proposed by the USFS. This roughly adds up to nearly 170 miles of roads constructed or reconstructed per year on the BHNF. The USFS (1996a) estimates that between the years 1997 and 2007, the amount of roads on the BHNF will increase by "104" miles (p. II-60). Through the Canyon/Nest, Elk Bugs and Fuel, Mercedes, Mineral, Power, and Riflepit timber sales, 179.3 miles of roads will be constructed and reconstructed. See Table 4. It is unknown at this time how many miles of road construction and reconstruction will be authorized by the Prairie and Research/Rochford timber sales, but the USFS will most likely propose to add further mileage. These timber sales and the road construction and reconstruction that has been authorized or that will very soon be authorized pose significant risks to the well-being of the Black Hills population of American dipper. The road construction and reconstruction authorized by these timber sales will impact Spearfish Creek, Whitewood Creek, Bear Butte Creek, Elk Creek, Box Elder Creek, and Rapid Creek and thus pose detrimental impacts to the Black Hills population of American dipper and its habitat. The Mineral, Peak, Power, and Riflepit timber sales in particular pose significant threats to the continued existence of the American dipper on Spearfish Creek, the only stream now capable of supporting a self-sustaining population of American dipper on the Black Hills.

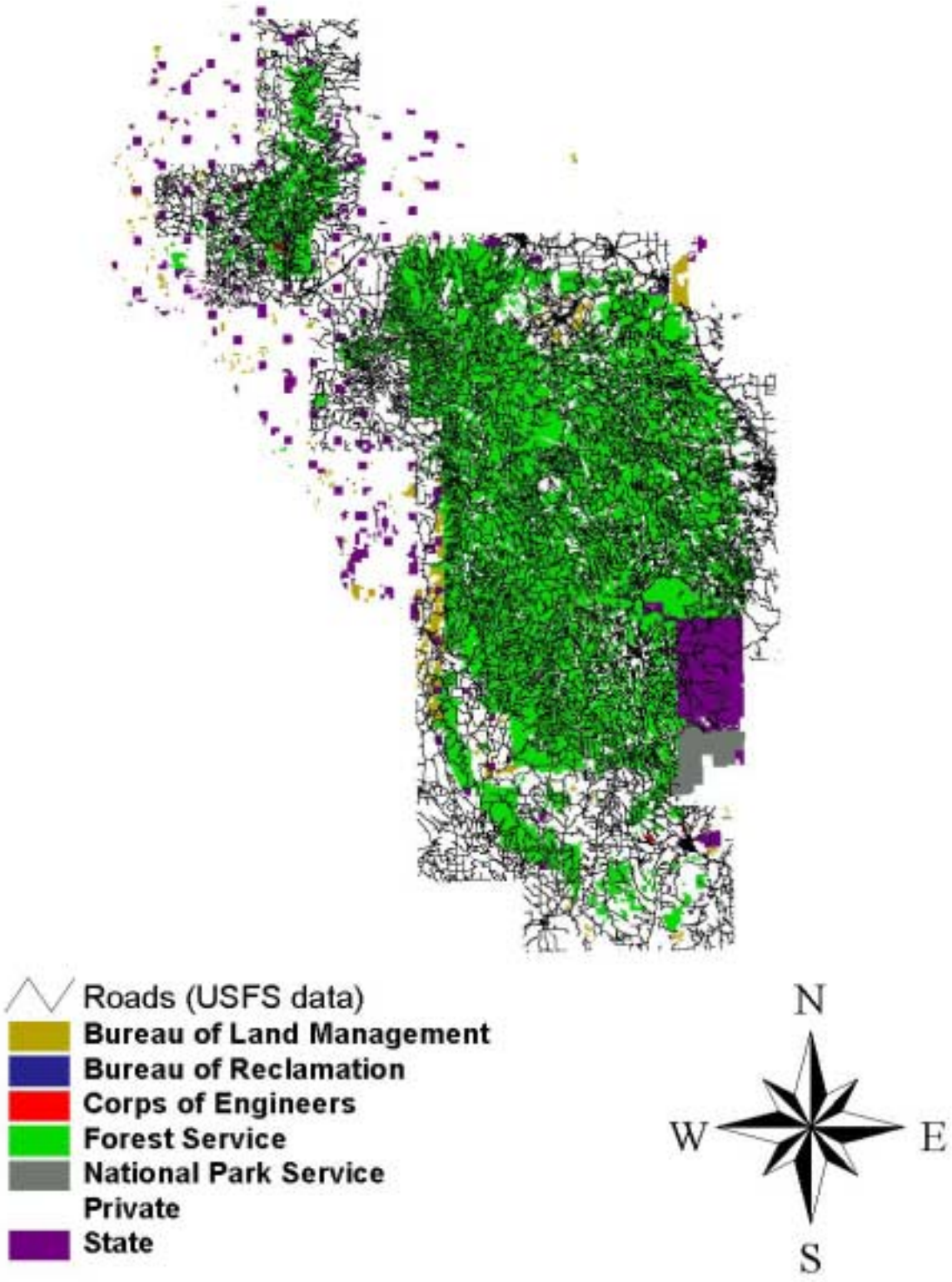


Figure 8. Roads in the Black Hills Ecoregion (Hall et al. 2002).

v. Dams

Dams pose serious threats and impacts to dippers and their habitat (Tyler and Ormerod 1994). Dams, diversions, and other water control structures that modify streamflows or stream channels pose adverse effects to American dippers, as well as other dipper species (Price and Bock 1983, Tyler and Ormerod 1994, Osborn 1999, Sorace 2002, Marzolin 2002). Tyler and Ormerod (1994) state:

> Releases of water may raise the water level in the river, wash out nests and prevent birds from feeding. Channels may be scoured and eroded below the dam. New concrete channels may be constructed which are poor habitat by comparison with the original watercourses with their diverse habitats of shoals, riffles, margins and deeper pools. Water from a deepwater reservoir if drawn off from the lower layers may be cold, low in oxygen and have a high metal content. These factors may all adversely affect the invertebrate and fish populations on which certain birds and mammals depend. (p. 192)

Dewatering, channelization, and subdivision construction have been described as creating inhospitable dipper habitat (Price and Bock 1983).

Dams and water diversions are believed to be adversely impacting the Black Hills population of American dipper and its habitat (Backlund 2001). Backlund (2001) states:

> Erratic releases and periodic low releases from Pactola Dam are probably responsible for the near extirpation of the dipper from Rapid Creek below Pactola, in Dark Canyon, an area that was once the best dipper habitat on Rapid Creek. (p. 5)

Rapid Creek periodically freezes during the winter due to low flows from Pactola Reservoir and adversely affects dippers (Backlund 2001, Bureau of Reclamation 2002a, b, c, d, e). Erratic flows during the rest of the year may also adversely affect dippers (Backlund 2001, USGS 2002). Streamflow data indicates that flows from Pactola Dam are more erratic and extreme than flows on Spearfish Creek, the only stream on the Black Hills that can support a self-sustaining population of American dipper . See Figure 9. The effects of low and erratic flows may be responsible for eliminating the dipper from Rapid Creek (Backlund 2001). Water flows from Pactola dam must be stable and sufficient so that American dippers can repopulate Rapid Creek (Backlund 2001). Pactola dam is managed by the Bureau of Reclamation, a federal agency whose mission is to provide water to arid lands in the western United States, not provide or manage for wildlife.

Stockade Dam on French Creek also exacerbates the adverse effects of pollution by allowing the water in this reservoir to warm and become highly eutrophic (Backlund 2001). The SDDENR (2002b) reports Stockade Lake is failing to meet its beneficial uses due to pollution from urban runoff and storm sewers

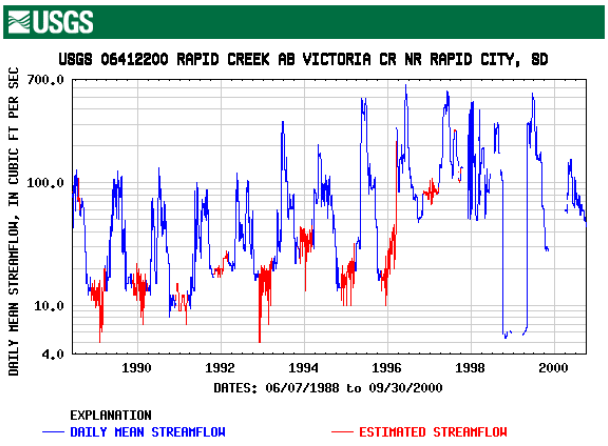
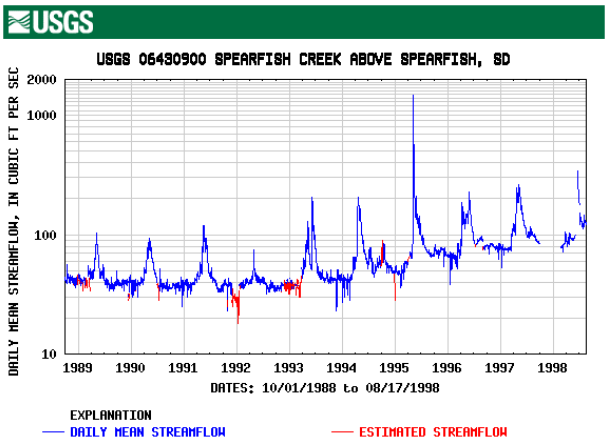


Figure 9. A comparison of streamflow data from Rapid Creek below Pactola Dam (above) and from Spearfish Creek above the town of Spearfish, SD (below) (USGS 2002).



The USFS (1996a) also states, "Stockade Lake loses its oxygen quickly in the summer, and may take years to recover from the cumulative effects of human and animal wastes, fertilizers, and erosion" (p. III-84), indicating the effects of this reservoir may significantly and adversely affect living organisms, like the Black Hills population of American dipper and its prey, downstream of Stockade Lake.

vi. Loss of Water Flow

Loss of water flow can adversely impact American dippers (Tyler and Ormerod 1994). Loss of water flow in streams has degraded the habitat of the Black Hills population of American dipper (Backlund 2001). Diversion of water from dipper streams must be reduced or eliminated to protect the bird on the Black Hills (Backlund 2001).

Loss of water flow causes otherwise open streams to freeze in the winter time, elevates water temperature in streams, increases the effects of sedimentation, and can cause perennial streams to become intermittent or ephemeral (USFS 1996a). Although attributed to dams in some cases, loss of water flow on streams that could be or are capable of supporting the Black Hills population of American dipper is often the result of diversions for other uses such as mining, livestock grazing, or irrigation (Backlund 2001, Driscoll et al. 1992). On Spearfish Creek, the USFS (2002d) predicts that if two diversions that supply hydroelectric operations with water were decommissioned, a total of 170 cubic feet per second ("cfs") would be returned to the stream. There are indications Spearfish Creek is suffering from low water flows (USFS 2002d). The USFS (1996a) states, "A majority of surface water in the Black Hills has been appropriated by mining, irrigated agriculture, and domestic and municipal uses" (p. III-57).

Losses in surface water flow on the Black Hills may also be attributable to groundwater extractions (USFS 1996a, Driscoll et al. 1997). The USFS (1996a) states:

> If the draw on groundwater increases enough, stream regimes may change from perennial to intermittent, or from intermittent to ephemeral in some locations. Groundwater extraction along the Carmel River in California led to severe bank erosion due to the riparian vegetation die-off and the subsequent loss of root stabilization. (p. III-57)

Groundwater extraction has been linked with reduced water levels in thermal springs and the endangerment of the Bruneau Hot springsnail (*Pyrgulopsis bruneauensis*) in Idaho (USFWS 1993a). The city of Rapid City, South Dakota currently receives water from Pactola Reservoir on Rapid Creek and from groundwater from nine wells within the Rapid Creek watershed (Rapid City Water Division 2001). Custer, South Dakota currently receives water from two wells on the Upper French Creek watershed and other wells that are recharged from subsurface flow from the French Creek watershed. The USFS (1996a) further states, "Increasing population growth and suburbanization of the Black Hills will lead to increased water consumption" (p. III-57), indicating threats to water flows and the Black Hills population of American dipper and its habitat on the Black Hills will continue due to groundwater extraction.

The USFS and others claim that water flows have been reduced on the Black Hills due to an increase in ponderosa pine forest abundance and density. However, when discussing the impacts of timber harvesting upon water yield from the Black Hills, the USFS (1996a) states:

> [W]hile timber harvest in small watersheds can lead to increased water yield, this yield is generally a small, almost immeasurable percentage of total water yield in larger watersheds. Generally, it is necessary to reduce the basal area of a forested watershed by 25 percent before there is a noticeable increase in streamflow (Region 2 Watershed Conservation Practices Handbook). Due to existing land use patterns, it may be impossible to harvest enough of the land base to yield a measurable increase on a large watershed basis (Charles A. Troendle, personal communication). Annual variations in precipitation are usually more important in determining the water yield. (p. III-46)

(emphasis added). In other words, while the USFS claims that the density of trees on the Black Hills has reduced waterflows, the agency is at the same time saying that even if trees were logged extensively, no measurable increase in water yield would occur. In fact, the USFS asserts that annual precipitation, rather than trees, are more important in determining water yield (USFS 1996a).

The extensive loss of beaver (*Castor canadensis*) throughout the Black Hills has also been attributed to reducing the amount of perennial streams and thus the amount of streams

capable of supporting the Black Hills population of American dipper. The USFS (1996a) explains:

> There has been a decrease in perennial stream mileage, but the magnitude has not been clearly determined. It is probably on the order of 50%. The primary factors causing this change include removal of beaver-dam complexes and increased extent and density of the ponderosa pine forest. (p. III-305)

Beaver dam complexes increase the size and holding capacity of riparian areas and raise near-stream water (USFS 1996a). Beavers were once common on all large streams in the Black Hills, but due to unrestricted market hunting and trapping at the end of the 18th century, populations plummeted. Efforts to reestablish beaver populations on the Black Hills throughout the twentieth century have not been successful as the USFS and other landowners continue to view the beaver as a pest and eradicate beavers and their dam complexes (Raventon 1994).

vii. Mining activities

Pollution and other impacts from mining, both past and present, is threatening the Black Hills population of American dipper and its habitat (Backlund 2001). Mining pollution in Bear Butte Creek and Whitewood Creek is limiting the ability of these streams to provide long-term habitat for the Black Hills population of American dipper (Backlund 2001). Anderson (2001) states that "various aspects of mining may negatively affect dipper" (p. 36), including direct discharges of metals, degradation of riparian habitat, and reduced clarity of streams.

The USFS (1996a) states, "Acid drainage is considered the most serious mining-related pollution, and is associated with the occurrence of pyrite" (p. III-77). May et al. (2001) state:

> Besides contamination from leeching processes and tailings, many abandoned gold mines in these [Spearfish Creek, Whitewood Creek, and Bear Butte Creek] basins contribute acid and heavy metals to streams, with potentially severe impacts in areas of high sulfide mineralization due to the production of acid-mine drainage when the sulfides are exposed to the atmosphere and was water leaches through the rock. (p. 2).

Acid drainage elevates pH levels in streams, which has been documented to be harmful to dippers (Ormerod et al. 1985, Ormerod et al. 1986, Vickery and Ormerod 1990, Vickery 1991, Ormerod and Tyler 1993, Vickery 1992, Tyler and Ormerod 1992, Ormerod and Tyler 1993, Tyler and Ormerod 1994). Mining also causes elevated levels of heavy metals, such as lead, iron, copper, cadmium, chromium, nickel, gold, arsenic, selenium, and zinc both in sediment and in solution (USFS 1996a, May et al. 2001). Excessive concentrations of heavy metals adversely impacts the American dipper and other dipper species (Tyler and Ormerod 1994, Strom 2000, Strom et al. 2001). The USFS (1996a) states, "When highly acidic water emanates from mine tailings and settling ponds, the reduced pH increases the solubility of heavy metals. This, in

turn, increases their mobility and rate of biologic uptake" (p. III-75).

The USFS (1996a) also discloses that "placer mining causes the direct disturbance of aquatic habitat by contributing large amounts of sediment to local drainages….Placer mining can also destroy channel structure and lead to a decrease of stream elevation" (p. III-95). The agency elucidates, "Since the purpose of these [placer] operations is to remove the metal from the stream deposits, streambank topsoil and vegetation may be removed, the stream channel altered, and downstream deposition and degradation could occur" (p. III-302). Waters (1995) states, "Mining operations produce immense quantities of sediments that can enter streams, elevating levels of suspended solids and turbidity, and creating deposits on streambeds" (p. 36). Such impacts have been documented to be detrimental to the American dipper and its habitat (Price and Bock 1983, Tyler and Ormerod 1994, Backlund 2001, Feck 2002).

The USFS (1996a) states, "Past mining operations – prior to the establishment of state and federal regulations for protection of surface resources – created conditions that continue to influence water quality [on the Black Hills]" (p. III-77). The USFS also discloses that adverse effects to water quality on the Black Hills are occurring from "old, unreclaimed mine sites and from sources on private land" (p. III-95). Marriott and Faber-Langendoen (2000) state, "Creeks have also been heavily disturbed from placer mining activities which destroy banks and soil profiles, leaving gravelly and rocky substrates barren of vegetation. Larger more intensive mining activities have substantially impacted stream flows and water quality in places" (p. 21).

In terms of mining related impacts to streams that presently support or have historically supported the Black Hills population of American dipper, Backlund (2001) as well as others (e.g., May et al. 2002, USFWS 2003), have identified mining along Spearfish Creek, Whitewood Creek, and Bear Butte in the northern Black Hills as posing significant threats. The USFWS (2003) states:

> There have been several gold mining operations in the northern Black Hills. Mining has occurred in this region for more than 100 years. Problems can arise from either tailings discharged into streams in the past that continue to leach hazardous substances into the water, or from treated mine effluent currently being discharged into streams. Concentrations of arsenic, cadmium, chromium, copper, cyanide, lead, mercury, nickel, selenium, silver, and zinc have exceeded concentrations documented as hazardous to fish and wildlife. All of these constituents, with the exception of cyanide, are naturally occurring in the rock being mined. Cyanide is added as part of the gold recovery process. In the past, additional mercury was also added as part of the gold recovery process. Acute effects, resulting in wildlife mortality, are fairly well documented. Bird deaths have occurred due to cyanide poisoning and fish kills have occurred from accidental releases of cyanide and acid mine drainage.

Due to mining activities and pollution, Bear Butte and Whitewood Creeks provide poor long-term habitat for the American dipper (Backlund 2001). Nearly 100 million tons of finely ground gold mill tailings were discharged into Whitewood Creek by Homestake Mining Company from the year 1876 to 1978 (Marron 1992). May et al. (2001) report that Spearfish Creek, Whitewood Creek, and Bear Butte have been impacted by releases of cyanide, mercury, zinc, and arsenopyrite. Releases of mercury have caused elevated mercury levels in fish and birds downstream in the Belle Fourche River drainage (Hesse et al. 1975, SDDENR 2000, 2002b). Concentrations of arsenic, cadmium, copper, mercury, nickel, lead, and zinc in sediment on portions of Spearfish Creek, Whitewood Creek, and/or Bear Butte Creek exceed Ecotox thresholds established by the U.S. Environmental Protection Agency (May et al. 2001). May et al. (2001) report that selenium concentrations in tributaries of Spearfish Creek and Whitewood Creek are classified as a "high hazard for Se accumulation from water into the planktonic food chain and for resultant toxicity to fish and aquatic birds" (p. 1). Sorenson (1998) reports that Bear Butte Creek is being impacted from past mining activities, as well as existing mining activities. The SDDENR (2000, 2002b) reports mining-related pollution problems on Bear Butte Creek and Whitewood Creek. The USFS (2002d) notes that sediment impounded behind diversion dams on Spearfish Creek likely contain "heavy metals and other toxic substances" (p. D-2). The USFS (2002d) recommends these heavy metals and toxic substances are "best left undisturbed" (p. D-2). This indicates pollution of sediments continues to threaten American dipper prey and consequently the dipper on Spearfish Creek. Heavy metals and other mining-related pollution in Spearfish Creek, Whitewood Creek, and Bear Butte pose significant threats to the well-being of the Black Hills population of American dipper.

Mining related problems have also been documented on other streams that historically supported the Black Hills population of American dipper. Historic bog iron mining is causing acid-mine drainage, heavy metal releases, and sedimentation in the Rapid Creek watershed (USFS 2002j). The USFS (1996a) states:

> Hop Creek [a tributary to Rapid Creek] drains an area of sulfide-rich schists, organic oozes, and beaver dams, which have allowed the formation of bog-iron deposits. During the mining process, vegetation was destroyed, increasing soil exposure and acceleration sediment delivery to, and the acidification of, the creek. Hope Creek had pH readings in the range of 2.0 during this period….A pH of 3.7 was measured in June 1996. (p. III-78).

The stream channel of French Creek near the town of Custer, SD has been highly modified due to past mining operations (USFS 2002n). Abandoned mines throughout the BHNF also pose environmental and safety problems, with some sites experiencing severe impacts (USFS 1996a).

The USFS (1996a) reports there are approximately 15,000 mining claims filed on the BHNF. Of these 15,000 claims, almost 60 currently have operating plans and 20 are being actively mined (USFS 1996a). These mining operations undoubtedly pose some risk to the habitat of the Black Hills population of American dipper. Additionally, there are three large mines (i.e., larger than 1900 acres) in operation on the Black Hills LAC Resources, Wharf, and Gilt Edge, all of which are adversely impacting the Spearfish Creek, Whitewood Creek, or Bear Butte Creek watersheds (Rahn et al.. 1996, May et al. 2001). Recent and historic operations of the Homestake Mine Golden Reward mines, which both recently closed on the Black Hills (Larson 2003), have adversely impacted the Whitewood Creek watersheds (May et al. 2001, USFS 2002d). May et al. (2001) report Wharf and LAC Resources are contaminating Spearfish Creek with arsenic and selenium; past operations at the Golden Reward are contaminating Whitewood Creek with copper and selenium; past operations at the Homestake Mine are contaminating Whitewood Creek with arsenic, copper, nickel, and selenium; and Gilt Edge is contaminating Bear Butte Creek with copper, selenium, and nickel. Water quality problems associated with these mines continue to pose threats to the health of humans, fish, and wildlife, especially aquatic species (May et al. 2001). This indicates the Black Hills population of American dipper may be suffering adverse impacts from heavy metal pollution associated with mining. These operations also utilize cyanide leaching treatments to extract gold from low-grade ore (May et al. 2001), meaning a potential for lethal cyanide contamination in streams exists. The Brohm Mine and Double Rainbow Mine continue to cause water quality problems on Bear Butte Creek despite mine remediation projects (Sorenson 1998).

Recreational mine dredge operations are also being planned in the Rapid Creek and Bear Butte Creek watersheds. These mining activities include the McKinney Mining operation, a proposed hand dug mining operation in the Bear Butte Creek watershed, the Lambert Mining operation, a proposed dredging operation that will directly impact Rapid Creek, and the Ketterling Mining operation, a hand-dug and dredge operation that will impact the Spearfish Creek watershed (USFS 2002l). Mining on the Black Hills, both past and present, continues to pose significant threats to the well-being of the Black Hills population of American dipper.

vii. Recreational Activities

Recreational disturbance of nesting areas is another threat to dipper habitat (Tyler and Ormerod 1994, Backlund 2001). By developing recreational sites within or near areas of suitable nesting habitat, nest sites can be limited or destroyed and increased recreational use can interfere with dipper foraging and feeding of young. Disturbance of dipper nesting habitat at

Roughlock Falls on Little Spearfish Creek, one of the few nest sites on this tributary to Spearfish Creek, from increased recreational use interferes with dipper foraging and feeding of young. Trampling of stream banks is causing severe erosion and development of this site by building new hiking trails and foot bridges has contributed to this problem (Backlund 2001). Spearfish Creek has many developed recreation and/or interest sites that could contribute to the degradation of dipper habitat and population declines of this species along this vital stream (USFS 1996b). As the USFS (1996b) states,

> Spearfish Canyon Scenic Byway is a 20-mile drive popular with the traveling public. It provides spectacular scenery, historical mining remnants and an all-season paved highway. This Byway, approved by the Chief of the Forest Service in 1989, allows public access to numerous outdoor recreational activities. This section of U.S. Highway 14A from the city of Spearfish to Cheyenne Crossing, receives very high recreational use throughout the year, but especially during the summer and fall. (p. III-53).

(emphasis added). Additionally, fishing activities along streams capable of supporting dipper populations could also disturb individuals and lead to population declines or possibly the failure of a population to be reestablished on other streams (Tyler and Ormerod 1994).

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes.

The Black Hills population of American dipper may be threatened by commercial, recreational, scientific, or educational interest. The Black Hills population of American dipper has been studied and will undoubtedly continue to be studied as scientists further analyze this population. In order to fully study and understand this population there will undoubtedly be direct handling of individuals. There is a possibility that handling dippers could cause the mortality of individuals as a result of improper handling, negligence, or lack of knowledge of dipper physiology.

Human recreational activity may also adversely impact American dippers (Carty 1994, Tyler and Ormerod 1994). American dippers, as well as other dipper species, have faced adverse impacts from various recreational activities including inadvertent hooking by fishermen (Chatwin 1956), entangling in litter (Loergering 1997), and inadvertent nest or nest site destruction (Tyler and Ormerod 1994). Dippers show mixed responses to human presence. Tyler and Ormerod (1994) state, "It cannot be claimed that recreation activities have any known significant detrimental effect on Dipper populations, but they can jeopardise the breeding success of individual pairs" (p. 191). Human presence in a popular recreational area on Spearfish Creek adversely impacts nesting and foraging dippers (Backlund 2001). Recreational activity may therefore be contributing to the endangerment of the Black Hills population of American dipper.

Persecution by humans has also been documented to adversely impact dipper populations throughout the world (Sullivan 1973, Tyler and Ormerod 1994), although there is currently no information on whether persecution by humans is adversely impacting the Black Hills population of American dipper.

C. Disease or Predation.

Although it has not been documented that disease or predation are playing a role in declining American dipper populations on the Black Hills, these factors may be causing problems (Price and Bock 1983, Tyler and Ormerod 1994).

Predation of dippers has been documented (Tyler and Ormerod 1994). Predators that may prey upon American dippers include *Accipiter* spp. (Sullivan 1973, Price and Bock 1983), great blue herons (Parker 1993), brook trout (Johnson 1953), rodents, mink (*Mustela* sp.), feral cats, crows (*Corvus sp*., kestrels (*Falco sp.*), merlins (*Falco columbarius*) and other hawks (*Buteo* spp.) (Tyler and Ormerod 1994). While predation of the Black Hills population of American dipper has not been specifically documented, it is more than likely dippers are preyed upon at some level by other forest and aquatic species. *Accipiter* spp., such as northern goshawk, sharp-shinned hawk, and Cooper's hawk all inhabit the Black Hills, as well as crows, kestrels, merlins and other hawks (Panjabi 2001). Brook trout also inhabit most Black Hills streams (USFS 1996a).

The Black Hills population of American dipper may also be suffering adverse impacts from parasites and diseases. Halstead (1988) reported blowfly larvae infecting the head of a nestling American dipper, resulting in the death of the bird. Fowl mites (*Ornithonyssus sylviarum*) also infected one nest and the nestling within it (Halstead 1988). In Oregon, trematodes (*Metoliophilus uvaticus*) were found in dipper chicks (Macy and Bell 1968) Trematodes (*Laterotrema cascadensis*) were also found in dippers in Washington and Oregon (Macy and Strong 1967). Protozoan blood parasites are known from an American dipper in Colorado (Stabler et al. 1966). Price and Bock (1983) documented feather lice (*Mallophaga* sp.) were present on birds in Colorado, although the birds did not appear to be adversely affected by the lice. Price and Bock (1983) also linked several dipper deaths to fungus (*Aspergillosis sp.*). There is currently no information on whether parasites or disease are adversely impacting the Black Hills population of American dipper, but such impacts may be occurring.

D. Inadequacy of Existing Regulatory Mechanisms.

There are virtually no regulatory mechanisms in place to protect the Black Hills population of American dipper. There are six government agencies which are responsible in some way for the Black Hills population of American dipper and its habitat. These include the USFS, the Bureau of

Reclamation, USFWS, the South Dakota Department of Game, Fish and Parks ("SDDGFP"), and the SDDENR.

On the Black Hills, the USFS is responsible for managing the Black Hills population of American dipper and its habitat on the BHNF in accordance with various laws, the SDDGFP is responsible for managing fish and wildlife in the in accordance with State laws, the SDDENR is responsible for enforcing State of South Dakota water quality laws and the Clean Water Act, and the Bureau of Reclamation is responsible for managing stream flow in Rapid Creek below Pactola Dam (Backlund 2001). The USFWS also has authority under the Migratory Bird Treaty Act to protect the Black Hills population of American dipper.

i. U.S. Forest Service

Most activities that affect the Black Hills population of American dipper and its habitat (e.g., livestock grazing, dam and diversion construction, road construction and use, recreation, and mining) on the Black Hills occur on the BHNF and are regulated by the USFS (USFS, 1996a). The USFS is required to maintain viable and well-distributed populations of native vertebrate species of wildlife in accordance with the National Forest Management Act ("NFMA") implementing regulations at 36 CFR § 219.19, although this requirement may soon be repealed (USFS 2002m). This is supposed to occur through implementation of a Land and Resource Management Plan ("forest plan"), which directs management activities on the BHNF in accordance with NFMA implementing regulations. The purpose of a forest plan is to guide management of National Forest land. That management must occur such that the viability of native vertebrate species is maintained.

Unfortunately, the Chief of the USFS ruled in 1999 that the 1997 Revised Land and Resource Management Plan and Environmental Impact Statement for the BHNF failed in many ways to ensure viable populations of native wildlife species (USFS 1999b). The USFS (1999b) also stated of the Black Hills population of American dipper that, "Although the USFS…did not analyze population or habitat status or trend, the Forest does acknowledge the concern of the State of South Dakota, which has this species listed as threatened" (p. 45). However, an acknowledgement does nothing to analyze the effects of forest management activities to the dipper and its habitat, nor does it ensure the viability or continued survival of the Black Hills population of American dipper on the BHNF.

Although the USFS has attempted to correct some inadequacies identified by the Chief in the short-term through a "Phase I Amendment" to the 1997 forest plan, the USFS has done nothing to specifically protect the Black Hills population of American dipper and its habitat (USFS 2001b). The 2001 Phase I Amendment Environmental Assessment, just as the 1997 BHNF Forest Plan and Environmental Impact Statement, entirely

fails to analyze the effects of forest management activities to the Black Hills population of American dipper and its habitat.

The 1997 forest plan and 2001 Phase I Amendment also fail to provide any standards and guidelines to ensure the Black Hills population of American dipper and its habitat are adequately protected on the BHNF (USFS 1996b, 2001b). The forest plan provides no management direction specifically protecting the Black Hills population of American dipper.

In response to direction in the amended forest plan, the USFS prepared the Spearfish Canyon Landscape Assessment in 2002. The assessment provides recommendations for how forest plan direction should be carried out in Spearfish Canyon. The only recommendation related to the Black Hills population of American dipper states:

> Coordinate with Homestake [Mining Co.] and other entities to reduce or eliminate human disturbance during breeding season to protect American dipper breeding sites. Coordinate with Homestake to monitor American dipper nest boxes at Roughlock Falls. (p. 22)

USFS 2002d. This is the only instance in which the USFS has given any specific management attention to the Black Hills population of American dipper through the forest plan. Unfortunately, it is not only a vague and uncertain recommendation, it is only a recommendation and therefore carries no management weight or assurance of implementation. Additionally, the Homestake Mine has ceased operations, raising doubts as to whether this recommendations is even valid (USFS 2002d).

Livestock grazing, logging, road construction, reconstruction, and road use, mining, water developments, and recreation are all allowed to occur within the Spearfish Creek, Whitewood Creek, Bear Butte Creek, Elk Creek, Box Elder Creek, Rapid Creek, and French Creek watersheds of the BHNF. To the extent these activities are regulated by the amended forest plan, the USFS often relies upon unenforceable and noncommittal "guidelines." And, while the forest plan includes "standards," which the USFS must comply with, these standards fail to adequately regulate activities that adversely impact the Black Hills population of American dipper.

Livestock grazing is allowed throughout the BHNF (USFS 1996a, b). Even in the only Research Natural Area of the BHNF, livestock grazing is allowed (USFS 1996b, standard 1.1A-2506). Research Natural Areas are required to be retained in a "virgin or unmodified condition." 36 CFR § 251.23. There are no standards explicitly restricting livestock grazing in riparian areas and streams. In fact, the forest plan does not even address the environmental impacts of livestock grazing. Instead, the plan defers all consideration and mitigation of grazing impacts until the development of an allotment management plan, which usually occurs every 10 years (USFS 1996b, 2001b, Standard 2501-2508).

Logging and other silviculture activities are allowed on virtually every acre of the BHNF

(USFS 1996a). The only area of the BHNF where logging and other silviculture activities are not allowed to occur is the 9,831 acre Black Elk Wilderness Area. However, no streams that presently support or historically supported the Black Hills population of American dipper flow through the Black Elk Wilderness Area. To the extent that logging and other silviculture activities are otherwise regulated by forest plan standards, the standards only address the amount of timber that can be sold in one year on the Forest, what silviculture treatments are allowed, and the acreage limitations on certain silviculture treatments. And, while certain areas of the BHNF have been determined to be unsuitable for commercial timber harvest, the USFS is still allowed under the NFMA (16 USC § 1600 et seq. and 36 CFR § 219) to harvest timber in unsuitable areas for reasons other than timber production. Furthermore, there are no standards that restrict silviculture activities on steep slopes or in riparian areas (USFS 1996b, 2001b).

The only areas of the BHNF where road construction, reconstruction, and road use is actually prohibited are the Black Elk Wilderness Area and Inyan Kara Mountain (USFS 1996b, 2001b, Standards 1.1 3.2A-9103. Inyan Kara Mountain is a 1,397 acre isolated mountain near the northwest Black Hills of Wyoming and is nowhere near streams that have historically supported and presently support the Black Hills population of American dipper. There are no road density limits and no limits on total roads in the BHNF. The forest plan standards do not prohibit or eliminate road-related impacts to streams and riparian areas. To the extent that road-related environmental impacts on the BHNF are required to be "minimized," the forest plan does not require attainment of any particular level of "minimization," does not say when "minimization" must be attained, and does not specify where "minimization" should occur (see e.g., USFS 1996b, 2001b, Standards 9201-9204).

Dams, diversions, and other water developments that may reduce streamflow or pose other adverse impacts to the Black Hills population of American dipper and its habitat on the BHNF are inadequately regulated by the forest plan. While the USFS requires special-use permits for such developments, as well as compliance with 36 CFR § 251.56 and Section 505 of the Federal Land and Policy Management Act, there are no well-defined environmental protection requirements associated with authorization of such activities (see e.g., USFS 1996b, Standard 1210). Furthermore, there are no requirements that specifically protect the Black Hills population of American dipper and its habitat from dams and other water developments. Additionally, the forest plan provides no direction to restore water flows to streams, despite the fact that the Black Hills population of American dipper is threatened with extinction by loss of water flows (USFS 1996b, Backlund 2001).

In terms of mining activities, the only areas of the BHNF withdrawn from mineral entry are the

Black Elk Wilderness Area and the land between the rims of Spearfish Canyon (USFS 1996b). Therefore, mineral exploration, and development, both recreational and commercial, is allowed on the rest of the BHNF. And, while Spearfish Canyon has been withdrawn from mineral entry, the rest of the Spearfish Creek watershed has not been withdrawn. In terms of regulating recreational and other mining activities through the forest plan, the USFS defers to 36 CFR § 228 (see e.g., USFS 1996b, Standard 1511). However, this regulation only states that, "All operations shall be conducted so as, where feasible, to minimize adverse environmental impacts on National Forest surface resources…" This regulation fails to require any level of "minimization," simply that impacts shall be "minimized." Furthermore, this regulation provides that adverse impacts associated with mining will be "minimized," but only where feasible. The forest plan provides entirely inadequate regulatory direction to protect the Black Hills population of American dipper and its habitat from mining activities.

Finally, the forest plan provides inadequate direction to limit recreational activities that may be adversely impacting the Black Hills population of American dipper. The only direction that may provide relief from the impacts of recreational activities applies only to Spearfish Canyon on the BHNF (USFS 1996b). The USFS (1996b) states, "Protect the area from actual or potential damage due to public use. Utilize closures under 36 CFR Subpart B when necessary" (p. III-55, standard 4.2A-5103). While these protections are necessary, the Black Hills population of American dipper has yet to receive official protection from recreational disturbances along Spearfish Creek.

In terms of controlling nonpoint source water pollution associated with these activities, the USFS is required to adhere to State of South Dakota developed best management practices ("BMPs") (USFS 1996b). A BMP is specifically defined as:

> …a practice or combination of practices that are determined by a State after problem assessment, examination of alternative practices, and appropriate public participation to be practicable and most effective in preventing or reducing the amount of pollution generated by diffuse sources to a level compatible with water quality goals.

40 CFR § 130. The USFS utilizes silviculture BMPs to mitigate the impacts of logging and associated activities (including road construction, reconstruction, and use) and utilizes best mineral management practices ("BMMPs") to mitigate the impacts of mineral developments (USFS 1996b). However, these measures are entirely ineffective in protecting water quality on the Black Hills. While the USFS is implementing these mitigation measures, water quality problems associated with silviculture and mining activities still exist on the BHNF, indicating BMP and BMMP effectiveness is highly questionable (USFS 1996a, SDDENR 1998, 2000, 2002b). The USFS (2002j) believes

silviculture BMPs to be only 80% effective, meaning BMPs are ineffective 20% of the time. Additionally, during BMP implementation BMPs, the USFS rarely, if ever, takes into consideration the current condition of streams that are impacted by logging and road construction (USFS 2002e, h, j, 2003). In the Mercedes timber sale for example, the USFS (2002j) concluded that BMPs would be effective water quality measures despite the fact that Castle Creek and Rapid Creek are suffering water quality problems associated with silviculture activities (SDDENR 1998, 2000, 2002b). In another instance, the USFS entirely failed to consider the fact that a stream in a timber sale area was suffering water quality problems when concluding BMPs would effectively protect water quality (USFS 2002e).

While some monitoring of BMP effectiveness has been completed on the Black Hills (Lee and Everett 2001), there are significant flaws in the results of this monitoring. For instance, in assessing the effectiveness of BMPs, no reference was made to any baseline water quality condition on waterbodies in timber sale areas. The data gathered during monitoring is purely qualitative and based only on cursory field observations. Finally, the monitoring itself was done by the Black Hills Forest Resource Association, a timber industry advocacy group that has consistently called for more logging, more road construction, and more development on the BHNF. The results are far from objective.

The USFS is further required to develop and maintain a list of sensitive wildlife species. Sensitive species lists are defined by the Forest Service Manual ("FSM") at 2670.5(19) as:

> Those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by: a. Significant current or predicted downward trends in population numbers or density; or b. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution

Sensitive species are managed to avert the need to list species under the ESA or State threatened and endangered lists. Specifically, sensitive species are managed by the USFS in accordance with FSM 2670.22 which states:

> 1. Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions; 2. Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands; and 3. Develop and implement management objectives for population and/or habitat of sensitive species

Despite the well-documented imperilment of the Black Hills population of American dipper on the BHNF, the USFS has not designated the dipper as a sensitive species.

The USFS is also required to comply with the National Environmental Policy Act ("NEPA")

when authorizing grazing, implementing logging projects, and undertaking road construction projects. NEPA requires federal agencies to consider the effects of their actions on the environment, but it does not prohibit the USFS from choosing alternatives that negatively impact the Black Hills population of American dipper and its habitat. In practice, NEPA is a procedural statute and provides no substantive protection. Additionally, the USFS often fails to adequately analyze and assess the impacts of its actions to water quality on the Black Hills (USFS 2002h). Adding to this downfall, the USFS has also concluded that it is only required to analyze and assess the impacts of management activities to federally listed threatened or endangered species, USFS sensitive species, and management indicator species (USFS 2002e, j, USFS 2003). Therefore, according to the USFS, there is no obligation to analyze or assess the impacts of management actions to the Black Hills population of American dipper, which have not been listed under the ESA, are not USFS sensitive species, and are not management indicator species.

The USFS is also in the process of making more long-term changes to the BHNF forest plan through a Phase II Amendment (USFS 2001c). While not completed yet, the USFS has already proposed managing certain species on the Black Hills as "species of local concern" (Twiss 2002b, USFS 2002i). The American dipper is being proposed as a "species of local concern" (USFS 2002i). However, there are no laws, regulations, or policies in place that direct how "species of local concern" are to be managed. According to BHNF Supervisor John Twiss (2002b), the BHNF will manage species of local concern "through implementation of the Land and Resource Management Plan (LRMP)." The goal of the USFS is to "address species of local concern through the LRMP planning process to provide a reasonable probability that the species will continue to persist on the Forest" (Twiss 2002b). A "reasonable probability that the species will continue to persist" on the Black Hills unfortunately provides no substantive, concrete, or guaranteed protection for the Black Hills population of American dipper and its habitat. Preliminary information suggests the USFS will continue to allow the Black Hills population of American dipper and its habitat to be adversely impacted on the Black Hills through the Phase II Amendment (USFS 2002i, Twiss 2002b).

ii. South Dakota Game, Fish and Parks

The SDGFP has had the American dipper listed as a state threatened species since 1996 (Backlund 2001). The following South Dakota statutes apply to the management of threatened species (State of South Dakota Statutes, Threatened and Endangered Species):

> 34A-8-1. Definition of terms. Terms as used in this chapter, unless the context otherwise requires, mean: (3) "Threatened species," any species which is likely to become an endangered species

> within the foreseeable future throughout all or a significant portion of its range.

(South Dakota Statues, Threatened and Endangered Species). This statute does call attention to the imperiled nature of the Black Hills population of American dipper.

> 34A-8-6. Departments to manage, protect and restore endangered and threatened species. The department of game, fish and parks and the department of agriculture shall perform those acts necessary for the conservation, management, protection, restoration and propagation of endangered, threatened and nongame species of wildlife.

This statue does not adequately address the threats to the Black Hills population of American dipper. The SDGFP is limited in its authority to conserve, manage, protect, restore, and propagate species listed as threatened under state law. The agency has no authority to regulate activities that occur on the BHNF and has no authority to regulate activities that occur on private lands. The agency has no authority to restore American dipper habitat on streams that could be capable of supporting American dippers on the Black Hills. While the SDGFP is monitoring dipper populations on the Black Hills and, on some streams, placing nesting boxes on bridges in coordination with private landowners (with limited success), the agency itself cannot adequately address the threats to the Black Hills population of American dipper. And, while the agency has the authority to restore habitat and dipper populations on State of South Dakota lands, there are little to no State of South Dakota lands that contain portions of Rapid Creek, French Creek, Elk Creek, Box Elder Creek, Bear Butte Creek, Whitewood Creek, and Spearfish Creek that could be or are capable of supporting the Black Hills population of American dipper.

> 34A-8-9. Possession, transportation and sale of endangered and threatened species prohibited -- Violation as misdemeanor.

This statute does not address the major threats to the Black Hills population of American dipper and its habitat (e.g., livestock grazing, sediment in streams, pollution, erratic and loss of water flows).

iii. South Dakota Department of Environment and Natural Resources

The South Dakota Department of Environment and Natural Resources is responsible for water quality on streams in the Black Hills of South Dakota. Water quality is affected by livestock grazing, pollution, logging, and road construction and use, and other activities. Sediment and other pollutants are parts of water quality. The following State of South Dakota water quality rules affect the Black Hills population of American dipper and its habitat (South Dakota Surface Water Quality Rules, 74:51:01):

> **74:51:01:02. Compliance with criteria for beneficial uses.** A person may not discharge or cause to be discharged into surface waters of the state pollutants which cause the receiving water to fail to meet the criteria for its existing or designated beneficial uses.

Beneficial uses, "do not limit the actual use of such waters," beneficial uses "designate the minimum quality at which the surface waters of the state are to be maintained and protected" (South Dakota Administrative Rules). If it is found that an activity causes a stream to fail to meet its designated beneficial use, the State of South Dakota has no authority to limit the activity. Therefore, South Dakota State water quality rules do not actually limit livestock grazing, road construction, reconstruction and use, logging, activities that pollute waters, or recreation that may be adversely impacting the Black Hills population of American dipper and its habitat. Additionally, these rules merely set acceptable limits for the discharge or carrying capacity of certain pollutants within surface waters. Unfortunately, while these rules set limits for total dissolved or suspended solids (sediment in water) over a certain time period (e.g., 30-day average, maximum average) in certain streams, this criteria does not adequately address sediment in streams (e.g., the deposition of sediment and silt on streambeds), which is the greatest threat to the Black Hills population of American dipper and its habitat (Tyler and Ormerod 1994, Backlund 2001, Feck 2002).

> **74:51:01:12. Biological integrity of waters.** All waters of the state shall be free from substances, whether attributable to human-induced point source discharges or nonpoint source activities, in concentration or combinations which will adversely impact the structure and function of indigenous or intentionally introduced aquatic communities.

This rule is vague in its relation to specific components of "aquatic communities" (defined as "an association of interacting populations and stages of aquatic life in a given water body or habitat"). Additionally, there is no clear meaning of "adversely impact," providing no clear direction to this rule. This rule provides no meaningful protection for the Black Hills population of American dipper and its habitat.

> **74:51:01:34. Antidegradation of waters of the state.** The antidegradation policy for this state is as follows:
> (1) The existing beneficial uses of surface waters of the state and the level of water quality that is assigned by designated beneficial uses shall be maintained and protected;
> (2) Surface waters of the state in which the existing water quality is better than the minimum levels prescribed by the designated beneficial uses shall be maintained and protected at that higher quality level;
> (3) The board or secretary, may allow a lowering of the water quality to levels established under the designated beneficial use if it is necessary in order to accommodate important economic or social development in the area in which the waters are located;

> (4) Surface waters of the state which do not meet the levels of water quality assigned to the designated beneficial use shall be improved as feasible to meet those levels;
> (5) No further reduction of water quality may be allowed for surface waters of the state that do not meet the water quality levels assigned to their beneficial uses as a result of natural causes or conditions, and all new discharges must meet applicable water quality standards; and
> (6) The secretary shall assure that regulatory requirements are achieved for all new and existing point sources and that nonpoint sources are controlled through cost effective and reasonable best management practices.

This rule applies to pollution, which degrades dipper habitat. This rule allows water quality to be lowered below levels established under designated beneficial uses and therefore allows pollution to continue to degrade the habitat of the Black Hills population of American dipper. While this rule does require water quality to be improved on streams that do not meet their beneficial uses, improvements are made only "when feasible," thus providing no direction to restore polluted or degraded waters. The failure of this regulatory mechanism is entirely evident on the Black Hills where several streams, including Rapid Creek, French Creek, Box Elder Creek, Whitewood Creek, and Spearfish Creek have been listed as experiencing the same water quality problems for years (SDDENR 1998, 2000, 2002a). Despite the existence of documented water quality problems, little to no corrective action has apparently been taken or enforced by SDDENR.

> **74:51:01:55. Criteria for toxic pollutants.** Toxic pollutants at levels which are or may become injurious to public health, safety, or welfare; plant, aquatic, and animal life; or the existing or designated uses of waters may not be present in the surface waters of the state. The toxic pollutants to which this section applies are the priority pollutants and chemicals in 40 CFR Part 131 (July 1, 1995) and any other toxic pollutants or substances determined by the secretary to be of concern at a specific site.

The priority pollutants at 40 CFR 131 do not include sediment in streams, which is the greatest threat to the continued existence of the Black Hills population of American dipper. Additionally, the pollutants determined by the secretary to be of concern do not include sediment in streams.

The South Dakota Department of Environment and Natural Resources is also responsible for issuing storm water discharge permits for construction projects that disturb more than five acres of land. 40 CFR § 122.23. The purpose of issuing permits for the discharge of storm water is to ensure water quality is not degraded during storm events, which often cause extensive erosion and sedimentation. This requirement affects road construction activities on the Black Hills that may impact more than five acres. However, much of the road construction that occurs on the Black Hills is used to facilitate logging and is therefore exempt from storm water discharge permitting requirements. 40 CFR § 122.3. This does not help the Black Hills

population of American dipper or its habitat in any way.

SDDENR also regulates groundwater extraction in the State of South Dakota, which also poses threats to the Black Hills population of American dipper (South Dakota Administrative Rules, Ground Water). However, there are no regulatory mechanisms that protect fish or wildlife from groundwater extraction (South Dakota Administrative Rules, Ground Water).

iv. Bureau of Reclamation

The Bureau of Reclamation regulates the flow of Rapid Creek downstream of Pactola Dam. As Backlund (2001) states, "Erratic releases and periodic low releases from Pactola dam are probably responsible for the near extirpation of the dipper from Rapid Creek below Pactola, in Dark Canyon, an area that was once the best dipper habitat on Rapid Creek." Pactola Dam is operates under Annual Operating Plans developed by the Bureau of Reclamation.

The Operating Plan for Pactola Dam in 2002 states (Bureau of Reclamation 2003e):

> The winter releases for WY 2002 will be between 20 and 30 cfs and has been coordinated with South Dakota Department of Game, Fish and Parks, local water users, Forest Service, and Corps of Engineers. Winter releases can be increased by 3 cfs during extremely cold weather to replace water that is lost in the formation of ice in the creek channel. Once the channel is covered with ice and snow, which provides insulation for the stream, the releases can be reduced if below average snowpack and inflow conditions indicate a need to conserve storage. During the flood control season, total releases will be controlled between 20 cfs and 1000 cfs.

While the Bureau of Reclamation expresses some concern over the aquatic communities below Pactola Dam, these concerns are limited to fish. Their concern is warranted and important, but this narrow focus does little to aid the Black Hills population of American dipper. The fact that the Bureau allows Rapid Creek below Pactola dam to freeze indicates the Black Hills population of American dipper is receiving insufficient attention from this federal agency. Additionally, the Bureau may allow flows to fluctuate between 20 and 1000 cfs. These erratic flows adversely impact the Black Hills population of American dipper and its habitat on Rapid Creek (Backlund 2001).

Other Annual Operating Plans for Pactola Dam reflect similar indifferences toward the American dipper and its habitat on Rapid Creek. The 2000-2001 Annual Operating Plan states as follows (Bureau of Reclamation 2003d):

> Pactola Reservoir is operated as close to the top of the conservation pool as possible, while regulating releases required to maintain downstream fishery and preserve flood control space. Except when adequate inflows occur below the dam, the following minimum releases will be made to maintain downstream fishery values:
>
> 1. Reservoir content greater than 29,000 acre-feet

October 1 to March 1 15 cfs
March 1 to October 1 20 cfs

2. Reservoir content less than 29,000 acre-feet

October 1 to April 15 7 cfs
April 15 to October 1 20 cfs

The winter release for WY 2001 has been coordinated with South Dakota Department of Game, Fish, and Parks, local water users, Forest Service, and Corps of Engineers. Winter releases can be increased from 15 cfs to near 18 cfs during extremely cold weather to replace water that is lost in the formation of ice in the creek channel. Once the channel is covered with ice and snow which provides insulation for the stream, the releases can be reduced if below average snowpack and inflow conditions indicate a need to conserve storage. During the flood control season, total releases will be controlled between 20 cfs and 1000 cfs. Releases in excess of 200 cfs when storage is below the top of the conservation pool at elevation 4580.20 will be cleared with the Corps of Engineers. The Corps will issue release orders on a current basis when storage is in the exclusive flood control pool. Contract negotiations with water users at Pactola Reservoir will provide the basis for future reservoir operations.

During the irrigation season of May 1 through October 30 sufficient natural flows to meet prior rights of the irrigators will be bypassed through the reservoir. Orders by water users will be released under the provisions of contracts with the water users. Drought conditions that have existed in past years have resulted in conservation measures being initiated by water users. Continuation of water conservation measures will assist in conserving reservoir storage and refilling of the reservoir even if below average inflows occur.

As disclosed by the Annual Operating Plan for 2000-2001, the Bureau fails to ensure Rapid Creek does not become covered with ice. In fact, the Bureau of Reclamation characterizes Rapid Creek covered with ice and snow as providing "insulation." American dippers cannot survive in such habitat – they are not insulated by ice. The Bureau of Reclamation discloses that minimum flows from Pactola normally range from 15-20 cfs. However, during flood season (mid to late spring when snows melt), when dippers may be nesting, flows from Pactola Dam are allowed to range from 20-1000 cfs, a huge range of 980 cfs. The Bureau of Reclamation therefore allows erratic flows that are most likely detrimental to the Black Hills population of American dipper (Tyler and Ormerod 1994, Backlund 2001). This is documented by USGS streamflow data (see Figure 7). Finally, the Bureau of Reclamation manages flows out of Pactola Dam from May through October to meet the "prior rights of irrigators," not to meet the needs of the Black Hills population of American dipper. Annual Operating Plans in 1998, 1999-2000, 2000, and 2001 reflect similar inadequacies in the regulatory mechanisms guiding management of Pactola Dam by the Bureau of Reclamation (Bureau of Reclamation 2003a, b, c, d).

v. U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service has authority to ensure migratory birds are protected by the Migratory Bird Treaty Act. The Black

Hills population of American dipper is a species protected by the Migratory Bird Treaty Act, 16 USC § 703 et seq.). 50 CFR § 10.13 (2000). However, the protection afforded by the Act is extremely limited, only prohibiting killing of dippers and the destruction of nest sites. The Migratory Bird Treaty Act does not provide the habitat protection necessary to ensure the Black Hills population of American dipper is not extirpated and it does not limit or restrict activities that may adversely impact the habitat of the Black Hills DPS of American dipper.

E. Other Natural or Manmade Factors Affecting the Continued Existence of the Black Hills Population of American Dipper's.

Natural processes such as fires, floods, or severe storms threaten the continued existence of the Black Hills population of American dipper. Backlund (2001) states that:

> Until it can be shown that Spearfish Creek is not the only source population of dippers in the Black Hills, the dipper population must be at high risk of extirpation. A major fire in the Spearfish Canyon or a severe winter in combination with other factors could easily eliminate this [dipper] population. (p. 9-10)

(emphasis added). Because of the small size and its isolation from other populations, the Black Hills population of American dipper may be further at risk of extirpation because of environmental stochasticity leading to irreversible population crashes (see e.g., Lande 1993, Hanski and Moilanen 1996). Catastrophes such as fires, floods, and severe storms magnify the risk of extirpation of the Black Hills population of American dipper (Lande 1993). Backlund (2001) fears that "A major fire in the upper [Spearfish Creek] watershed could be devastating due to the temporary increase in sediment" (p. 10). The Black Hills population of American dipper is most likely not viable and is at a higher risk of extirpation (Ruggiero et al. 1994, Tyler and Ormerod 1994).

As an example of the high likelihood of an event of this nature happening and adversely impacting the Black Hills population of American dippers, Backlund (2001) states "American dippers were severely impacted by the winter of 1996-1997, regarded as one of the worst winters in history, and the spring flooding that followed" (p. 7). Consequently, dipper populations and nest sites on Spearfish Creek were incredibly low in 1997.

The occurrence of natural, catastrophic disturbances on the Black Hills is well-documented. The USFS (1996a) states, "The climate of the area is highly variable…Severe weather can occur, including hailstorms, high winds, and rare tornadoes. Heavy blizzards can occur, most often in late winter/early spring" (p. III-7). In 1972, a massive flood occurred on Rapid Creek (Carter et al. 2002). The USFS (1996a) describes the flood:

> The highest recorded discharges on Rapid Creek occurred on June 9 and 10, 1972 (Table III-7), when heavy rains falling over the east-central Black Hills broke all previous precipitation records….In less than five hours, 15 inches of rain fell near Nemo on Box Elder Creek and 14.5 inches fell near Sheridan Lake. Halligan and Longsdorf (1976) concluded that it was the steep grade of the channel descent (up to 100 feet per mile) combined with the high-intensity precipitation that led to the high flood stages and flow velocities. The damage included 238 people dead, 3,057 people injured and $164 million in property losses. (p. III-63)

Carter et al. (2002) state:

> The 1972 flood on Rapid Creek has an estimated recurrence interval of 500 years (Burr and Korkow, 1996), which means that a flood of this magnitude will occur an average of once every 500 years. Every year there is a 0.2-percent chance (1 in 500) of experiencing a similar flood. (p. 3)

The natural occurrence of large-scale, stand replacing fires on the Black Hills is well documented (Graves 1889, Shinneman 1996, Shinneman and Baker 1997). Additionally, largescale, stand-replacing fires in ponderosa pine forests, such as the Black Hills, are naturally more common than believed (Baker and Ehle 2001). Some of the largest fires in the recorded history of the Black Hills have burned in recent years (USFS 2001a). Most of these fires burned in areas that had been intensively logged and thinned (see e.g., USFS 2001a). The USFS (2001a) states:

> In recent years (since 1987) there have been many timber sales in the Jasper area including 24 large sales (greater than 1.0 mmbf [million board feet])….A total of approximately 183 mmbf of timber has been harvested in the area from these 24 sales. (p. 4-5).

The Jasper Fire was the largest fire to burn in the recorded history of the Black Hills (USFS 2001a). Logging and thinning has occurred, is occurring, and is proposed to occur in the Spearfish Creek watershed (USFS 2002d, f, k, l, See Table 2, Figure 7), thereby indicating wildfire risk in these watersheds may be unnaturally increased.

In such an unpredictable environment, capable of extreme displays of natural forces, the Black Hills population of American dipper faces significant natural threats to its continued existence on Spearfish Creek. Until the Black Hills population of American dipper is reestablished on other streams capable of supporting breeding populations, its continued existence is highly uncertain.

Additionally, competition among other species may be adversely impacting the Black Hills population of American dipper. Price and Bock (1983) suggest that trout are likely competitors with American dippers because of niche overlap. Nonnative brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), cutthroat trout (*Oncorhynchus clarki*), and rainbow trout (*Oncorhynchus mykiss*) inhabit most streams on the Black Hills (USFS 1996a; South Dakota Game, Fish and Parks undated pub.). While the mere existence of these fish species suggests the

Black Hills population of American dipper may be facing adverse impacts from competition, the fact that the trout are introduced species may indicate the American dipper on the Black Hills is not behaviorally adapted to coexist or compete effectively with nonnative trout species.

The small size of the Black Hills population of American dipper also increases the risk of extirpation. Smaller, more isolated populations are at greater risk of extirpation because there are fewer dippers and genotypes available to survive a catastrophic event. Inbreeding depression in the small Black Hills population may result in loss of fitness (Schemske and Lande 1985; Wilcox and Murphy 1985; Brussard and Gilpin 1989; Oostermeijer *et al*. 1995). Habitat destruction has reduced the population size, making the American dipper more susceptible to stochastic events (Allee *et al*. 1949; Petersson 1985; Brussard and Gilpin 1989).

Finally, the Black Hills population of American dipper appears to be threatened by anthropogenic global climate change. According to the U.S. EPA (1998), "The earth's climate is predicted to change because human activities are altering the chemical composition of the atmosphere through the buildup of greenhouse gases – primarily carbon dioxide, methane, nitrous oxide, and chlorofluorocarbons" (p. 1). The agency reports temperature increases, changes in precipitation, soil moisture, and sea level as effects of climate change (U.S. EPA 1998). Average temperatures in South Dakota have already been increasing from anthropogenic climate change (U.S. EPA 1998). The agency predicts that over the next century, the climate may change even more. According to the U.S. EPA (1998), "Changes in climate can be expected to further stress ecosystems and wildlife such as the mountain lion, black bear, longnose sucker, fringe-tailed myotis, marten, and bald eagle" (p. 4). Climate change in South Dakota could lead to decreased stream flows and groundwater levels, thus eliminating the availability of surface water for fish and wildlife (U.S. EPA). Such impacts would adversely affect the Black Hills population of American dipper (Tyler and Ormerod 1994, Backlund 2001). Decreased stream flows could magnify the effects of pollution (U.S. EPA 1998), thus adversely impacting the American dipper (Tyler and Ormerod 1994, Backlund 2001). Climate change could lead to increased incidences of flooding (U.S. EPA 1998), which has also been documented to adversely impact the American dipper and threatens the Black Hills population of American dipper (Price and Bock 1983, Tyler and Ormerod 1994, Backlund 2001). Climate change also has the potential to push ecological zones upward, thus reducing the availability of suitable dipper habitat on the Black Hills (U.S. EPA 1998). McCarty (2001) wrote, "Ongoing climate change is an additional source of stress for species already threatened by local and global environmental changes, increasing the risk of extinction" (p. 325).

VI. CRITERIA FOR THE DESIGNATION OF CRITICAL HABITAT

Those sections of the ESA implementing regulations relevant to the designation of critical habitat are:

> 424.12(a)(2) Critical habitat is not determined when one or both of the following situations exist:…(ii) The biological needs of the species are not sufficiently well known to permit identification of an area as critical habitat.
>
> 424.12(b) In determining what areas are critical habitat, the Secretary shall consider those physical and biological features that are essential to the conservation of a given species and that may require species management considerations or protection. Such requirements includes but are not limited to the following: (1) Space for individual and population growth, and for normal behavior; (2) Food, water, air, light, minerals, or other nutritional or physiological requirements; (3) Cover or shelter; (4) Sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and generally (5) Habitats that are protected from disturbances or are representative of the historic, geographical, and ecological distributions of a species.
>
> 424.14(d) Petitions to designate critical habitat…Upon receiving a petition to designate critical habitat…to provide for the conservation of a species, the Secretary shall promptly conduct a review in accordance with the Administrative Procedures Act (5 USC § 553) and applicable Department regulations, and take appropriate action.

Petitioners document below the need for the designation of critical habitat concurrent with the ESA listing to provide for the conservation of the Black Hills DPS of American Dipper as required by the ESA.

A. The American Dipper on the Black Hills Warrants Classification and Consideration as a DPS and Warrants Listing as Threatened or Endangered in Accordance With the ESA

Petitioners have shown the Black Hills population of American dipper warrants classification as a DPS under the ESA and the USFWS's DPS policy. Furthermore, petitioners have shown the Black Hills DPS of American dipper warrants listing as threatened or endangered under the ESA. Accordingly, the USFWS must designate critical habitat for this imperiled population of American dipper concurrent with listing.

B. The Biological Needs of the Black Hills Population of American Dipper are Sufficiently Well Known

The biological needs of the American dipper are sufficiently well known. Sufficient research has been done on the American dipper to determine prey requirements, habitat requirements, behavioral attributes, its ecology, its response to various events, and the impacts of certain activities to the species and its habitat (Bakus 1959a, b, Sullivan 1973, Price 1975, Ealey

1977, Price and Bock 1983, Osborn 1999, Backlund 2001, Feck 2002).

C. Habitat Essential to the Conservation of the Black Hills Population of American Dipper is Well Known

Research has documented the habitat requirements of the American dipper (Bakus 1959a, b, Sullivan 1973, Ealey 1977, Price and Bock 1983, Osborn 1999, Feck 2002).

Additionally, historical and present-day records clearly describe where the Black Hills population of American dipper has flourished, where the Black Hills population of American dipper has now disappeared, and where the Black Hills population of American dipper now cling perilously to survival (Pettingill and Whitney 1965, Backlund 1994, Hays et al. 1996, Hays and Hays 1997a, b, Hays and Hays 1998, Backlund 2001). Protection of these historically and presently occupied habitats on the Black Hills is essential to the conservation of the Black Hills population of American dipper.

D. Designation of Critical Habitat is Prudent and Would Not Lead to Increased Threats to the Species

There is no indication that designation of critical habitat would lead to increased threats to the Black Hills population of American dipper (Backlund 2001, Anderson 2001). On the contrary, existing research strongly suggests the protection of American dipper habitat would benefit the Black Hills population of American dipper (Tyler and Ormerod 1994, Backlund 2001). Indeed, the destruction of the habitat of the Black Hills population of American dipper has been identified as the primary reason for the species' decline and endangerment on the Black Hills (Backlund 2001). Based on the best available science, there is no indication that, upon designating critical habitat for the Black Hills population of American dipper, the species would become the target of poaching, illegal taking, harassment, or persecution.

E. Designation of Critical Habitat Would Benefit the Black Hills Population of American Dipper

Kingery (1996) reports management practices that protect, for any purpose, riparian areas from overgrazing, silting, overlogging, and pollution will also protect species in both summer and winter. Backlund (2001) makes similar recommendations for the Black Hills population of American dipper.

Additionally, the USFS, responsible for managing much of the Black Hills, more often than not ignores the needs of native plants, animals, and their habitats on the BHNF. Indeed, the Supervisor of the BHNF, John Twiss, has admitted that he disagrees with a Washington Office decision requiring major changes in the 1997 BHNF forest plan (Twiss 2002a). These changes were mandated so that plants, animals, and their habitats would be better protected in the

face of extensive and significant exploitation of forest resources on the BHNF. In light of this disagreement, it is highly questionable whether the USFS will give the Black Hills population of American dipper and its habitat on the BHNF the protection needed to avoid extinction. Designation of critical habitat for the Black Hills population of American dipper would ensure federal entities, like the USFS, actually protect and conserve the species. Designation of critical habitat would demand on-the-ground protection of the Black Hills population of American dipper, which the USFS too often fails to carry out, to the detriment and ultimate destruction of the valuable and unique Black Hills ecosystem.

VII. REQUEST FOR AN EMERGENCY LISTING RULE

The ESA provides authority for the Secretary to issue temporary listing rules in the event of "any emergency posing a significant risk to the well being of any species of fish or wildlife or plants." 16 U.S.C. § 1533(b)(7). Indeed, the Secretary is commanded to make "prompt use" of this authority "to prevent a significant risk to the well being of any such species." 16 U.S.C. § 1533(b)(3)(C)(iii).

The Black Hills population of American dipper (*Cinclus mexicanus unicolor*) is a critically imperiled distinct vertebrate population segment that deserves emergency listing and immediate protection under the ESA while the Secretary promulgates a final rule. Emergency protection for the Black Hills population of American dipper is warranted because of the imminent and ongoing destruction of habitat from pollution, extensive livestock grazing, logging and other silviculture activities, road construction, mining, recreational activities, and stream developments (i.e., dams and diversion). As has been demonstrated by this petition, all of these activities pose significant risks to the well being of the Black Hills population of American dipper. In addition to the high probability of stochastic events and other factors adversely impacting the small American dipper population on the Black Hills, the species' well being is significantly further at risk. As has been documented, the distribution of the Black Hills population of American dipper has been restricted to only one stream that is capable of supporting a self-sustaining population, thus rendering the species highly susceptible to extinction within the Black Hills. Because the Black Hills population of American dipper most likely cannot and do not interact with American dipper populations in other mountain ranges, such as the Big Horn and Laramie Mountain Ranges in Wyoming, there exists no possibility of the Black Hills population of American dipper naturally restoring itself on the Black Hills. Therefore, in addition to requesting ESA listing, Petitioners further request that an emergency listing rule be promulgated immediately.

VIII. DOCUMENTS CITED

Petitioners hereby incorporate by reference every document cited in this petition and/or cited in the References below. We are happy to provide copies of any of these documents upon request.

IX. SUMMARY

The Black Hills population of American dipper is a critically imperiled distinct vertebrate population segment that warrants listing as threatened or endangered, critical habitat designation, and Emergency protection under the ESA. Protection under the ESA provides the best hope for the continued existence of the Black Hills population of American dipper. It is clear that agencies like the USFS, the SDDENR, and the Bureau of Reclamation have not demonstrated their ability to protect and restore the Black Hills population of American dipper population and its habitat. And, while the SDGFP has attempted to protect this species, there is in reality little the agency can achieve with its limited authority. Listing the Black Hills population of American dipper as threatened or endangered under the ESA will provide the authority and direction necessary to effectively protect and restore the Black Hills DPS of American dipper.

The Black Hills DPS of American dipper fits ESA listing criteria on at least four counts and possibly all five:

1. The present or threatened destruction, modification, or curtailment of its habitat or range – Dipper habitat on the Black Hills has become extremely limited and continues to be destroyed as a result of pollution, livestock grazing, logging, road construction, dams, loss of water flows, mining, and recreation. Dipper habitat continues to be destroyed and is imminently threatened by many ongoing and proposed activities.

2. Overutilization for commercial, recreational, scientific, or educational purposes – It is possible that American dipper is or could be adversely affected by overutilization for commercial, recreational, scientific, or educational purposes.

3. Disease or predation – The existence of predators such as coyote, accipiters, other predators, and domestic and/or feral dogs and cats may pose threats to American dippers and their young, as well as various diseases.

4. The inadequacy of existing regulatory mechanisms – The existing regulatory mechanisms do not adequately protect the dipper and its habitat. Additionally, the existing regulatory mechanisms do not ensure dipper populations and habitat will be restored to viable levels and to historically occupied streams on the Black Hills.

5. Other natural or manmade factors affecting its continued existence – As documented by the best available science, one of the greatest threats to the continued existence of the American dipper on the Black Hills is the occurrence of natural, catastrophic events in the Spearfish Creek watershed, which threaten to destroy the only self-supporting population in the Black Hills. The loss of the Spearfish Creek population would ultimately lead to the extirpation of the species on the Black Hills. The small size of the dipper population places the species at further risk of extirpation. The dipper is further

threatened by competition with trout and global warming.

Finally, the Black Hills population of American dipper and its habitat warrants protection because of its aesthetic, ecological, educational, and scientific value to people of the United States. The Black Hills population of American dipper is a valuable indicator of water quality. The Black Hills population of American dipper is also charasmatic and celebrated as a unique riverine species. The naturalist John Muir aptly described:

> Find a fall or cascade, or rushing rapid, anywhere upon a clear stream, and there you will surely find its complementary ouzel, flitting about in the spring, dining in the foaming eddies, whirling like a leaf among the foam-bells; ever vigorous and enthusiastic, yet self-contained, and neither seeking nor shunning your company…He is the mountain stream's own darling, the hummingbird of blooming waters, loving rocky ripple slopes and sheets of foam as a bee loves flowers, and a lark loves sunshine and meadows.

It is to the benefit of the Black Hills ecosystem and to the citizens of the United States for the USFWS to ensure the hummingbird of the blooming waters in the Black Hills receives the protection and attention it needs before it is gone forever.

X. 90-DAY FINDING

Petitioners expect to receive a formal acknowledgement of this petition, a full discussion and consideration of the request for an Emergency Listing rule, expeditious finalization of a formal listing proposal and rule, and designation of critical habitat concurrent with a final rule. Petitioners expect to receive a formal acknowledgment of this petition and a decision within 90 days of its receipt.

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