STATUS REVIEW AND PETITION TO LIST THE MONO BASIN AREA SAGE GROUSE (*CENTROCERCUS UROPHASIANUS*) AS A DISTINCT POPULATION SEGMENT OF GREATER SAGE-GROUSE AS THREATENED OR ENDANGERED UNDER THE ENDANGERED SPECIES ACT

Submitted by the STANFORD LAW SCHOOL ENVIRONMENTAL LAW CLINIC

On behalf of

THE SAGEBRUSH SEA CAMPAIGN

WESTERN WATERSHEDS PROJECT

CENTER FOR BIOLOGICAL DIVERSITY

CHRISTIANS CARING FOR CREATION

SENT CERTIFIED U.S. POSTAL MAIL

November 10, 2005

Nevada Fish and Wildlife Office
U.S. Fish and Wildlife Service
1340 Financial Blvd, Suite 234
Reno, Nevada 89502-7147

Sacramento Fish and Wildlife Office
U.S. Fish and Wildlife Service
2800 Cottage Way, Room W-2605
Sacramento, California 95825

Re: Petition to List Mono Basin Area Sage Grouse (*Centrocercus urophasianus*) as a Distinct Population Segment under the Endangered Species Act

Ladies and Gentlemen:

On behalf of the Sagebrush Sea Campaign, Western Watersheds Project, Center for Biological Diversity, and Christians Caring for Creation, the Stanford Law School Environmental Law Clinic hereby petitions to list the Mono Basin area sage grouse (*Centrocercus urophasianus*) as a "threatened" or "endangered" distinct population segment of the greater sage grouse under the Endangered Species Act (ESA) (16 U.S.C § 1531 *et seq.*) and the Administrative Procedures Act (5 U.S.C. § 551 *et seq.*).

This petition is not intended to supplement any previous petition to list the Mono Basin area sage grouse under the ESA, but is submitted as a wholly new petition for the Mono Basin area population.

Please use the following address for all correspondence regarding this petition:

Deborah A. Sivas, Director
Environmental Law Clinic
Stanford Law School
559 Nathan Abbott Way
Stanford, California 94305
(650) 723-0325

Sincerely,

Deborah A. Sivas
Director

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Executive Summary

The historic distribution of greater sage-grouse closely conformed to the distribution of sagebrush-steppe, covering what became sixteen western states and three Canadian provinces. Huge flocks of sage grouse were reported to "blacken the sky" before the turn of last century. However, sage grouse have declined as the West was settled, and populations have been reduced by 45-80% as grazing, agricultural conversion, residential development, road construction, mining, wildfire, energy development, invasive species, off-road vehicle use, and other forms of land use continue to degrade and eliminate sage grouse habitat.

Sage grouse occur in only two subregions in California: the Mono Basin area and the Modoc Plateau. Recent scientific evidence has demonstrated that Mono Basin area sage grouse are genetically distinct from other greater sage-grouse populations. Their genetic distinctiveness, combined with their declining population trends, qualify Mono Basin area sage grouse for protection under the Endangered Species Act (ESA) as a distinct population segment.

Mono Basin area sage grouse populations have fallen precipitously since the early 1900s. A species that was once described as abundant now only exists in small, isolated populations in the region. Large expanses of Mono Basin area sage grouse habitat continue to be degraded and eliminated by livestock grazing; off-road vehicle use; residential development; pinyon-juniper encroachment; invasive species; wildfire; mining; the Mammoth Lakes airport expansion; placement and construction of roads, fences and transmission lines; and other forms of land use and development.

Further, existing regulatory measures will not stave off extinction for the Mono Basin area sage grouse. According to the U.S. Fish and Wildlife Service, only one of thirty existing conservation measures meets the agency's criteria for effective conservation actions. Clearly, more effective measures are needed.

The Mono Basin area sage grouse qualifies as a threatened or endangered species under the ESA due to continued habitat destruction and modification; overutilization of the species; disease, predation, and other natural and man-made factors; and the inadequacy of existing regulatory mechanisms to conserve and recover Mono Basin area sage grouse populations.

The remaining small, isolated populations of Mono Basin area sage grouse are extremely susceptible to extinction. As poor land management continues to fragment an already tattered landscape, time is running out for the Mono Basin area sage grouse. Immediate action is needed to ensure that this isolated and genetically unique population of this majestic species is preserved forever.

Petitioners

The **Sagebrush Sea Campaign** focuses public attention and conservation resources on protecting and restoring the vast sagebrush steppe landscape. The campaign participates in public planning processes, advocates for natural resource protection, and uses education, research, and litigation to conserve and restore the Sagebrush Sea for present and future generations. The Sagebrush Sea Campaign is a project of Forest Guardians.

Mark Salvo, Director
Sagebrush Sea Campaign
c/o 2224 W. Palomino Drive
Chandler, Arizona 85224
mark@sagebrushsea.org

Western Watersheds Project protects and restores western watersheds and wildlife though education, public policy initiatives and litigation. In ten years, Western Watersheds Project has expanded the scope and range of its work, and is now active in eight western states.

John Marvel, Executive Director
Western Watersheds Project
P.O. Box 1770
Hailey, Idaho 83333
jon@westernwatersheds.org

The **Center for Biological Diversity** is a national conservation organization based in Tucson, Arizona with over 15,000 members. Combining conservation biology with litigation, policy advocacy, and an innovative strategic vision, the Center for Biological Diversity is working to secure a future for animals and plants hovering on the brink of extinction, for the wilderness they need to survive, and by extension for the spiritual welfare of generations to come.

Daniel Patterson, Ecologist and Deserts Program Director
Center for Biological Diversity
P.O. Box 549
Joshua Tree, California 92252
dpatterson@biologicaldiversity.org

Christians Caring for Creation is a national prayer network based in South Pasadena, California. The network supports God's clear mandate to protect every living creature on the Earth and keep them from extinction.

Connie Hanson, Executive Director
Christians Caring for Creation
South Pasadena, California
cccpnch@aol.com

Description of Mono Basin Area Sage Grouse

Mono Basin area sage grouse are a subpopulation of greater sage-grouse (*Centrocercus urophasianus*) that occur on the border of California and Nevada. See Map 1. Geneticists have discovered that Mono Basin area sage grouse are genetically distinct from other greater sage-grouse. New research indicates that Mono Basin area sage grouse have "a unique history of isolation distinct from all other populations" and that they are "at least as divergent from other populations of the greater sage-grouse as Gunnison sage-grouse are from the greater sage-grouse." (Oyler-McCance et al. 2005: 1308). Oyler-McCance et al. concluded that the Mono Basin area population does "certainly qualify as a distinct population segment from a genetic standpoint and may even warrant consideration as a new subspecies." (Oyler-McCance et al. 2005: 1308).

Despite their distinct genetic traits, Mono Basin area sage grouse appear and behave as other greater sage-grouse, and have the same habitat requirements as other sage grouse.

Natural History of Sage Grouse

Connelly et al. (2004), Crawford et al. (2004), Braun et al. (2002), Connelly et al. (2000) and Schroeder et al. (1999) describe the natural history of greater sage-grouse. Although Mono Basin area sage grouse possess distinct genetic characteristics from other greater sage-grouse, their habitat needs for feeding, breeding, nesting, brood-rearing, and shelter are the same as for other sage grouse. The following brief life history information is synthesized from the above listed references and additional references cited in the text.

Sage grouse have inhabited the western United States and southern Canada since the Pleistocene epoch (Wetmore 1951). The sage grouse was discovered by Lewis and Clark in 1806 and was given its scientific name, *Centrocercus urophasianus* (Latin for "spiny-tailed pheasant"), in 1831 (Patterson 1952). Huge flocks of sage grouse were reported to "blacken the sky" before the turn of the century (Patterson 1952; Bent 1932). Prior to the arrival of white settlers, American Indians utilized the sage grouse for food and created dances and costumes to mimic their strutting behavior (Autenrieth 1981). Their historic range closely conformed to the distribution of sagebrush-steppe, covering what became sixteen western states and three Canadian provinces. However, since 1900 the distribution and numbers of sage grouse have been reduced, with extirpation of populations at the periphery of their range. The greater sage grouse presently occurs in eleven western states and two Canadian provinces, including the distinct population of Mono Basin area sage grouse in California.

Sage grouse are a sagebrush obligate species and require sagebrush varieties throughout the year for food and cover. Seasonal habitats consist of sagebrush, grasses and forbs. (California Wildlife Habitat Relationships habitat types found in the Mono Basin area include "wet meadow," "sagebrush," and "low sage." (CDFG 2001b: 4)).

Sage grouse breeding activities occur from March to early June. In the early spring, the more colorful males congregate at dawn and often at late evening at leks – ancestral strutting grounds that are clear of large sagebrush and tall debris for predator detection and have good acoustical qualities so the sounds of display activity can be heard by other sage grouse. Leks vary in size from one to forty acres (Scott 1942) and may be located up to fifty miles from wintering areas (Pyrah 1954). Dominant males will breed with more than one female.

Hens leave the lek and begin their nesting effort immediately after mating. Ideal nesting habitat has two components: a sagebrush overstory and a thick grass/forb understory (Gregg 1992; Wakkinen 1990; Roberson 1984; Autenrieth 1981; Braun et al. 1977). Both the over- and understory provide food, shelter from the wind and sun, and cover from predators (DeLong et al. 1995; Webb 1993; Gregg 1992). Nests are typically shallow bowls lined with leaves, feathers, and small twigs placed at the base of a live sagebrush bush. Eggs are incubated by the female for approximately 25-29 days and recent clutch size in the Mono Basin area has averaged 6-7 eggs. (Casazza et al. 2005: 10). If the first nest is lost due to predation or severe weather, some hens will re-nest but second clutch sizes are often smaller. Males provide no paternal care or resources.

Newly hatched chicks feed on insects and forbs (Johnson and Boyce 1990). Tall grasses and shrubs are important to conceal hens with chicks from predators and provide shade. As chicks mature, they follow the hens to summer range consisting of an interspersion of sagebrush stands and forb-rich wet meadows and riparian areas (with tall grass on the periphery to provide escape cover). Groups of unsuccessful hens and flocks of males follow similar habitat use patterns but are less dependent on wet meadow areas than are hens with broods.

As autumn approaches intermixed flocks of young and adult birds move from wet meadows and riparian areas to sagebrush dominated landscapes that continue to provide green forbs. Good winter range will provide sage grouse with access to sagebrush under all snow conditions as the shrub is the only food source available to the grouse in the winter. As spring approaches, flocks of sage grouse return to leks and breeding areas used the prior year.

During the year sage grouse will range widely between leks, brood rearing areas, wet meadows and riparian zones, loafing and feeding areas, and winter habitat, sometimes covering over one hundred miles of terrain (Hulet et al. 1984). Subsequently, large areas of healthy, diverse sagebrush habitats and functioning hydrologic systems are necessary to support sage grouse.

Historic Population, Geographic Distribution, Current Population and Trends of Mono Basin Area Sage Grouse

Historic Population

There are no firm estimates of historic sage grouse populations in the Mono Basin area. In one of the earliest accounts on record, Captain John C. Fremont reported the occurrence of sage grouse in eastern California on his first trip into Nevada in 1843-1844. (Perez 1994: 3, *citation omitted*). The Mono Paiute called sage grouse “Hoo’d-dze-hah” and the Washoe, another Mono Basin area Indian tribe, called them “See-yook.” (Merriam 1979: 164, 109). Original settlers used the term

"thousands" when referring to sage grouse numbers in California. (Perez 1994: 4, *citation omitted*).

However, "early explorers in the Inyo-Mono Counties seldom mention sage grouse in their journals." (Perez 1994: 3, *citation omitted*). Perez, citing a 1966 Inyo National Forest sage grouse habitat management plan, stated that "available reports indicate that sage grouse were probably not abundant in the area of Inyo-Mono and populations were localized in limited suitable habitat." (Perez 1994: 3-4).

In contrast, Grinnell found that sage grouse had been found "in great numbers" in the Long Valley region. (Hornaday 1916: 202). Other sources report that early California settlers reported seeing thousands of sage grouse in the Mono Basin. (Schneegas 1967: 271). Perez summarized historic reports from 1865 to 1900 that indicated that "sage grouse were extremely abundant throughout Eastern California." (Perez 1994: 4, *citation omitted*). Joseph Leconte found sage grouse to be "very abundant" in the Bridgeport Valley in 1870.

Howell noted that sage grouse were once found as far south as Big Pine. (Howell 1917). Perez reported that "distribution [between 1865-1900] extended south into Inyo County to Independence, probably along the eastern Sierra Nevada foothills." (Perez 1994: 4, *citation omitted*). Courtwright noted in 1916 that sage grouse are "becoming abundant in the Mono [Inyo] National Forest, from Bridgeport south on the open country." (Courtwright 1916: 163).

California sage grouse population declines have been noted as far back as 1916. Grinnell found that "there is no doubt whatever but that there has been very great decrease in certain places, for instance, in Long Valley, Mono County." (Hornaday 1916: 202). "From 1910 to about 1930, Inyo National Forest Rangers reported that grouse were extremely scarce." (Perez 1994: 3, *citation omitted*). The 1966 Inyo National Forest sage grouse habitat management plan for the Crowley Lake area (Long Valley) blamed "expanding settlement and agriculture, and heavy livestock grazing of sagebrush ranges" as "the most significant factors" in declining sage grouse populations. (Inyo National Forest 1966: 2).

In 1918, Grinnell stated that "[i]n Mono County, the birds have been greatly reduced in numbers because of their accessibility." (Grinnell et al. 1918: 571). Grinnell advocated for changes in sage grouse management:

> In most parts of its California range the Sage-hen has been so reduced in numbers that something must be done to afford it better protection, if it is to maintain its place as a game bird. The automobile has enabled the gunner to enter the heart of the Sage-hen country, and little has been done to counteract this added factor in the destruction of the species. As a result, there is some danger that the Sage-hen, like the Columbian Sharp-tailed Grouse, may soon be numbered among the California birds which have been nearly or quite exterminated through the agency of man."

(Grinnell et al. 1918: 571-572).

Howell noted a similar decline and urged immediate action to stem the decline of sage grouse in the Mono Basin area:

> In such locations they prove to be easy prey to hunters, and their complete protection comes none too soon, for their numbers are decreasing annually. I fear that the good roads movement in the west will prove to be an effective extinctive agency for this great game, unless prompt and stringent measures are adopted by all the states interested in its perpetuation.

(Howell 1917: 187).

Grinnell continued: "even the short [hunting] season and small bag limit accorded the bird within the last few years have not been sufficient to enable it to hold its own. There is plentiful evidence that its numbers are being reduced each year." (Grinnell et al. 1918: 572).

California has manipulated its hunting season for decades in attempt to manage fluctuating sage grouse populations throughout the state. Following a population dive in the early 1900s, sage grouse numbers apparently began to increase again in the mid-1930s, including the Crowley Lake area in Mono County. (Perez 1994: 4, *citation omitted*). An increase in sage grouse was reported in the White Mountains in 1939, and increased populations were reported in the Long Valley, Adobe Valley, Coyote Valley and the White Mountains in 1940. (Perez 1994: 4, *citation omitted*).

However, sage grouse populations declined again in the mid-twentieth century, causing the state of California to close the sage grouse hunting season throughout the state in 1967 and 1968. Sage grouse numbers continued to fluctuate through the end of the century, with the California Department of Fish and Game finally instituting a permit system to control sage grouse hunting in 1987. (Perez 1994: 3, *citation omitted*).

Sage grouse numbers in California and the Mono Basin area remain depressed. Perez concluded in 1994 that, "although almost all sage grouse habitat has been maintained and hunter numbers have been restricted, sage grouse numbers are still chronically depressed." (Perez 1994: 6). The California Department of Fish and Game reported the average total peak lek count of known leks in Mono and Inyo counties was 362 males between 1997-2001. (CDFG 2002: F-5).

Geographic Distribution

Sage grouse distribution in California is limited to the far eastern side of the state. "Due to its reliance on sagebrush for food, as well as cover, the sage grouse is limited to the semi-arid sagebrush regions along the eastern border of California. They are known to inhabit the counties of Alpine, Lassen, Modoc, Mono, Shasta, and Siskiyou." (Perez 1994: 1).

The range of the Mono Basin area sage grouse once extended continuously from Storey County, Nevada through Inyo County, California. (Schroeder et. al. 2004). The Greater Sage-Grouse Conservation Plan for the Bi-State Plan Area of Nevada and Eastern California ("Bi-State Plan") identifies six "population management units" (PMU) for Mono Basin area sage grouse. These management units also extend continuously from Storey County, Nevada through Inyo County, California. See Map 1.

The Bi-State PMUs are bounded on the northeast by the Carson River from Carson City to Highway 95, and Highway 95 south to Wabuska. The eastern boundary extends roughly from Yerington south to Hawthorne, and continues south to Tonopah. From Tonopah, the Bi-State Plan boundary stretches into Esmeralda County to encompass the Silver Peak Range and White Mountains. The southwestern boundary cuts through the Owens and Long valleys, before running to the Sierra Nevada Mountains, which form the majority of the western boundary. The northwest boundary extends from the Sierra Nevada crest, north towards Gardnerville, and back to the Carson River.

Prominent geographic features that are wholly or partially contained within the Mono Basin area PMUs include:

- White Mountains
- Bodie Mountains
- Owens Valley
- Long Valley
- Slinkard Valley
- Glass Mountain
- Sweetwater Mountains
- Excelsior Mountains
- Pine Nut Mountains
- Pine Grove Hills
- Wassuk Mountains
- Silver Peak Range
- Walker River
- Mono Lake
- Bridgeport Valley

These management units contain large areas of (former) habitat that is currently considered unsuitable for sage grouse. The current occupied range of Mono Basin area sage grouse has been reduced to a few small, isolated populations with limited range. Recent telemetry data provided new information on the location and extent of Mono Basin area sage grouse (*see* Casazza et al. 2005). Descriptions of current Mono Basin area sage grouse PMUs follow:

Pine Nut: There are ten leks in the Pine Nut PMU. Not all are active. Eight leks are located east of Rawe Peak, and two are located north of Minnehaha Canyon and west of Red Canyon. (Bi-State Plan 2004: 16). Habitat includes Bald Mountain, Red Canyon, Minnehaha Canyon, Mineral Valley Meadows, Blossom Meadow, Big Meadow, and Buckeye Meadows. (Bi-State Plan 2004: 16-18). Winter range is unknown. (Bi-State Plan 2004: 16-18).

Desert Creek/Fales: There are ten active leks in the Desert Creek/Fales PMU, located at the south end of Smith Valley, near Sweetwater Summit, on Burchum and Wheeler flats near Sonora Junction, and on Jackass Flat in the Sweetwater Mountains. (Bi-State Plan 2004: 34-35). Most sage grouse activity occurs in close proximity to these leks. (Casazza et. al. 2005: 14).

Bodie: The Bodie[1] PMU contains 29 leks, of which eight are verified as long-term strutting sites, and six are satellite leks. (Bi-State Plan 2004: 67). The status of the remaining leks is undetermined. (Bi-State Plan 2004: 67). The leks extend from the Dry Lakes Plateau in the east to Lower Summers Meadow in the west, and from Big Flat in the north to Bridgeport Canyon to the south. (Bi-State Plan 2004: 67). Important seasonal habitats include Mt. Biedeman and Bridgeport Canyon in the winter and spring, and the north and east slopes of Bodie Mountain and the area around Paramount Mine in the spring and summer. (Casazza et. al. 2005: 19). Other occupied range in the Bodie PMU include the Bridgeport Valley and the ridges west of Highway 295, the area between Bodie Mountain and the Dry Lakes area, as well as the Dry Lakes area near Beauty Peak, Mt. Biedeman, and the area west of Highway 395 and north of Conway Summit. (Casazza et. al. 2005: 19).

Mount Grant: Leks have been located on a ridge overlooking Lapon Meadows. (Bi-State Plan 2004: 131). Habitat in the Mt. Grant PMU includes areas around China Camp Ranch, Nine Mile Ranch, Elbow, Aurora, and Mt. Grant. (Bi-State Plan 2004: 131; Casazza et al. 2005: 19)

South Mono: The South Mono PMU contains several primary use areas: the Parker Meadows area south of Mono Lake, and the Long Valley area near Crowley Lake. (Casazza et al. 2005: 24) There are nine leks in Long Valley, two in Parker Meadows, and one in the Granite Mountains. (Bi-State Plan 2005: 155). Other use areas include the Glass Mountains, adjacent to the Mono Craters, on the ridges above Grant Lake, East Valley/Waterson Troughs, Little Hot Creek Bench, O'Harrell Canyon, meadow systems in the Owens River, Hot Creek, and Convict Creek drainages, North Landing, the Whitmore Tubs area, and the area between Hot Creek and Little Hot Creek. (Casazza et al. 2005: 25-27).

White Mountains: Habitat utilized in the White Mountains PMU is located in the Red Peak, Sage Hen Peak, and Cottonwood Creek drainages, Red Peak and Bucks Peak Flat, Tres Plumas, the headwaters of Mill Canyon, south slope of North Crooked Creek, County Line Hill, Sage Hen Peak, parts of the North Crooked Creek drainage, Sheep Mountains, Campito Mountains, Sage Hen Flat, Chiatovich Flat, Kennedy Flat, Middle Canyon, Chiatovich Creek, Mustang Mountain, Volcanic Hills, Truman Meadows, Silver Canyon, and the area between Mt. Barcroft and Piute Mountain. (Casazza et al. 2005: 29; Bi-State Plan 2004: 106-107).

Current Population and Trends

The Bi-State Plan describes current and historic population estimates for each PMU in the bi-state planning area. See Map 1. A second, associated planning document, the Greater Sage-Grouse Conservation Plan for Nevada and Eastern California ("NV-CA Plan"), also presents population estimates for Mono Basin area sage grouse.

It is important to note that some population estimates presented in both the Bi-State Plan and the NV-CA Plan may be inflated. First, both plans present low and high population estimates for each PMU. The high estimates for some populations were determined by extrapolating total population from annual spring lek counts based on two formulae that (1) estimate the percentage

[1] Some references and maps label this population management unit as the "Bodie" PMU, while other references and maps identify it as the "Bodie Hills" PMU. This petition uses "Bodie" PMU.

of males represented on a lek for a given population; and (2) the ratio of males to females in a population. High population estimates for some PMUs are based on 50% as the percentage of males in a total population that are represented in lek counts and 2.73 hens per cock. Expert comments, submitted as part of a scientific review process for both the NV-CA and Bi-State plans, have cautioned that the number of males counted on a lek is closer to 75% or higher of all males in a total population if 3 or more lek counts are made and the 2.73 female-male ratio is too high and not supported by available data (Braun 2004c). Regardless, both plans use these questionable estimators to determine high population estimates for some PMUs.

Second, the NV-CA Plan likely overestimates the number of undetected leks in the PMUs (*see* NV-CA Plan 2004: 24, Table 2-2 *and* Appendix D). According to one expert commenter, his professional experience is that biologists tend to project a low estimate of the percent of leks that are detected in an area as everyone involved in sage grouse lek counts – agency staff, volunteers, resource users, non-governmental organizations – hope and assume that there are more leks out in the sagebrush than they have found in their surveys (pers. comm. with C. Braun). While there may be unfound leks in an area, the percentage of unfound leks is invariably lower than biologists estimate, and the undetected leks are usually smaller on average than found leks (because larger leks have more males, they are easier to find; smaller leks, with fewer males, are more difficult to find) (pers. comm. with C. Braun). Overestimating undetected leks is significant because doing so inflates the total number of leks that are deemed to exist in an area. Total leks, in turn, are used to estimate total males in a population, thus inflating the total males count. Further, using averages from those leks actually counted will also inflate the number of cocks counted, as leks actually counted have more males than undetected leks. This results in twice the error rate and inflates the overall estimate of males (and consequently total population) that occur in an area. Unfortunately, low and high population estimates presented in the NV-CA Plan appear to be based on low estimates of detected leks, resulting in inflated population estimates.

Finally, both estimated total leks and low and high population estimates for each PMU in the NV-CA Plan differ from those presented in the Bi-State Plan, further confusing the issue. In every case, lek totals and low and high population estimates in the NV-CA Plan are higher than those in the Bi-State Plan.

Regardless of which data and what plan are used, and notwithstanding the flawed formulae described above, the outlook for Mono Basin area sage grouse is discouraging, as population numbers in each PMU have declined significantly from historic estimates. A summary of the Bi-State Plan's population estimates for each PMU follows.

Pine Nut PMU

The population estimate for the northern (and majority) population in the Pine Nut PMU is 260-450 birds. (Bi-State Plan 2004: 19). The population is "well below historic levels." (Bi-State Plan 2004: 19). The mean number of chicks per hen has decreased from 4 or 6.8 in the 1960s to 1.6 in the 1990s. (Bi-State Plan 2004: 19). None of the leks surveyed in 1993 were active when resurveyed in 2002. (Bi-State Plan 2004: 19). "Anecdotal evidence suggests that populations within the Pine Nut Range were greater and were once distributed across a wider area." (NV-CA Plan 2004: 28).

Desert Creek-Fales PMU

The population estimate for California portion of the Desert Creek-Fales PMU is 122-182 birds, approximately 50% of the long-term average population. (Bi-State Plan 2004: 37-38). The NV-CA Plan estimates a larger minimum population of 699 birds for the entire PMU, but this estimate may be flawed as explained above. Since 1982, the Fales population has undergone a "steep, downward trend" associated with the loss of the most productive lek. (Bi-State Plan 2004: 38). Between 1993-2003, the three-year average population ranged from 26-56% of the long-term average population, indicating a decline of 44-74% in the past 50 years. (Bi-State Plan 2004: 38).

The most productive lek in the Desert Creek-Fales PMU, known as Lek 1, produced nearly half of this PMU's grouse in the 1950s and 1960s. (Bi-State Plan 2004: 37). By 1981, the lek was abandoned. (Bi-State Plan 2004: 37).

Bodie PMU

The population estimate for the Bodie PMU is 560-830 birds, approximately 58-63% of the long-term average population. (Bi-State Plan 2004: 70). This indicates a population decline of 37-42% in the past 50 years.

White Mountains PMU

No current population estimate is presented in the Bi-State Plan, although the plan does note significant population declines in the White Mountains PMU. Sage grouse have been extirpated from the Magruder Canyon, Upper Tule Canyon and Silver Peak areas of Esmerelda County, Nevada. (Bi-State Plan 2004: 108). Grouse have also been extirpated from Truman Meadows and McBride Flats in Mineral County, Nevada. (Bi-State Plan 2004: 109, 110).

Only the White Mountains within this PMU presently contain a significant population from a region where sage grouse were once considered "extremely abundant." (Bi-State Plan 2004: 109, 110).

Mount Grant PMU

The population estimate for the Mount Grant PMU in 2000-2002 was 210-280 birds. (Bi-State Plan 2004: 132). The population at the Nine Mile Flat portion of the PMU has declined, with only two of five active leks remaining. (Bi-State Plan 2004: 132). Average umber of chicks per 100 hens has declined from 38 in the 1980s to 22 in the 1990s to only 7 in 2001 and 2002. (Bi-State Plan 2004: 132). Similarly, the number of birds observed has dropped from 140 in the 1980s to 84 in the 1990s to 32 in 2001 and 2002. (Bi-State Plan 2004: 132). This suggests a "decline in numbers over the past few years, especially since the mid 1990s." (Bi-State Plan 2004: 132).

South Mono PMU

The most recent population estimate for the South Mono PMU is 1,125-1,680 birds, which include 1,015-1,515 birds in Long Valley, 71-106 birds in the Parker Meadows area, and 39-38 birds in the Granite Mountains. (Bi-State Plan 2004: 163). The current trend of the Granite Mountain population "has declined to approximately 20% below the long-term average." (Bi-State Plan 2004: 166).

Lek counts in 2004 and 2005 found increased numbers of males on some leks (and decreased numbers on others) in the Long Valley, Granite Mountain, Parker Meadows, Bodie Hills, Fales Hot Springs, and Jackass Flat areas (*see* Taylor 2004). However, as the Taylor memorandum notes, ideal whether conditions may have accounted for the increased counts on some leks in 2004. (Taylor 2004). The increased intensity in sage grouse counting efforts in the Mono Basin area in recent years may have also contributed to greater numbers of grouse being counted on some leks (and the discovery of new or previously undetected leks) in 2004 and 2005.

Other Population and Trends Estimates

California Population and Trend Estimates

Connelly et al. assessed California sage grouse population trends and found that from 1986 to 2003, the population declined at an average rate of 1.9%. (Connelly et. al. 2004: 6-24). Still, the Connelly assessment concluded that the data suggested "widely fluctuating but perhaps relatively stable to increasing populations." (Connelly et al. 2004: 6-24). However, Connelly and his coauthor's submission that sage grouse populations are stable or increasing is not relevant to whether Mono Basin area sage grouse deserve protection under the Endangered Species Act.

First, the Connelly assessment considers sage grouse on a statewide basis in California and a significant number of sage grouse in the state occur outside the Mono Basin area. Connelly et al. does not separately assess the sage grouse population in the Mono Basin area. Second, as the authors acknowledge, sampling bias may have led to artificially increased lek size counts. "[L]ater censusing efforts in the northern area [in California] (the area not inhabited by the Mono Basin area sage grouse) included some relatively large leks *inflating overall estimates of lek size and resulting in an apparent significant positive change in lek size*." (Connelly et al. 2004: 6-25, emphasis added).

Still, even with the admittedly inflated estimates of lek size, Connelly et al. shows a decline of average number of males per lek from 32 to 25 from 1985 to 2003, as well as a decline in the median number of males per lek from 20 to 14 over the same period. (Connelly et al. 2004: 6-25).[2]

[2] Connelly notes an increase in the average number of males per lek in the Mono Basin area from 23 in 1965-1987 to 24 from 1987-2003. However, the later counts include an additional 5 leks of unknown size, this leading to the distorted results the authors describe.

Furthermore, the findings in the Connelly assessment are disputed by Braun, another recognized sage grouse expert. Braun contended that Connelly et al. relied on population information that "has great variation, low precision, and dubious accuracy." (Braun 2004a: 3, *see also* "Current Population and Trends" above). Braun addressed the Connelly assessment's findings on the California sage grouse populations:

> [T]he Assessment suggests that sage-grouse populations are stable or only slightly declining in two states. Close examination of what is known in these states (California and Colorado) demonstrates that sage-grouse populations in both states have markedly decreased since the 1960s…Sage-grouse have been extirpated from local areas and even counties in both states…and other populations are barely persisting. *It is clear the Assessment most likely underestimates the decline that has occurred*.

(Braun 2004a: 3, emphasis added).

Gibson studied sage grouse in California for 20 years. He described the problems with sage grouse counts that the Connelly assessment used to determine that California sage grouse populations are stable or increasing.

> The raw counts that DFG [California Department of Fish and Game] has tabulated have not been corrected for large annual variations in sampling effort and so *are not really suitable for analyzing long term population trends.* This is certainly true for all areas prior to the early 1980s and is still the case for Bodie (where heavy snow limits access in many years) and probably Wheeler-Burcham.

(Gibson 2001: 1, emphasis added).

As far back as 1992, the California Department of Fish and Game has recognized declines in the Mono Basin area sage grouse population. A CDFG biologist noted that the Mono Basin area population has declined, and "is more susceptible to problems arising from drought conditions." (Perez 1992). Hall affirmed this finding in 1995, concluding that the Bagley Pass and Fales populations were "at risk" and likely contained less than 200 birds. (Hall 1995: 39).

At the request of the California Department of Fish and Game, Gibson analyzed California sage grouse populations, correcting counts for those years with incomplete coverage. Gibson found that the Bodie, Wheeler-Burcham, and Granite Mountains populations all show "long term declining trends," but noted that the Bodie population was at about its present level in the 1950s. (Gibson 2001: 2).

Finally, sage grouse population estimates in the Mono Basin area derived from these lek data may be too high. The U.S. Geological Survey noted that "Gibson (1987) states that he believes these values [for Mono Basin area sage grouse subpopulations] to be biased high, but not as high as lek count bias due to the even sex ratio, which was not apparent from harvest." (USGS 2003: 9).

Nevada Population and Trend Estimates

Connelly et al. presents estimates of sage grouse populations in Nevada. These estimates contain the same problem as the California estimates: there is significant sampling bias due to increased surveys in recent years, and data for the Mono Basin area sage grouse is not separated from other populations across the state. Nonetheless, the Connelly assessment finds that, across the state, lek attendance has decreased significantly, the proportion of small leks has increased considerably, and average and median males per lek has decreased between 1974-2003 by 48% and 57%, respectively. (Connelly et al. 2004: 6-37).

Connelly et al. concludes that the "[a]nnual rates of change suggest a long-term decline for sage-grouse in Nevada…and support the trend information obtained from lek attendance (males/lek) and lek class size." (Connelly et al. 2004: 6-37). Nevada sage-grouse populations declined at an overall rate of 2.1% per year from 1974 to 2003 and 2.53% per year from 1986 to 2003. (Connelly et al. 2004: 6-37). Further, populations in the mid-1970s were 1.2-3.5 times higher than 2003 populations. (Connelly et al. 2004: 6-37).

The overall rates of decline reported in the Connelly assessment for California (1.9% from 1986 to 2003) and Nevada (2.53% from 1986 to 2003) are consistent, and illustrate the problems faced by the Mono Basin area sage grouse. The rates of decline described in the Connelly assessment shows that California sage grouse populations decreased (from already significantly diminished numbers) by 28% from 1986 to 2003. Nevada populations decreased by 36% in the same period.

Population Mechanisms and Vulnerability of Mono Basin Area Sage Grouse

Dangers of Small Populations

The threats facing small populations of wildlife are well documented. Soulé and Mills note that small, isolated populations lead to inbreeding, which in turn reduces survival, fertility, and physiological vigor. (Soulé and Mills 1998; *see also* Benedict et al. 2003). "[I]n small populations the extinction probability should increase over time because these genetic effects magnify the extrinsic sources of jeopardy, including disease, inclement environmental conditions, and random demographic events." (Soulé and Mills 1998: 1658).

The authors call the loss of genetic material in small, isolated populations "inevitable," and describe an event known as the "extinction vortex." (Soulé and Mills 1998: 1658-1659). Under this scenario, as a population becomes isolated, it becomes increasingly inbred, leading to inbreeding depression, and resulting in fewer reproductive adults in the next generation. The result is an amplification of the consequences of a population "bouncing downward" due to environmental factors. The result is an expected decline to oblivion for small populations—the "extinction vortex." (Soulé and Mills 1998: 1659).

Westemeier documented the "extinction vortex" in a population of greater prairie chicken. Westemeier's study showed how a small and isolated population led to low genetic diversity and decreased fitness. (Westemeier 1998). Eventually, the population lost viability, and the "extinction vortex" increased the probability of localized extinctions. (Westemeier 1998).

Without intervention, the focal population "would not have recovered genetic variation sufficient to offset adverse effects on demographic traits." (Westemeier 1998: 1697). Westemeier's study concluded that "isolated relict populations…cannot be conserved indefinitely with inadequate habitat and small size." (Westemeier 1998: 1697).

Westemeier studied a conservation strategy designed to "enhance genetic variation" that included relocating greater prairie chicken from other locations into the study site. (Westemeier 1998). However, because the Mono Basin area sage grouse are genetically unique, a translocation strategy that relies on greater sage-grouse from other locations is not possible.

Each of the populations in the Mono Basin area is either small, isolated, or both. (Connelly et al. 2004: 6-61, 6-62). Braun noted that "isolated populations have the greatest risk for low gene flow, catastrophic events, and extirpation." (Braun 2004a: 4). CDFG has also stated that "sage grouse in Mono County are particularly vulnerable due to their genetic isolation from each other and from other populations, and increased pressure from residential and commercial development of habitat." (CDFG 2001b: 1). Consequently, the Mono Basin area sage grouse are threatened by the "extinction vortex" effect on small, isolated populations.

The minimum viable population size for sage grouse has been estimated at 200-500 birds.[3] (Hall 1995: 39, *citing* Braun). This means that, based on population estimates presented in the Bi-State Plan, the entire Desert Creek-Fales PMU, as well as the Parker and Granite Mountain populations of the South Mono PMU, and Nine Mile Flat population in the Mount Grant PMU, are below the minimum viable population size. In addition, the entire Mount Grant and Pine Nut PMUs may not contain viable populations.

Further, as Connelly et al. noted, California sage grouse populations are "widely fluctuating." (Connelly et al. 2004: 6-24). Gibson noted that the population "periodically crashes" and "does not always stage a sustained recovery afterwards." (Gibson 2001). This fluctuation puts the population at even higher risk of extinction due to climactic and habitat-altering events.

Oyler-McCance et al. (2005) report a lack of genetic diversity in populations of Gunnison sage-grouse, a species similar to Mono Basin area sage-grouse, in that both have been reduced to small, isolated populations. The authors stated that "low levels of genetic diversity found in Gunnison sage-grouse … should be of conservation concern." (Oyler-McCance et al. 2005: 636). In addition to "monitoring and maintaining genetic diversity," the authors list "preventing future habitat loss and fragmentation, enhancing existing sagebrush communities, and restoring sagebrush communities that have been converted [to other uses]" as important conservation activities to conserve and restore – and reconnect – Gunnison sage-grouse populations. (Oyler-McCance et al. 2005: 636).

[3] Schroeder studied greater sage-grouse in Washington to discover minimum viable population size. He found that the effective population is approximately 33% of the estimated population. By using the minimum viable population size of 500 suggested by researchers, Schroeder found that the Washington populations are 59-76% below the level necessary for long-term survival. (Schroeder 2000a). Schroeder's conclusions may have bearing on Mono Basin area sage grouse populations that contain similar number of median males per lek as do Washington populations. (Connelly et al. 2004: 6-25, 6-54).

Mills (2005) addresses management of small populations and notes that "there is little doubt that the *actual* (as opposed to genetic effective) population size necessary to maintain evolutionary potential for the long term should be thousands of individuals and not hundreds." (Mills et al. 2005: 692, emphasis and parenthetical original).

Small populations are affected by an array of factors that drive the species towards extinction:

> [W]hen a population becomes small it becomes particularly susceptible to a host of other threats that interact with and exacerbate problems caused by deterministic factors. Thus, *for small populations, even if the deterministic problems were reversed so the population achieved a positive average population growth, the population could still be driven towards extinction*.

(Mills et al. 2005: 695, emphasis added).

Small populations are particularly vulnerable to random fluctuations in demographic, environmental, and genetic conditions. (Mills et al. 2005: 696). A species may, for example, randomly lose alleles, or suffer negative effects from extreme climatic events or skewed sex ratios. Because of these uncertainties, "managers must be prepared for unexpected problems and adjust their management plans accordingly." (Mills et al. 2005: 708). The annual population fluctuations of the Mono Basin area sage grouse provide strong support that this population is vulnerable to extinction based on these uncertainties. Management of the Mono Basin area sage grouse needs to reflect this uncertainty.

Mills et al. advocates for assessing population viability of small populations to ensure that species with small populations are managed so as to ensure their long-term survival. Effective management of these populations "must address both ultimate and proximate causes of population declines." (Mills et al. 2005: 704).

The authors conclude that "management of small populations should begin early rather than late, because with diminishing population size, a population's vulnerability to extinction increases as management options become more and more constrained." (Mills et al. 2005: 708). As described above and below, populations of the Mono Basin area sage grouse are trending downward and most remaining populations are isolated, while management options continue to be constrained by development and other land use changes.

Population Bottlenecks

A population bottleneck is a physical or evolutionary event in which a significant percentage of a population or species is killed or otherwise prevented from reproducing, and the population is reduced by 50% or more, often by several orders of magnitude. Population bottlenecks increase genetic drift, as the rate of drift is inversely proportional to the population size. It also changes the relationship of natural selection. Population bottlenecks lead to decreased genetic variability, thus inhibiting a species' ability to survive long-term.

Nesting and Brooding Success

Several studies have identified poor nesting and brooding success as a likely population bottleneck for greater sage-grouse. Poor nesting and brood-rearing success is associated with degraded nesting and brooding habitat.

Sage-grouse hens select nesting sites with greater shrub and herbaceous cover (Connelly et al. 1991; Wakkinen 1990), and nest success is positively correlated with the presence of big sagebrush (*Artemisia tridentata*) and thick grass and forb cover. (Connelly et al. 1991; Greg et al. 1994; Schroeder and Baydack 2001; Bergerud 1988; *see also* Inyo National Forest 1966: 5, "certain combinations of habitat are extremely important. The most obvious elements involved are: sagebrush heights and species composition; the understory density of forbs and grass; the presence of meadows, and water."). Fatooh et al. reported that all monitored sage grouse nests in the Bodie Hills were ≤ 3 km from the nearest lek. (Fatooh et al., undated).

A comprehensive study by Holloran et al. affirmed that hens in Wyoming selected nesting sites with more shrub and residual grass cover than was present at randomly selected sites and that "taller, thicker residual grass cover in dense sagebrush stands appeared to increase the probability of a successful nest." (Holloran et al. 2005: 646, 647). Casazza et al. (2005) also reported that sage grouse nests were found in greater shrub cover and greater sagebrush height than at random locations within their Mono Basin study area. (Casazza et al. 2005: 11-12, Table 5). Fatooh et al. reported that "nests tend to be placed under the tallest sagebrush in a stand" in the Bodie Hills, and that "nest sites had a healthy component of perennial grasses, often closely clustered around the nest shrub." (Fatooh et al., undated, unpaginated).

Herbaceous cover is important for concealment, security and shelter from weather and predators. (Schroeder and Baydack 2001; Sveum et al. 1998); unsuitable nesting habitat (exposing nests, hens and chicks to the sun, wind, and predators) may contribute to lower nesting success. (Holloran et al. 2005; Connelly and Braun 1997). The absence of adequate nesting and brooding habitat also affects chick survival. (Gregg et al. 1994; DeLong et al. 1995; Sveum et al. 1998). Insects (arthropods), which are an important food source for sage grouse chicks (Pyle and Crawford 1991; Johnson and Boyce 1990), are less abundant in degraded habitats. Dense stands of sagebrush with little herbaceous understory support fewer ant colonies. (Sneva 1979). Beetles are most abundant in a mosaic of shrub-dominated sites and open areas with some bare ground. (Rickard and Haverfield 1965).

The relative lack of nesting and brooding success by sage grouse hens in degraded habitat in the Mono Basin area bear witness to these ecological facts. The U.S. Geological Survey studied nest success rates of the Mono Basin area sage grouse population. Of the 23 nests monitored in 2003, only eleven were successful. (USGS 2003: 17). Only seven nests resulted in successful broods, and only 30% of the eggs in these successful broods hatched chicks that survived for 50 days. (USGS 2003: 17). The resulting probability of a nesting sage grouse hen in the Mono Basin area producing a chick that survives 50 days is only 14.7%. (USGS 2003: 17). USGS researchers monitored sage grouse nests in the Mono Basin area again in 2004. Of 41 nests monitored, 22 were successful. (Casazza et al. 2005: 10).

Winter Habitat

Gibson found evidence that the Mono Basin area sage grouse population (specifically the Bodie population) experiences a "winter bottleneck." (Gibson 2001). He attributed this "variably-sized winter habitat bottleneck" to the significant snowfall accumulation that occurs in some winters (Gibson 2001) (however, Fatooh et al. noted that recent data in the Bodie Hills area may not support Gibson's hypothesis of a winter bottleneck and that additional study is needed).

Winter habitat is being degraded and eliminated across the range of Mono Basin area sage grouse. Private land development and associated road construction (with rights-of-way across BLM land) approved in 2002 was predicted to negatively affect sage grouse on 1,500 acres of public land and 560 acres of private land near Cedar Hill (in the vicinity of the Bodie Hills), including sage grouse winter habitat. (BLM-Bishop FO 2002). Winter habitat in Pine Nut PMU in the Sweetwater, Desert Creek, and Dalzel Canyon areas, and along the Walker River, is also being converted to irrigated pasture and hay fields. (Bi-State Plan 2004: 49).

The Mono Basin Area Sage Grouse is a Distinct Population Segment

The Endangered Species Act ("ESA" or "Act") affords protection to distinct population segments that are threatened throughout a significant portion of their range. Regulations define "distinct population segments" as those that are both "discrete" from the remainder of the species and "significant" to the remainder of the species. Population segments that meet these criteria are then evaluated as if they were a separate species under the ESA to determine if they are threatened or endangered.

The Mono Basin area sage grouse qualifies as a distinct population segment, based on its unique genetic composition and significance to the species. The Mono Basin area sage grouse also qualifies as a threatened or endangered species under the ESA.

The Endangered Species Act

The ESA declares it to be the "policy of Congress that all Federal departments and agencies shall seek to conserve endangered species and threatened species." (16 U.S.C. § 1531(c)(1)). The Act requires the appropriate Secretary (in this case, the Secretary of Interior) to determine whether any species is threatened or endangered. (16 U.S.C. § 1533(a)(1)).

These determinations are to be made "solely on the basis of the best scientific and commercial data available" and only "after conducting a review of the status of the species and after taking into account those efforts, if any, being made by any State or foreign nation, or any political subdivision of a State or foreign nation, to protect such species, whether by predator control, protection of habitat and food supply, or other conservation practices, within any area under its jurisdiction." (16 U.S.C. § 1533(b)(1)(A)).

The Act defines "endangered species" as "any species which is in danger of extinction throughout all or a significant portion of its range." (16 U.S.C. § 1532(6)). "Threatened species" is defined as "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." (16 U.S.C. § 1532(19)).

The Act further defines "species" to include "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." (16 U.S.C. § 1532(16)). Thus the Act specifically recognizes distinct population segments (DPS) as suitable candidates for protection under the ESA.

Upon determining that any species, subspecies, or distinct population segment of a species, is threatened or endangered, the Secretary shall:

- To the maximum extent prudent and determinable…concurrently with making a determination…that a species is an endangered species or a threatened species, designate any habitat of such species which is then considered to be critical habitat. (16 U.S.C. § 1533(a)(3)).
- Issue such regulations as (s)he deems necessary and advisable to provide for the conservation of (threatened species). (16 U.S.C. § 1533(d)).
- Develop and implement plans…for the conservation and survival of endangered species and threatened species. (16 U.S.C. § 1533(f)).

The Act provides citizens the right to petition the Secretary of Interior to make a determination as to whether a species warrants protection as a threatened or endangered species. (16 U.S.C. § 1533(b)(3)(A)). Within 90 days of receiving such petition, the Secretary shall, to the maximum extent possible, "make a finding as to whether the petition presents substantial scientific or commercial information indicating that the petitioned action may be warranted." (16 U.S.C. § 1533(b)(3)(A)). "Substantial information" means "that amount of information that would lead a reasonable person to believe that the measure proposed in the petition may be warranted." (50 C.F.R. § 424.14(a)(1)).

If a petition is found to present such information that action may be warranted, the Secretary shall "promptly commence a review of the status of the species concerned. (16 U.S.C. § 1533(b)(3)(A)). Within 12 months of receiving a petition that is found to present substantial information that action may be warranted, the Secretary shall find that either the petitioned action is warranted, not warranted, or warranted but action is precluded by other factors. (16 U.S.C. § 1533(b)(3)(B)).

Distinct Population Segments

In 1996, the U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service adopted a policy to further define "distinct population segments" for the purpose of listing, delisting, and reclassifying species under the Endangered Species Act. (DOI 1996, 61 Fed. Reg. 4722).

The policy reaffirms the agency's commitment to protect distinct population segments, as required by the ESA, and outlines the elements the agencies will use to make decisions regarding the status of a possible DPS as threatened or endangered under the Act. These elements are:

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 segments 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, threatened or endangered?).

(DOI 1996, 61 Fed. Reg. 4722, 4725).

The policy lists criteria the agencies use to determine discreteness and significance of a DPS. A population segment is considered discrete if "[i]t is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors." (DOI 1996, 61 Fed. Reg. 4722, 4725). The policy further clarifies that "[q]uantitative measures of genetic or morphological discontinuity may provide evidence of this separation." (DOI 1996, 61 Fed. Reg. 4722, 4725).

If a population is considered discrete, its significance is determined by considering "available scientific evidence of the discrete population segment's importance to the taxon to which it belongs." (DOI 1996, 61 Fed. Reg. 4722, 4725). This consideration may include:

1. Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon,
2. Evidence that loss of the distinct 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.

(DOI 1996, 61 Fed. Reg. 4722, 4725).

If FWS determines that a DPS is discrete and significant, the DPS is assessed as if it were a distinct species to determine whether it qualifies as a threatened or endangered species under the ESA. (DOI 1996, 61 Fed. Reg. 4722, 4725). The Secretary may determine a DPS is threatened or endangered because of any of the following factors:

1. [T]he present or threatened destruction, modification, or curtailment of its habitat or range;
2. [O]verutilization for commercial, recreational, scientific, or educational purposes;
3. [D]isease or predation;
4. [T]he inadequacy of existing regulatory mechanisms; or
5. [O]ther natural or manmade factors affecting its continued existence.

(16 U.C.S. § 1533(a)(1)).

The Mono Basin Area Sage Grouse is a Discrete Population

A population segment is considered discrete if "[i]t is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors." (DOI 1996, 61 Fed. Reg. 4722, 4725). Further, "[q]uantitative measures of genetic or morphological discontinuity may provide evidence of this separation." (DOI 1996, 61 Fed. Reg. 4722, 4725). The Mono Basin area sage grouse meets these criteria, and is a discrete population.

Recent research has determined that the Mono Basin area sage grouse is genetically distinct from other sage grouse. The population is also geographically separated from other sage grouse populations that occur in the western United States. These findings are described below.

The Mono Basin Area Sage Grouse is Genetically Distinct from Other Populations of Greater Sage Grouse

New research has demonstrated that the Mono Basin area sage grouse is genetically distinct from other greater sage grouse. Benedict first studied Nevada sage grouse populations and found that the "Lyons population appears to be unique from other Nevada populations." (Benedict et al. 2000: 8). CDFG acknowledged that "genetic investigations conducted by researchers … indicate that Mono County populations, along with populations in Lyon County, Nevada, are genetically differentiated from sage grouse populations elsewhere." (CDFG 2001b: 1). Benedict found that 94.1% of the birds examined in the Lyons population carried novel haplotypes. (Benedict et al. 2000: 3). Approximately 83% of the haplotypes found in the Lyons population were considered "novel." (Benedict et al. 2000: 3). Taylor et al. also found genetic differences between sage grouse populations in Mono County and Lassen County (CA). (Taylor et al. 2000). These differences suggest that the populations found in Lassen County are not consistent with the Mono Basin area populations.

Benedict et al. studied the genetic makeup of greater sage grouse from four western states and determined that the Mono Basin area sage grouse contained significantly differing genes than greater sage grouse from other regions. (Benedict et al. 2003). Specifically, Benedict et al. found that the Mono Basin area population was the only population lacking an otherwise ubiquitous haplotype, and that 97.7% of the Mono Basin area population contained a novel haplotype. (Benedict et al. 2003). No other population had more than 30% of its population containing the novel haplotype found in the Mono Basin area population. (Benedict et al. 2003). Benedict et al. stated that the Mono Basin area population does "segregate from the other populations" of greater sage grouse. (Benedict et al. 2003).

Benedict et al. concluded that their results "suggest that the Lyon/Mono [Mono Basin area] population has been isolated from neighboring populations for a considerable amount of time…Over thousands and perhaps tens of thousands of years, factors such as mutation, genetic drift, and the fixation of rare haplotypes have resulted in the significant divergence of the Lyon/Mono population from other Sage-grouse populations." (Benedict et al. 2003).

These findings were confirmed by Oyler-McCance et al., who studied the genetic makeup of greater sage grouse across its range, and found that "of the 54 individuals from the Lyon/Mono population, 50 are characterized by haplotypes unique to that population." (Oyler-McCance et al. 2005: 1300). Oyler-McCance et al. further found that the "Lyon/Mono population was the only population forming its own cluster, which again supports the idea that the population is genetically distinct." (Oyler-McCance et al. 2005: 1307).

Oyler-McCance et al. found that the "Lyon/Mono population has a unique history of isolation distinct from all other populations" and that the population "is at least as divergent from other populations of the greater sage-grouse *as Gunnison sage-grouse are from the greater sage-*

grouse." (Oyler-McCance et al. 2005: 1308, emphasis added). The Gunnison sage-grouse is recognized as a separate species from the greater sage-grouse.

Oyler-McCance et al. concluded that the Mono Basin area population does "*certainly qualify as a distinct population segment from a genetic standpoint and may even warrant consideration as a new subspecies*." (Oyler-McCance et al. 2005: 1308, emphasis added). The study concludes that the Mono Basin area population "should be managed separately and protected because of its genetic distinctiveness as it may contain genetic variation that may be important to the survival of the species over large timescales." (Oyler-McCance et al. 2005: 1308).

These conclusions match those of Benedict, who found that "[p]reservation of genetic diversity represented by the unique allelic composition of the Lyon/Mono population is also of particular importance for conservation" and that "the population should be managed independently." (Benedict et al. 2003: 309).

Taylor's preliminary research has not shown any morphological differences between the Mono Basin area sage grouse and other sage grouse populations. (Taylor et. al. 2002). However, the author notes that the population is "genetically unique." (Taylor et. al. 2002).

The conclusion that the Mono Basin area population is genetically distinct appears to be endorsed by other public authorities. The Greater Sage Grouse Conservation Plan for the Bi-State Plan Area of Nevada and Eastern California (a project of Nevada Governor Kenny Guinn) discusses the unique genetic qualities of the Mono Basin area sage grouse. (Bi-State Plan 2004: 2-7). The California Department of Fish and Game acknowledged that the small sage grouse populations in Mono and Lyon counties "are genetically differentiated from sage grouse populations elsewhere" in 2001. (CDFG 2001b: 5).

The Mono Basin Area Sage Grouse is Markedly Separated from Other Populations of Greater Sage-Grouse

The Mono Basin area sage grouse occurs only in several distinct, isolated populations centered around the Bodie Hills, Mono Lake and Long Valley in California. (Bi-State Plan 2004). Mono Basin area sage grouse populations are more than 100 km west and tens of kilometers south of the next closest populations of greater sage grouse in California and Nevada. (*See* Schroeder et al. 2004 *and* Map 2).

In assessing a previous petition to list the Mono Basin area population as a distinct population segment, the FWS concluded that the petition did not demonstrate that the Mono Basin area population was physically isolated from other nearby populations of greater sage-grouse. (USFWS 2002, 67 Fed. Reg. 78811, 78813). The FWS concluded that:

> Although these birds are associated with separate locations on a landscape consisting of various mountain ranges and intervening valleys, they are able to move between these areas…Exchange is also possible between the northernmost lek locations in Lyon County and the next closest area of habitat to the north in the

> Pah Pah Range. The distance between these two locations…is well within the species' maximum estimated dispersal distance of 160 km.

(USFWS 2002, 67 Fed. Reg. 78811, 78813).

This conclusion is flawed for two important reasons. First, that sage grouse are able to move between the isolated populations of the Mono Basin area does not demonstrate that the Mono Basin area population is not isolated from the remainder of the taxon. The question is not whether the individual populations within the Mono Basin area are isolated; rather, the question is whether the Mono Basin area population as a whole is "markedly separated from *other populations* of the same taxon." (DOI 1996, 61 Fed. Reg. 4725, emphasis added).

Second, citing a maximum dispersal distance of greater sage grouse of 160 km overlooks three important factors: 1) sage grouse generally do not cover such distances; 2) physical barriers (mountains, woodlands) and/or habitat conditions may inhibit migration over large distances; and 3) the Mono Basin area sage grouse have not been found to cover such distances.

Benedict et al. suggested that the Lyon (NV) and Mono (CA) populations remain a "single, contiguous population that happens to cross a state boundary" between California and Nevada. (Benedict et al. 2003). After surveying the Churchill, Washoe, Elko, Sheldon National Wildlife Refuge, Lander/Eureka/Nye, and Lyon sage grouse populations in Nevada, Benedict et al. found that the Lyon population appeared to be unique from the others. (Benedict et al. 2000).

The unique genetic characteristics of Mono Basin area sage grouse described throughout this petition are empirical evidence that Mono Basin area sage grouse have rarely interbred with outside populations. These distinctive genetic traits developed over thousands of years. Thus, even when there was greater (pre-settlement) habitat connectivity between the Mono Basin area and other sagebrush habitats in California and Nevada, Mono Basin area sage grouse did not interbreed with other populations. Modern research indicates that various sub-populations within the Mono Basin area use spring, summer and winter habitat in relatively small, confined areas, offering additional evidence that Mono Basin area sage grouse do not disperse over large areas during the year. (Casazza et al. 2005: 8, Fig. 1). The largest estimated home range for one Mono Basin area sage grouse population is 80 square miles, while the smallest may be 4.5 square miles. (Casazza et al. 2005: 9).

Little is known about dispersal and migration in greater sage-grouse. (Connelly et al. 2004: 3-5). Sage grouse migration between summer and winter range averaged 9.9 km to 13.1 km for females and 13.1 km to 35.2 km for males in three studies. (Connelly et al. 2004: 3-4). However, the Connelly assessment notes that "[f]idelity to display sites (leks) has been well documented in greater sage-grouse." (Connelly et al. 2004: 3-5). Further, dispersal appears to be "relatively gradual and sporadic." (Connelly et al. 2004: 3-5).

Two studies showed a median distance between nests in successive years to be 0.7 km and 3.0 km. (Connelly et al. 2004: 3-6). Unsuccessful females "tended to move farther between consecutive nests…However, there was no statistical indication that these relatively long movements increased their subsequent likelihood of success." (Connelly et al. 2004: 3-5, *citations omitted*). Research in Idaho suggests that most females nest within 3.2 km from the

nearest lek, and the average distance between nests and the nearest lek was 5.8 km in Washington. (Schroeder 2000b). The average distance between the nest site and lek where the females were captured was 7.8 km, a distance the author considered "relatively large." (Schroeder 2000b). Sage grouse in Colorado moved only 4-13 km between breeding and summer-use areas. (Commons and Braun 2000). Further, sage grouse are not likely to cross more than 6-8 miles of continuous, unsuitable habitat. (NEA 1999: 26, *citing* pers. comm. with C. Braun and J. Connelly).

Research in the Mono Basin area indicates that sage grouse hens nest in the vicinity of leks (Casazza et al. 2005), which may help limit population range. A 1966 Inyo National Forest sage grouse habitat management plan described "maximum movements" of sage grouse in the Crowley Lake area (Long Valley) between autumn and winter habitats as "probably less than 10 miles." (Inyo National Forest 1966: 11). Fatooh et al. reported that the distance between sage grouse seasonal habitats in the Bodie Hills is generally less than 10km, "which would define this population as 'nonmigratory' during … dry years." (Fatooh et al., undated). Of all Mono Basin area sage grouse, only birds in the Bodie PMU are considered locally "migratory," and their movements between integrated spring and summer habitat and winter habitat in the Bodie Hills are relatively short. (NV-CA Plan 2004: 21). Other Mono Basin area sage grouse populations are deemed non-migratory, moving very short distances between seasonal habitats. (NV-CA Plan 2004: 21-22).

Mono Basin area sage grouse are isolated from other populations of greater sage-grouse by geographical barriers and habitat conditions. See Map 3. Migration between the Mono Basin area and northern California is impeded by numerous highways (Interstates 80, 50, 395, State routes 89, 70, 49, 88, 120, 108), as well as residential development, agriculture, intensively grazed rangelands, and other unsuitable habitat. Historically, no connection existed between the Mono Basin area sage grouse population and other greater sage grouse populations to the east. (Benedict, et. al. 2003: 308 ; Oyler-McCance, et. al. 2005: 1307). This separation still exists and has been exacerbated by residential development, agriculture, intensive grazing, and roads (including State routes 6 and 95).

Considering the migration patterns of greater sage-grouse, the extent of separation between the isolated Mono Basin area populations and other populations of greater sage-grouse, and the barriers to migration described above, the Mono Basin area sage grouse is markedly separated from remaining greater sage grouse populations.

This contention is consistent with, and supported by, the genetic research cited above. In particular, Benedict et al. concludes that the Mono Basin area population "has been isolated from neighboring populations for a considerable amount of time," and that "over thousands and perhaps tens of thousands of years, factors such as mutation, genetic drift, and the fixation of rare haplotypes have resulted in the significant divergence of the [Mono Basin area] population from other Sage-grouse populations." (Benedict et al. 2003: 308).

Had there been continual (or even sporadic) migration between the Mono Basin area population and other populations of greater sage grouse, the Mono Basin area population would not have developed such divergent genetic characteristics. That the Mono Basin area population contains

these unique genetic traits provides strong evidence of the marked separation from other populations. As noted in the Bi-State Plan, "the uniqueness of the mitochondrial haplotypes in the Mono/Lyon sage-grouse suggests that interbreeding with neighboring populations has not occurred in recent history." (Bi-State Plan 2004: 2).

The Mono Basin Area Sage Grouse is a Significant Population

If a population is considered discrete, its significance is assessed by considering "available scientific evidence of the discrete population segment's importance to the taxon to which it belongs." (DOI 1996, 61 Fed. Reg. 4725). This consideration may include:

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.

(61 Fed Reg. 4725).

The Mono Basin area population meets three of these criteria. The population exists in a unique ecological setting; loss of the population would result in a significant gap in the range of the greater sage-grouse, and the population differs markedly from other populations of greater sage grouse in its genetic characteristics.

The Mono Basin Area is a Unique Ecological Setting

The Mono Basin area is a varied geographical setting that includes low elevation valleys, mountain ranges that exceed 14,000 feet in elevation, and several intermediate ranges. See Map 3. The Mono Basin area is located in the "Mono" ecological province, a long, narrow province that straddles the California-Nevada border. (Rowland et al. 2003: 63, Fig.1). The area contains a variety of plant communities including commercial agriculture, sagebrush steppe, and forestlands. Shrublands at lowest elevations are usually assigned to the big sagebrush series, but there is local dominance of the rubber rabbitbrush habitats, grassland series, such as ashy ryegrass, and one-sided bluegrass. (Chipping, undated).

Perez (1994) notes that sage grouse occur in "seven habitat types within California including: perennial grass, annual grass, alkali desert scrub, bitterbrush, low sagebrush, sagebrush, and wet meadow." (Perez 1994: 1, *citation omitted*). Each of these habitat types are found in the Mono Basin area. Further, the Mono Basin area is a unique setting in that it contains abundant healthy and recovering riparian vegetation and contains a large lake within a relatively small internally drained terminal basin.

Barbour describes the California sagebrush steppe as an "elongated strip of land from the upper Owens River north along the eastern flanks of the Sierra Nevada…to Honey Lake near the 40th

parallel," and distinguishes this ecotype from those occurring in northeast California. (Barbour 1988: 764). Barbour describes the Mono Basin area as "a transitional series of communities between the coniferous forests of the Sierra Nevada Mountains and the extensive *Artemisia* steppe of the Great Basin." (Barbour 1988: 764). This definition demonstrates the unique characteristics of Mono Basin area vegetation communities.

Barbour offers the following description of the Mono Basin area:

> Much of the eastern slope of the Sierra Nevada from the California boundary to the crest of the mountains is an extremely abrupt physical and biological gradient. Annual precipitation can range from 80 mm at the bottom of an eastern basin to 1250 mm along the mountain crest…Elevations change from 1200 to 3000 m in a relatively short distance. Youth, or absence of soil profile development, is a predominant characteristic. Few landforms support soils older than late Pleistocene.

(Barbour 1988: 767).

The Modoc Plateau contains many of northeast California's sage grouse populations. By contrast to the eastern Sierra region, the Modoc Plateau is comprised primarily of fluid basalt flows, or other volcanic deposits, and contains older Pliocene-aged rocks. (Barbour 1988: 767).

The vegetation communities of these two regions also differ considerably. The *Artemisia tridentata/Agropyron spicatum* community is prevalent along the Modoc Plateau, and are largely similar to sagebrush communities found in Oregon. (Barbour 1988: 772). The *Artemisia tridentata/Agropyron spicatum* community is limited to the Mono Basin area. (Barbour 1988: 773). Other differences are described in Table 1.

*Table 1. Differences in sagebrush (*Artemisia *ssp.) elements and soils between regions populated by the Mono Basin area sage grouse and areas populated by sage grouse on the Modoc Plateau.* (Barbour 1988; Sawyer 1995; Munz 1959).

Sage Grouse Population	Artemisia tridentata/ Agropyron spicatum	A. tridentata/ Stipa thurberiana	A. tridentata/ Stipa speciosa	A. tridentata/ Hilaria jamesii	Soils
Mono Basin area	Rare	Common	Limited	Limited	Aridisoils
Modoc Plateau	Common	Rare	Common	Common	Mollisols

Loss of the Mono Basin Area Population Would Result in a Significant Gap in the Range of the Greater Sage-Grouse

The Mono Basin area population of sage grouse anchors the extreme southwest boundary of the current range of greater sage-grouse. Historically, sage grouse range extended unbroken from the Mono Basin area north to Modoc County, California and into Oregon, northwest Nevada, and Idaho. (Schroeder et al. 2004). See Map 3. However, there no longer exists connected sage grouse habitat between the Mono Basin area and occupied habitat to the north and west.

Instead, sage grouse habitat in the Mono Basin area has been broken into islands, each separated from the other, and all entirely separated from the larger population of greater sage-grouse to the north and east (*see* Schroeder et al. 2004).

Despite the historic habitat connection to populations of greater sage-grouse in northeast California and northwest Nevada, the Mono Basin area population may have always been separated from sage grouse in central Nevada (*see* Schroeder et al. 2004). There historically existed a broad band of unsuitable habitat in western Nevada that separated the Mono Basin area population from larger populations of greater sage-grouse (*see* Schroeder et al. 2004).

This band of unsuitable habitat may explain why the Mono Basin area population "has been isolated from neighboring populations for a considerable amount of time." (Benedict et al. 2003). Benedict et al. suggest that the Mono Basin area population may have been separated from the larger population "for thousands and perhaps tens of thousands of years." (Benedict et al. 2003: 308).

The Mono Basin area population now occurs "on the southwestern edge of the species' range" and "appears to have been isolated from all other greater sage-grouse populations." (Oyler-McCance et al. 2005). The FWS acknowledged that the Mono Basin area population "represents the extreme southwestern extent of historic greater sage grouse range." (USFWS 2001, 66 Fed. Reg. 22984, 22991).

Mono Basin area sage grouse populations are now the only remaining sage grouse populations south of populations in northeast California and west of larger populations in central and eastern Nevada. The separation between Mono Basin area sage grouse and other populations covers more than 100km to the east and tens of kilometers to the north.

The extirpation of Mono Basin area sage grouse would result in a significant gap in the range of the greater sage grouse. This gap would extend from Plumas County, California through Sierra, Nevada, Placer, El Dorado, Alpine, Mono, and Inyo counties in California. The gap would extend from Storey County, Nevada, through Carson City, Lyon, Douglas, Mineral, and Esmerelda counties in Nevada. Sage grouse have already been extirpated in at least one California county. (Braun 2004b). Sage grouse have also been extirpated from Storey and Carson City counties in Nevada. (WSSGTC 1999).

This range gap would cover 14 counties (seven of which currently contain sage grouse) across two states and span thousands of square miles. Further, because of the genetic distinctiveness of the Mono Basin area sage grouse, extirpation of this population may prevent repopulation of the DPS to other parts of its historic range. This would create an even larger gap in greater sage-grouse range.

The FWS addressed the importance of isolated populations to sage grouse in its candidate assessment of the Columbia Basin Distinct Population Segment of the greater sage-grouse.

> A number of studies address the characteristics of peripheral and/or isolated populations and their potential influences on, and importance to, the remainder of

> the taxon. Peripheral and isolated populations may experience directional selection due to the marginal or varied habitats or species compositions at range peripheries, exhibit adaptations specific to these differing selective pressures, demonstrate genetic consequences of reduced gene flow dependent on varying levels of isolation, and/or have different responses to anthropogenic influences (Levin 1970; 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 discussions addressed the attributes of isolated populations and their potential importance to conservation efforts. Some investigations would emphasize genetic distinctiveness (Lesica and Allendorf 1995; Waples 1998), while others suggest a spectrum of influences may demonstrate the value of discrete populations (Pennock and Dimmick 1997; Ruggiero et al. 1999). The purposes of the [Endangered Species] Act are to conserve species "…of esthetic, ecological, educational, historical, recreational, and scientific value…" As addressed above, the DPS policy reflects this broader objective and does not limit the concept of significance strictly to genetic distinctiveness.

(USFWS 2001, 61 Fed. Reg. 22984, 22991).

Lesica and Allendorf contend that the "conservation value of a peripheral population depends upon their genetic divergence from other conspecific populations," and that the "long-term conservation of species is likely to depend on the protection of genetically distinct populations." (Lesica and Allendorf 1995: 753). As demonstrated above, the Mono Basin area sage grouse population is genetically distinct from other greater sage grouse populations—and thus its protection is critically important.

The Mono Basin Area Population Differs Markedly from Other Populations of Greater Sage-Grouse in its Genetic Characteristics

The genetic research described above details the distinct genetic characteristics of the Mono Basin area sage grouse. Please see "The Mono Basin Area Sage Grouse is Genetically Distinct from Other Populations of Greater Sage-Grouse," above.

In particular, the conclusions of Benedict et al. and Oyler-McCance et al. are critical. Benedict et al. concluded that the Mono Basin area population "was found to contain an unusually high proportion of unique haplotypes, consistent with its genetic isolation from other Sage-grouse populations." (Benedict et al. 2003: 301). Benedict et al. further stated that the "Lyon/Mono [Mono Basin area] population has been isolated from neighboring populations for a considerable amount of time…Over thousands and perhaps tens of thousands of years, factors such as mutation, genetic drift, and the fixation of rare haplotypes have resulted in the significant divergence of the Lyon/Mono population from other Sage-grouse populations." (Benedict et al. 2003: 308).

Oyler-McCance et al. reached similar conclusions, finding that the Mono Basin area population contained a unique genetic makeup that distinguished it from the other greater sage-grouse.

Oyler-McCance et al. concluded that the Mono Basin area population does "certainly qualify as a distinct population segment from a genetic standpoint and may even warrant consideration as a new subspecies." (Oyler-McCance et al. 2005: 1308). Oyler-McCance et al. added that the Mono Basin area population "should be managed separately and protected because of its genetic distinctiveness as it may contain genetic variation that may be important to the survival of the species over large timescales." (Oyler-McCance et al. 2005: 1308).

Comparison to Columbia Basin DPS of Greater Sage-Grouse and Gunnison Sage-Grouse

The FWS recently reviewed petitions to protect the Washington state population of greater sage-grouse (Columbia Basin Distinct Population Segment) and the Gunnison sage-grouse under the Endangered Species Act. Due to the many similarities between the Columbia Basin DPS, Gunnison sage-grouse and the Mono Basin area DPS, it is instructive to review the factors leading to the FWS determinations for these species as they relate to the Mono Basin area sage grouse.

Columbia Basin Distinct Population Segment of Greater Sage-grouse

The FWS found that the Washington population of sage grouse warrants protection as a distinct population segment under the ESA, but that the listing was precluded by other listing priorities. (USFWS 2001, 66 Fed. Reg. 22984).

In evaluating the geographic isolation of the Washington sage grouse from other greater sage-grouse, the FWS found that the next closest population to the Washington sage grouse was more than 185 km to the south. (USFWS 2001, 66 Fed. Reg. 22984, 22988). Habitat restrictions, and limited seasonal movements and dispersal behavior lead the FWS to conclude that the Washington DPS is "discrete from the remainder of the taxon." (USFWS 2001, 66 Fed. Reg. 22984, 22989).

The physical barriers, restricted movement, and isolation faced by Mono Basin area sage grouse are similar to those for the Washington population. Designating the Mono Basin area population as a DPS is also supported by genetic research concluding that the Mono Basin area DPS "appears to have been isolated from all other greater sage-grouse populations." (Oyler-McCance, et al. 2005: 1307).

Gunnison Sage-Grouse

FWS recently concluded that the Gunnison sage-grouse warrants listing under the Endangered Species Act, but is presently precluded by other priorities. (USFWS 2000, 65 Fed. Reg. 82310, 82311). The agency found that current threats to Gunnison sage-grouse, inadequacy of conservation plans, extent of population decline, and loss of Gunnison sage-grouse habitat supported listing the species under the Act. (USFWS 2000, 65 Fed. Reg. 82310). As described below, each of these factors are also present in the case of Mono Basin area sage grouse.

It is also important to note that Oyler-McCance et al. found that the "Lyon/Mono [Mono Basin area sage grouse] population is at least as divergent from other populations of the greater sage-grouse as Gunnison sage-grouse are from the greater-sage grouse by virtue of the large number of new haplotypes unique to the population." (Oyler-McCance et al. 2005: 1308). Taylor also noted that the genetic differences between the Mono Basin area sage grouse and other populations of greater sage grouse "is greater than that found between the two morphologically distinguishable species of sage-grouse." (Taylor 2001, *citing* Young et. al. 1994; Kahn et. al. 1999; Oyler-McCance et al. 1999).

The Mono Basin Area Sage Grouse is a Threatened or Endangered Species

According to FWS policy, once a DPS is determined to be discrete and significant, it is assessed as if it were a distinct species according to the standards outlined in the ESA to determine whether it qualifies as a threatened or endangered species. (DOI 1996, 61 Fed. Reg. 4725). A DPS may qualify as threatened or endangered if the existing population is adversely affected by any of the following factors:

1. [T]he present or threatened destruction, modification, or curtailment of its habitat or range;
2. [O]verutilization for commercial, recreational, scientific, or educational purposes;
3. [D]isease or predation;
4. [T]he inadequacy of existing regulatory mechanisms; or
5. [O]ther natural or manmade factors affecting its continued existence.

(16 U.C.S. § 1533(a)(1)).

By each of these criteria, the Mono Basin area sage grouse qualifies as a threatened or endangered species under the ESA. In fact, at least one agency already considered proposing sage grouse in California for listing under the ESA. After designating the greater sage-grouse in California as a state Species of Special Concern, the California Department of Fish and Game considered proposing sage grouse in California as a category 2 candidate species on the federal threatened and endangered species list as recently as 1994. (Perez 1994: 2). (This was prior to FWS eliminating category 2 candidate species.)

The Natural Heritage Program defines "Imperiled" species as those with typically six to 20 occurrences or 1,000-3,000 individuals (*see* Master, et. al. 2000). According to this system, the Mono Basin area sage grouse would be recognized as a G2 imperiled species. Mills notes that the median population size for threatened and endangered species at the time of listing under the Endangered Species Act was 1,075 individuals for vertebrates. (Mills et al. 2005: 693, *citing* Wilcove et al. 2003).

According to the International Union for the Conservation of Nature (IUCN), species are considered vulnerable, endangered, or critically endangered based on: (a) deep declines in population size, (b) reduction in geographic range or populations, (c) small population size coupled with decline or fluctuations, (d) very small or restricted population, or (e) quantitative analysis (*see* Mace and Lande 1991). The Mono Basin area sage grouse fulfill each of these criteria and would qualify as an imperiled species under the IUCN criteria.

Sage grouse are a BLM "sensitive species" in California (BLM-Bishop FO 2002) and Nevada (Rowland et al. 2003); designated a "sensitive species" by the Forest Service, Pacific Southwest Region (USFS 1996), and a "management indicator species for the Inyo National Forest (National Wildlife Federation 1999); listed on the national Partners in Flight "Watch List" (Rowland et al. 2003), Audubon Society's WatchList for California (CDFG 2000), and the Nevada Partners in Flight Priority Species list; and listed on the "sensitive animal species" list produced by the Nevada Natural Heritage Program (NVNHP). (Rowland et al. 2003). Species on the NVNHP list are those "whose long-term viability has been identified as a concern." (Rowland et al. 2003: 21).

Destruction, Modification, or Curtailment of Habitat and Range

A species must be listed if it is endangered or threatened by "present or threatened destruction, modification, or curtailment of its habitat or range." (50 C.F.R.§ 424.11(c)(1); 16 U.S.C. § 1533(a)(1)(A)).

Schroeder estimated the pre-settlement range of sage grouse across the western United States and documented continuous pre-settlement habitat along the California-Nevada border from Inyo County, California to Modoc County, California, and into Oregon. (Schroeder et al. 2004). By 2000, the Mono Basin area population had become physically isolated from other remaining greater sage-grouse populations, and now occur only in small, isolated groups in the Mono Basin area. (*See* Schroeder et al. 2004).

The Mono Basin area population is scattered among several counties in western Nevada and eastern California. Sage grouse are now extirpated from Storey and Carson City counties in the Nevada portion of the Mono Basin area sage grouse range; "at extreme risk" in Douglas and Esmerelda counties; and "at risk" in Lyon and Mineral counties, Nevada. (WSSGTC 1999). The Mono Basin area sage grouse range in California is discussed below.

The historic range of sage grouse in California was 6,427,239 acres, and the current range is 2,733,895. (Hall 1995: 17). This means sage grouse range has been reduced by over 58% across the state. Notwithstanding unused habitat types and considering only the low and high suitability shrub-steppe habitats, sage grouse range has been reduced from 5,697,390 acres to 2,572,721 acres. (Hall 1995: 17). This amounts to a 55% reduction in statewide range. This decline is consistent with the overall habitat decline of the greater sage-grouse across the West. (Schroeder et al. 2004).

The Mono Basin area sage grouse has suffered an even greater reduction in range. As FWS noted in its 90-day finding on a previous petition to list the Mono Basin area DPS, "[b]y 1995, suitable habitat within this [Mono Basin] area had *declined approximately 71 percent* from an estimated historic level of 916,571 ha (2,264,889 ac) to 265,758 ha (656,700 ac)." (USFWS 2002, 67 Fed. Reg. 78811, 78813, *citing* Hall 1995, emphasis added). Thus, habitat in the California portion of the Mono Basin area sage grouse range has been reduced by over 70% and, as described below, continues to be reduced.

Oyler-McCance et al. (2001) contend that habitat loss and fragmentation from a variety of human activities has caused the extirpation of local populations of Gunnison sage-grouse, and

continues to threaten remaining Gunnison sage-grouse populations. The authors documented the loss of sagebrush in southwestern Colorado since 1958 using aerial photographs, and discovered sagebrush habitats have been reduced 11-50% in Gunnison sage-grouse range (Oyler-McCance et al. 2001). The authors were concerned that, "if current trends of habitat loss and fragmentation continue, Gunnison sage grouse may become extinct." (Oyler-McCance et al. 2001: 330).

Myriad land uses and related factors have resulted in widespread impacts to sagebrush habitat in the Mono Basin area. Among the most prominent of these are conversion to agriculture, urbanization, and impacts from livestock grazing and wildfire suppression. According to the California Department of Fish and Game, as stated in a draft Sage Grouse Management Plan for California in 1994, "biologists are concerned about a potential for high nest failures and brood mortality due to poor habitat condition" and that sage grouse existence [in California] is influenced by habitat manipulation, livestock grazing, water developments, and other human-associated activities." (Perez 1994: 2). In Nevada, very little sagebrush habitat has not been affected by energy development or livestock grazing. (Rowland et al. 2003: 16).

Barbour described impacts to sagebrush habitat in California from livestock grazing and wildfire suppression. (Barbour 1988: 771-793). Among the most important of these changes are: the reduction or elimination of perennial grasses; increased density of shrubs not preferred by herbivores (primarily dominant species of *Artemisia* ssp.); alteration of successional patterns; invasion of cheatgrass (*Bromus tectorum*); extensive elimination of *Artemisia tridentata* and replacement with *Chrysothamnus/Bromus tectorum*; and soil alteration. (Barbour 1988: 771-793). Today, sagebrush covers just over 25% of the Mono Basin area. (USGS 2003: 17).

Past, present, and future threats to sage grouse and sage grouse habitat are reviewed by Connelly et al. (2004), American Lands Alliance (2003), Braun (2004a), and Braun (1998). Braun (1998) listed an array of factors that have led to the decline of sage grouse across the western United States, including:

- Habitat loss: agriculture, mining/energy development, ranches/farm sites; reservoirs; roads and highways; towns and urban sites.
- Habitat fragmentation: fences; powerlines; roads; treatments (chemical and mechanical treatment of sagebrush).
- Habitat degradation: treatments; livestock grazing; fire.
- Natural changes: drought; predation; hunting.

Many of these threats have caused declines in Mono Basin area sage grouse. Identified threats to sage grouse in the Mono Basin area include:

- Pinyon-juniper encroachment
- Predation
- Residential development
- Wildfire
- Off-road vehicle use
- Roads
- Powerlines
- Wild horses

- Livestock grazing
- Poaching
- Pronghorn competition
- Noxious weeds/invasive species
- Wind energy development
- Agricultural conversion
- Human disturbance
- Hunting
- Fences
- Mineral exploration and extraction
- Water distribution
- Quality of sagebrush habitats
- Quality of meadows and riparian habitats
- Disease
- Pesticides
- Population cycles
- Climate/weather
- Shortage of good quality brood habitat

(Bi-State Plan 2004).

Private Land Development

Private land development is a significant threat to Mono Basin area sage grouse. Over 329,000 acres, close to 12% of the habitat in the bi-state planning region, is privately owned and susceptible to development. See Table 2 below. Cities and counties own approximately 50,000 acres in the area. (Bi-State Plan 2004). Connelly et al. described the impacts of urbanization on greater sage-grouse (Connelly et al. (2004): 7-24 – 7-26).

Table 2. Privately owned land within the bi-state planning area. (Bi-State Plan 2004).

PMU	Total Acreage	Private Land Acreage	Percent Private
Pine Nut	574,373	144.798	25%
Desert Creek-Fales	567,992	65,716	11.6%
White Mountains	NA	NA	NA
Bodie	349,630	58,952	17%
Mount Grant	699,079	41,945	6%
South Mono	579,483	17,662	3%
Total	**2,770,557**	**329,073**	**11.8%**

Development of private land currently threatens Mono Basin area sage grouse populations. In the Pine Nut PMU, "Carson City, the Johnson Lane area of Douglas County, Fish Springs, Topaz Ranch Estates, Wellington, Minden, Gardnerville, Dayton, and Smith Valley are continuing to expand." (Bi-State Plan 2004: 24). Further, winter habitat in the Sweetwater, Desert Creek, and

Dalzel Canyon areas, and along the Walker River, is being converted to irrigated pasture and hay fields. (Bi-State Plan 2004: 49).

In the Desert Creek-Fales PMU, "[p]rivate rangeland in Desert Creek, Fales/Burcham Flat/Sweetwater, and the east side of Antelope Valley are being converted to residential and vacation homes." (Bi-State Plan 2004: 47). CDFG also noted that "[l]eks in the Fales/Wheeler Flat area are found on a combination of private and USFS lands" and that "[t]he private lands are facing increased pressure of subdivision and development. Habitat and populations on adjacent Forest Service lands could be affected by this development on private lands." (CDFG 2001b: 1).

In the Bodie PMU, "[r]esidential, commercial and recreational development of private lands in the PMU is increasing, and additional development is likely in the foreseeable future. (Bi-State Plan 2004: 88). CDFG found that "[d]evelopment of private parcels and mining proposals on public lands threaten the sage grouse population in the Bodie Hills." (CDFG 2001b: 1). Private land development and associated road construction across public land approved in 2002 was predicted to negatively affect more than 2,000 acres of private and public lands in the vicinity of the Bodie Hills, where "mule deer, sage grouse and other species find essential habitat requirements." (BLM-Bishop FO 2002). Development of numerous private parcels is increasing, and "is likely to contribute to 'leap frog' development that may have significant negative effects on sage grouse in the Bodie PMU." (Bi-State Plan 2004: 88). The Bi-State Plan goes on to describe the effects of such development on sage grouse:

> Habitat loss and fragmentation due to land use change and development is a significant risk in the Bodie PMU. The majority of private lands in the PMU are still characterized as rangeland and the commercial, residential, or recreational development of these lands is of particular concern. *Such land use change and development will result in the direct loss and fragmentation of sage grouse habitat. In addition, the construction of roads, fences, utility lines and other infrastructure required so support such development will magnify the extent of habitat loss and degradation.* Additional indirect impacts resulting from increased human presence and disturbance associated with development will further degrade sage-grouse habitat quality. Potential development in, and adjacent to, strutting, nesting, brooding, summer, winter, and connectivity habitats may be especially damaging. Significant impacts to sage-grouse will likely result from the development of meadows and currently intact sagebrush habitats in the PMU. The existing land ownership pattern increases the potential for land use change and development induced habitat loss and fragmentation impacts in the Bodie PMU.

(Bi-State Plan 2004: 88, emphasis added).

Development of private lands in the South Mono PMU could create "far reaching" impacts to sage grouse. (Bi-State Plan 2004: 169). Predation from ravens and other predators is a "major concern" for the South Mono population. (Mono County 2004: 35). However, Mono County still seeks to significantly expand the Benton Crossing Landfill, which could impact sage grouse populations through direct loss of habitat, increased predation, and the potential to increase insect-bone diseases. (Mono County 2004). Proposed mitigation measures are undefined and may not protect sage grouse from these impacts. (Mono County 2004: 39).

Further, the town of Mammoth Lakes is currently revising its general plan to allow for more development on non-federal lands. (Mammoth Lakes 2005). The plan calls for significantly increased residential and commercial development in and around the town with a goal to increase recreation and tourism opportunities in the Mammoth Lakes area. Specifically, the plan aims to "increase development opportunities for resort/visitor accommodations and associated commercial uses." (Mono County 2004: 3-5). The plan will increase peak resident and visitor population to 71,200 people at any one time, a significant increase over peak population allowed under the current general plan. (Mono County 2004: 3-5).

A number of other proposed developments could affect the South Mono sage grouse population. These include the proposed Sierra Business Park (37 industrial lots adjacent to proposed airport expansion); Casa Diablo geothermal development project; Upper Basalt geothermal exploration project; Basalt Canyon Slim Hole and geothermal well exploration projects, Basalt Canyon geothermal project; Rhyolite Plateau geothermal exploration project; Lake Ridge Ranch Estates (114 new residences); C & L residential plan (53 new residences); Crowley Lake Estates (5 new residences); Rimrock Ranch residential plan (35 new residences); Pine Creek Communities residential plan (189 new residences); and Rodeo Grounds specific plan. (Mammoth Lakes 2005: 5-9, 5-10).

Mammoth Lakes Airport Expansion

The proposed expansion of the Mammoth Lakes airport and construction of an adjacent business park could significantly impact the South Mono sage grouse population. While the original environmental impact statement for the project was challenged in California Superior Court, the town of Mammoth Lakes is now preparing a revised draft environmental impact statement, which is scheduled for release in autumn 2005. (Mammoth Lakes 2005: 3-12).

The project will include widening the airport runway from 100 to 150 feet; extending the runway 1200 feet to the west to accommodate Boeing 757 jets; widening and extending the parallel airplane taxiway; developing passenger terminal facilities; improving the runway access road; and expanding the parking lot. (CDFG 2001: 1). The project also includes development of a 37-lot industrial park. (Mammoth Lakes 2005: 5-9). One of the largest leks in Long Valley (lek 2) is located "approximately three miles east of the Airport along the flight path to Runway 27." (Mammoth Lakes 2001: III-32). Sage grouse also nest near the airport. (Casazza et al. 2005: 25).

The California Department of Fish and Game has expressed serious concerns about the impacts of the proposed airport expansion on sage grouse that use proximate habitat in the South Mono PMU.

> The area to the east of the airport and north of US 395 includes critical areas of winter, breeding and summer habitat for sage grouse. Aircraft may disturb birds on leks. *Grouse almost invariably leave when small planes fly over the leks in Long Valley*…Aircraft may also disturb flocks of sage grouse that use this area in winter and early spring. Radio-telemetry data show that this area is a key area during this time of year when areas further north and west are under deep snow…*[I]t is highly*

> *likely that repeated disturbance could result in significantly higher predation rates, and therefore significant declines in the population*.

(CDFG 2001: 5, citing pers. comm.).[4]

Further, CDFG has noted that birds using the "major foraging area" near Convict Creek, as well as those using the "important nesting and lekking areas," especially lek #8 which has been "one of 2 major leks in the valley in the last 2-3 years" are also vulnerable to disturbance from the airport expansion. The agency concluded that CDFG "continues to believe that disturbance to sage grouse resulting in significant impacts to the Long Valley population could occur" without compliance with CDFG's proposed mitigation measures (limited use of the proposed flight corridor during sage grouse display period). (CDFG 2001: 6). Mammoth Lakes has refused these mitigation measures. (CDFG 2001: 6).

CDFG has also expressed concern over the direct impacts of airport expansion and related development on sagebrush habitat.

> In the Long Valley area, a recent proposal to expand the Mammoth Airport to accommodate large commercial jet aircraft has tremendous growth-inducing impacts to the region, and the Long Valley sage grouse population. Proposed developments associated with the proposed airport expansion include residential, commercial retail, and a hotel. These developments, located on property owned by the Town of Mammoth Lakes, could have significant impacts on sage grouse found on BLM and City of Los Angeles-owned lands within Long Valley. Additional private land in Long Valley contains key sage grouse use areas."

(CDFG 2001b: 1).

An expanded airport, industrial park, and related development will also likely include increased nighttime illumination in Mammoth Lakes. A local sage grouse working group has voiced concern that "constant illumination of habitats throughout the night will most likely limit sage grouse use." (Sage Grouse Conservation Team Meeting Minutes 2000: 5).

Public Land Development

Although the majority of Mono Basin area sage grouse habitat is managed by the Bureau of Land Management and U.S. Forest Service, these public lands are managed under multiple-use policies that have harmed sage grouse and degraded their habitat. Land use and commercial development affects federal public lands in two ways: first, public land is subject to some forms of development; and second, private land development often affects the integrity and health of adjacent public lands. The Bi-State Plan notes this risk in the Bodie PMU:

[4] Unsatisfied with the Forest Service's planning effort for the Mammoth Lakes airport expansion, the California Department of Fish and Game even appealed the Forest Service's decision notice/finding of no significant impact on the environmental assessment on the expansion project in April 2003. CDFG requested that the Forest Service prepare a new NEPA document "acknowledging potential cumulative, growth-inducing, direct and indirect impacts to sage grouse."

> Habitat loss and fragmentation associated with land use change and development is not restricted to private lands in the Bodie PMU. Rights-of-way for roads, utility lines, sewage treatment plants and other public purposes on public lands are frequently requested, and granted, to support development activities on adjacent private lands.

(Bi-State Plan 2004: 88).

Development of private lands can also have indirect effects on sage grouse populations and habitat on public lands. In the Desert Creek-Fales PMU, the Bi-State Plan notes that:

> Residential development may reduce habitat resulting in risks to habitat quantity and fragmentation. Human activities including ORV [off-road vehicle use], private airstrips, horse riding, biking, walking, etc. may disturb individual birds during the breeding and nesting seasons. Domestic dogs and cats can prey on sage grouse.

(Bi-State Plan 2004: 47).

While the Bi-State Plan suggests the risks from private land use and development are "manageable," it also notes that mitigation can be expensive. (Bi-State Plan 2004: 47). As described below, the plan provides no new regulatory measures or funding for mitigation of these threats.

Thirteen sites have been authorized for monitoring for wind development in the Pine Nut PMU. (Bi-State Plan 2004: 31). Wind turbines may be constructed on these sites by 2007. (Bi-State Plan 2004: 31). Numerous geothermal energy developments have also been proposed or approved on public and private land in the South Mono PMU. (Bi-State Plan 2004: 178-181).

The Inyo National Forest is evaluating a proposal to conduct a geothermal pipeline on suitable sage grouse habitat. Sage grouse have been found within ¼ mile of the proposed project. (USFS 2005: 7). The project may displace individual sage grouse and will eliminate suitable habitat. (USFS 2005: 22). The only management recommendation calls for cessation of construction activities within 100 feet of active sage grouse nests until young have fledged. (USFS 2005: 23).

Myriad other smaller projects or activities are authorized and developed on federal public lands in addition to those described here and the threats sections below. The size and scope of these projects and activities are considered minor by the federal management agencies, so that their potential environmental impacts are not scrutinized under the National Environmental Policy Act (NEPA).

In response to a Freedom of Information Act request, the BLM Carson City Field Office provided a sampling of records for smaller projects and lesser activities authorized between 2001-2005. They included 55 records of "categorical exclusion" from environmental review under NEPA and 13 decision records of "finding of no significant impact" under NEPA for an array of projects and activities on public lands in sage grouse range, including rights-of-way and construction of roads, communication towers, powerlines, gas/water/sewer pipelines, water tanks, buried fiber optic/telephone cables, seismeter stations, irrigation facilities, monitoring wells, and a railroad.

While the impacts of these projects may not be individually significant for sage grouse, the cumulative impact of these projects fragments and degrades sagebrush habitat. As described below, road construction fragments habitat, spreads weeds and is a vector for humans and predators into sage grouse habitat; soil disturbance from laying pipelines invites invasion from noxious weeds; and power poles and communication towers provide perches for raptors that prey on sage grouse chicks and adults.

Mining

Mining directly eliminates habitat wherever it occurs in the sagebrush steppe, and may poison surface water and expose wildlife to toxic chemicals and heavy metals. Mining often requires the construction of roads, powerlines, ditches, pipelines, and slagheaps that fragment habitat. Surveys and exploration for mineral deposits also cause habitat degradation.

Hard-rock mining for silver and gold is a prominent threat in the Bodie PMU where "mineral exploration is likely to continue into the foreseeable future." (Bi-State Plan 2004: 89). Recent proposals to mine for gold, silver, sand and gravel would affect several important sage grouse areas, including the summer concentration area near the Paramount Mine and the lek area on Dry Lakes Plateau. (Bi-State Plan 2004: 90). Disturbances associated with these activities include noise, stream sedimentation, water and soil contamination, habitat removal, and road proliferation. (Bi-State Plan 2004: 90).

Sage grouse may use an area reclaimed from mining after some decades, but only if migration corridors from population source areas are available (*see* Braun 1998). However, it is difficult to establish sagebrush and forbs on reclaimed areas after mining; mining site reclamation is very expensive; invasive weed species often spread onto reclamation sites; and shrub densities on reclaimed sites may not be adequate to support sage grouse (*see* American Lands Alliance 2003). Braun (1998) found that there was no evidence that sage grouse populations were able to reach their previous numbers on reclaimed mining sites, and the Gunnison sage-grouse has been adversely affected by past mining (GBCP 1997: 47).

Livestock Grazing

Livestock grazing is associated with the widespread decline of sage grouse across their range through habitat degradation, loss, and fragmentation. (Connelly and Braun 1997; Webb and Salvo 2002). Connelly et al. described the impacts of livestock grazing on greater sage-grouse (Connelly et al. (2004): 7-26 – 7-35). Beck and Mitchell (2000) reviewed literature for positive and negative direct and indirect impacts of livestock grazing on sage grouse. Their review found more negative than positive impacts from grazing. (Beck and Mitchell 2000: 994, Table 1).[5] However, of more importance is the scope of the reported positive and negative impacts on sage

[5] The U.S. Fish and Wildlife Service may have incorrectly relied on Beck and Mitchell (2000) in its response to the previous petition to list the Mono Basin area sage grouse under the Endangered Species Act when it claimed that "most of the threats cited by the petitioner for the Mono Basin area are speculative." 67 Fed. Reg. 78814 *and* "list of references" cited in the negative 90-Day Finding on a Petition to List the Mono Basin Area Sage Grouse as Endangered (available from Nevada Fish and Wildlife Office). Beck and Mitchell (2000) do not conclude that livestock grazing benefits sage grouse or that the effects of grazing on sage grouse are neutral.

grouse and sagebrush-steppe habitats. While positive impacts are generally limited to specific areas and circumstances (e.g., light grazing regenerates upland meadow), negative impacts often affect much larger areas, rendering them unusable for sage grouse.

> Impacts should be considered in the context of their scale. For example, a sage grouse population in southeastern Idaho may have benefited indirectly from presence of livestock when they established strutting grounds on sheep salting areas [very small areas relative to overall habitat], whereas weed infestations induced by livestock grazing in the Great Basin may reduce quality of habitat for sage grouse populations across this vast region.

(Beck and Mitchell 2000: 997, *citations omitted*).

Beck and Mitchell (2000) concluded, and significant other research indicates that livestock grazing appears to most affect productivity of sage grouse populations. Hockett (2002) reviewed the many ways that grazing affects nesting and brood-rearing habitats. Livestock eat and trample sagebrush, and grasses and forbs around sagebrush, which can degrade or eliminate nesting habitat (Webb 1993; Gregg and Crawford 1991; *see also* Holloran et al. 2005[6]), which affects both nesting success and chick survival. (Gregg et al. 1994; DeLong et al. 1995; Sveum et al. 1998). Significant research indicates:

- Adequate availability of forbs (that are also grazed by livestock) during the pre-laying period may affect the nutritional status of hens and their reproductive success. (Barnett and Crawford 1994).
- Herbaceous cover is an important factor in nest site selection (Connelly et al. 1991; Wakkinen 1990), and nest success is positively correlated with the presence of big sagebrush (*Artemisia tridentata*) and thick grass and forb cover. (Beck and Mitchell 2000; Connelly et al. 1991; Greg et al. 1994; Schroeder and Baydack 2001; Bergerud 1988).
- Herbaceous cover is important for nesting sage grouse for concealment, security and shelter from weather and predators. (Schroeder and Baydack 2001; Sveum et al. 1998); unsuitable nesting habitat (exposing nests to the sun, wind, and predators) may contribute to lower nesting success. (Connelly and Braun 1997).
- The presence of livestock can cause sage grouse to abandon their nests. (Rasmussen and Griner 1938; Patterson 1952; Call 1979).
- Consumption of forbs by livestock in late spring and early summer may limit their availability for sage grouse chicks. (Call 1979).
- Insects (arthropods), which are an important food source for sage grouse chicks (Pyle and Crawford 1991; Johnson and Boyce 1990), are less abundant in degraded habitats. Dense stands of sagebrush with little herbaceous understory support fewer ant colonies. (Sneva 1979). Beetles are most abundant in a mosaic of shrub-dominated sites and open areas with some bare ground. (Rickard and Haverfield 1965).
- The availability of primary foods directly affects diets of sage grouse chicks. Where forbs and insects comprised >75 percent of chick diets where forbs and arthropods were more

[6] The study by Holloran et al. (2005) discovered that "herbaceous cover and height were more important than shrub cover or height in distinguishing successful from unsuccessful [sage grouse] nests." (Holloran et al. 2005: 647). Grazing livestock select herbaceous cover—grasses and forbs—before sagebrush.

available, whereas chicks consumed 65 percent sagebrush in less productive habitat. (Drut et al. 1994b).

A 1966 Inyo National Forest sage grouse habitat management plan identified livestock grazing as a factor in historic declines in Mono Basin area sage grouse populations. "The impact of thousands of sheep and cattle on the semi-arid ranges of Inyo and Mono Counties resulted in complete destruction of the virgin range in many areas." (Inyo National Forest 1966: 2). "Meadows and upland stands of perennial grasses and weeds were grazed to ground level" (Inyo National Forest 1966: 9) and "native perennial grasslands have been reduced by long over-grazing." (Inyo National Forest 1966: 20).

Perez, writing for the California Department of Fish and Game in 1994, stated that sage grouse populations are "chronically depressed" in California, "due most likely to poor nesting and brooding habitat," and that "domestic livestock grazing has and continues to be the major factor in reducing the quality of these habitats." (Perez 1994: 6). The CDFG reference also noted that periodic drought, coupled with livestock grazing, increases grouse mortality by decreasing suitable habitat. (Perez 1994).

Livestock grazing also affects other seasonal habitats for sage grouse. Livestock damage riparian areas and associated meadows (Belsky et al. 1999) that are important for sage grouse. Livestock also eat and trample sagebrush (Owens and Norton 1992), the sole food source for sage grouse during the winter. Wandering livestock can stress sage grouse, and their grazing opens the vegetative cover, exposing sage grouse to predators. Livestock grazing also introduces and spreads unpalatable weeds in sagebrush habitat (Bedunah 1992; Lacey 1987), reducing food sources for sage grouse.

Range developments to support livestock grazing also harm sage grouse. Raptors perch on fence posts and telephone poles to spy sage grouse. Livestock water developments may artificially increase predators or competitors for sage grouse. The conversion of sagebrush steppe to crested wheatgrass or other forage species for livestock eliminates sage grouse habitat (Autenrieth 1981). Low fliers, sage grouse frequently collide with fences used to manage livestock, often while attempting to escape from predators. (Wilkinson 2001: 1). Fence strikes are frequently lethal for sage grouse.

Commercial livestock grazing on public lands affects broad swaths of sage grouse habitat in the Mono Basin area. Rigney (undated) cites declining sage grouse numbers in California due to over-grazing. According to the Bi-State Plan, there are 32 commercial sheep or cattle allotments entirely or partly within the Desert Creek-Fales PMU; 28 allotments in the Bodie PMU; and 19 within the Mount Grant PMU. (Bi-State Plan 2004: 57, 83). Approximately 75% of the Bodie PMU is subject to commercial grazing. (Bi-State Plan 2004: 82). Detailed grazing data for other PMUs are not provided in the Bi-State Plan. However all PMUs are subject to livestock grazing.

In an assessment of the ecological conditions of Great Basin habitat, the U.S. Department of Agriculture noted that vast areas of sagebrush habitat in Nevada are at risk of cheatgrass invasion and may be especially sensitive to inappropriate livestock grazing. (Wisdom et al. 2003: xiv; Rowland et al. 2003). These sagebrush stands "may be sensitive to inappropriate grazing by

domestic and wild ungulates, which results in the reduction or elimination of native grasses and forbs, and thereby conveys competitive advantage to cheatgrass establishment and dominance." (Wisdom et al. 2003: xiv).

Enforcement of permit conditions, seasons of use, numbers of livestock, and trespass grazing is a "concern" for the southern population in the Pine Nut PMU. (Bi-State Plan 2004: 29). Riparian habitats in the White Mountains are being adversely impacted by grazing. (Bi-State Plan 2004: 122). Trespass livestock are impacting habitat within the Mount Grant PMU. (Bi-State Plan 2004: 138).

A sampling of the impacts of grazing on sage grouse can be found in the Churchill Canyon allotment decision, which includes sage grouse habitat and a lek site. The decision calls for 1074 animal unit months (AUM) for grazing, with a potential increase of 883 (AUMs); establishment of 25 watering areas; and construction of six miles of fence, a half-acre corral, water pipeline and trough. (BLM, undated(b): 2-3).

Despite convincing evidence of the myriad adverse impacts of livestock grazing on sage grouse and sagebrush habitats, the BLM has stated as recently as 2003 that continuing grazing "within the requirements of [existing range management] standards and guidelines [in the Mono Lake area] will result in the long term protection and improvement of the ecosystems found within the jurisdiction of the Bishop Field Office – better habitats for plants and animals, protection of cultural sites, etc." (BLM-Bishop FO 2003: 22-23). Such statements are indication that the BLM is trapped by federal law, and compelled by politicians, local resource users, and its own organizational culture to continue livestock grazing even to the detriment of fish, wildlife and watersheds.

Non-native Species

Non-native plants are common in sagebrush-steppe habitat and degrade habitat quality for sage grouse. Connelly et al. described the impacts of cheatgrass invasion and other invasive plant species on sagebrush habitat and greater sage-grouse (Connelly et al. (2004): 7-7 – 7-18, 7-20 – 7-22). In the Pine Nut PMU, "[n]oxious weeds and cheatgrass are invading sagebrush and wet meadow range sites" throughout the area. (Bi-State Plan 2004: 30).

In a comprehensive assessment of sagebrush conditions in the Great Basin, the U.S. Department of Agriculture found that 44% of all sagebrush habitat in Nevada currently faces a moderate or high risk of being replaced by non-native cheatgrass. (Wisdom et al. 2003: xi). The same assessment found that 14% of sage grouse habitat in Nevada is at high risk of cheatgrass invasion. (Wisdom et al. 2003: xii). Another 26% of Nevada sage grouse habitat is at moderate risk of cheatgrass invasion. (Wisdom et al. 2003: xii). A related assessment found that sage grouse habitat in the BLM-Carson City District, where Mono Basin area sage grouse occur, was at moderate risk of displacement by cheatgrass, with nearly half (48%) of habitat for sage grouse in the district at low risk of displacement and 13% at high risk of displacement. (Rowland et al. 2003: 15-16; *see also* Rowland et al. 2003: 67, Fig. 5).

Wisdom et. al. notes that 40% of sagebrush ecosystems in Nevada are at low risk of cheatgrass invasion and that these stands "are likely to function as habitat strongholds for the associated species of concern into the future." (Wisdom et al. 2003: 10-3). "Protection of these low-risk habitats from pervasive human disturbances, such as mining, energy, powerline and road developments, is essential in maintaining these habitats as functional environments for many species of concern [including sage grouse]." (Wisdom et al. 2003: 10-3).

Off-road Vehicle Use

Off-road vehicles are a threat to a number of sage grouse populations in the Mono Basin area. In the Bodie PMU, "[p]opulation impacts of motorized recreation include disturbance, displacement and direct mortality from vehicle collisions." (Bi-State Plan 2004: 91). Recreation in the Bodie PMU "is characterized as a past, current, and future risk to multiple birds and multiple sites." (Bi-State Plan 2004: 91). The prospect of increased use in the Bodie area is a "particular concern." (Bi-State Plan 2004: 91).

In the South Mono PMU, "[r]isks to sage-grouse populations…from recreational activities are affecting multiple birds on multiple sites year round." (Bi-State Plan 2004: 170). Increased urbanization threatens to increase this risk. (Bi-State Plan 2004: 170).

In the Pine Nut PMU:

> Unrestricted road access throughout the Pine Nut PMU provides the potential for increased human presence in critical habitats during critical times of the year. People particularly affect nesting, early brood, and late brood habitat during spring through fall where critical habitats are easily accessed by vehicles. Increased human presence disrupts daily activities for individual birds and broods.

(Bi-State Plan 2004: 24).

Despite the threats, the plan concludes that "[m]anagement of this risk is somewhat unpredictable due to current limitations on enforcement of existing laws. (Bi-State Plan 2004: 24). Further, threats in the Pine Nut PMU include an off-road vehicle race that traverses sage grouse brooding habitat and that "affect[s] individual and multiple birds by direct mortality or by disturbances to broods that cause chicks to become separated from hens, also resulting in chick mortality." (Bi-State Plan 2004: 27).

The BLM is currently considering recommendations to develop new off-road vehicle facilities within sage grouse habitat. (Robertson and Bushman, undated: 4, 6, 8, 10).

Pinyon-Juniper Encroachment

Connelly et al. described the impacts of cheatgrass and pinyon-juniper encroachment on sagebrush-steppe habitat and greater sage-grouse. (Connelly et al. (2004): 7-7 – 7-18).

Pinyon-juniper encroachment into sagebrush habitat is occurring throughout the Mono Basin area, and has widespread impacts on sage grouse habitat. The Inyo National Forest noticed

encroachment of "pinon pine" into sagebrush habitats in the Crowley Lake area (Long Valley) in 1966. (Inyo National Forest 1966: 22). In the Pine Nut PMU, "[m]any of the ecological sites that support big sagebrush have been converted to pinyon-juniper woodlands over the past 100 years. (Bi-State Plan 2004: 20). Pinyon-juniper encroachment is "impacting potential nesting and early brood habitat in multiple sites" and "may also be affecting the connectivity between the north and south breeding populations." (Bi-State Plan 2004: 20). The effects may become "permanent and irreversible" without active management. (Bi-State Plan 2004: 20).

Similarly, pinyon-juniper encroachment "is occurring throughout the entire Desert Creek-Fales PMU in both upland and riparian habitats and is adversely affecting both habitat quality and quantity for sage grouse." (Bi-State Plan 2004: 39). Pinyon and juniper also cover much of the land below 7000 feet elevation in the Bodie Hills, and Fatooh et al. questioned whether "pinyon and juniper may be a limiting potential winter habitat or constraining potential migration routes" in the area. (Fatooh et al., undated, unpaginated). All or portions of the other PMUs are also affected by pinyon-juniper encroachment. (Bi-State Plan 2004: 96, 119, 133, 167).

Wisdom et al. found that 41% of the Great Basin ecosystems analyzed were at moderate (6%) or high (35%) risk of pinyon-juniper invasion. (Wisdom et al. 2003: xi).

Fences, Power Lines, Roads

Fences and power lines fragment sage grouse habitat, cause direct mortality, and provide perches for avian predators. (Braun 1998; various BLM documents). In northern California, overhead power lines had a negative effect on lek attendance and strutting activity ceased on all leks within one mile of a power line. (Bi-State Plan 2004: 81, *citing* pers. comm. with F. Hall). Fewer radio-marked grouse were lost to avian predators as distance from power lines increased. (Bi-State Plan 2004: 81, *citing* pers. comm. with F. Hall).

In the Pine Nut PMU, the north Pine Nut lek is bordered on two sides by power lines, and sage grouse strutting grounds and nest sites are within the hunting territory of ravens that nest on power lines. (Bi-State Plan 2004: 28). New power lines have been requested in the area. (Bi-State Plan 2004: 28).

The recent declines in the Desert Creek-Fales PMU may be linked to power line construction in the past ten years. (Bi-State Plan 2004: 54). The Bi-State Plan identifies a number of power lines that may be affecting sage grouse in the Bodie area. (Bi-State Plan 2004: 81). Sage grouse in the South Mono PMU are currently impacted by power lines, and proposed energy development in the area may expand power line corridors. (Bi-State Plan 2004: 169).

The Bureau of Land Management recently authorized construction of a power line within the Pine Nut Mountains that includes suitable sage grouse habitat. (BLM 2004a: 3-15). The power line is within five miles of a lek site and transects potential sage grouse brood-rearing habitat. (BLM 2004a: 3-15). Construction of transmission lines can increase weed invasion in sagebrush-steppe (*see* Sierra Pacific Power Company 2003: 7-8), which degrades sage grouse habitat.

The BLM Bishop Field Office has observed that "[w]e have documented increased mortalities and decreased use of leks when fences or power lines have been built nearby." (BLM-Bishop FO, undated(a)). Fences in the Bodie area have been identified as a potentially significant threat to sage grouse (Bi-State Plan 2004: 80) (lek censuses in the Bodie Hills revealed that sage grouse were displaced from at least one lek area by a fence (Fatooh et al., undated)). However, as the Bi-State Plan notes, "present management [in regards to fences] is inadequate to address sage-grouse needs." (Bi-State Plan 2004: 80).

Roads are identified as an important cause of habitat fragmentation and degradation of Gunnison sage-grouse habitat, an imperiled grouse species with limited range. (Oyler-McCance et al. 2003: 330). Human disturbances from roads and other activities can also exacerbate the spread of cheatgrass into sagebrush ecosystems. (Wisdom et al. 2003: 10-3). Wisdom et al. noted that fire is often not the cause of cheatgrass expansion, but rather

> the resulting process that pervasive disturbances (e.g. road construction and use, inappropriate grazing, energy development, mining, recreational activities). Consequently, prudent management of pervasive disturbance agents in areas of moderate risk to cheatgrass displacement is an important factor in maintaining these areas has habitats for species of special concern [including sage grouse].

(Wisdom et al. 2003: 10-3).

A recent proposal by the Inyo National Forest and BLM would reopen and increase motorized vehicle use on the Furnace Creek Road in the White Mountains PMU. (Inyo National Forest 2005).

Military Training/Development of Military Lands

Connelly et al. described the impacts of military training and related activities and development on sagebrush-steppe habitats and greater sage-grouse. (Connelly et al. (2004): 7-43 – 7-44). Approximately 48,936 acres of sage grouse habitat in the Mono Basin area are managed by the Department of Defense as an army depot. (Bi-State Plan 2004: 127). These lands cannot be considered suitable or protected habitat, as they are open to an array of development and activities that negatively impact sage grouse habitat.

Water Development

The conversion of natural basins to managed watersheds for the purpose of providing water for agriculture and urban centers negatively affects semiarid ecosystems. The City of Los Angeles Department of Water and Power (LADWP) manages land in the Mono Basin area and diverts, collects, and exports water from the Mono Basin area (Owens Valley) to Los Angeles. (CDFG Candidate Conservation Agreement Project Proposal, encl. B; Elmore et al. 2003). The diversion, exportation, and inter-basin transfer of water from arid environments "typically result in adverse ecological impacts to aquatic, riparian, wetland, mesic, and phreatophytic systems naturally dependent on that water." (Elmore et al. 2003: 443, *citations omitted*). Groundwater pumping also adversely affects semi-arid habitats that have evolved to depend on groundwater resources during times of drought. Elmore et al. (2003) studied the effects of water management

on plant communities in the Owens Valley in California and discovered that native vegetation decreased during times of drought when groundwater pumping lowered water tables. In some areas, the decline in native vegetation was followed by an increase in non-native weed species after the drought ended. (Elmore et al. 2003: 443). These effects are amplified wherever vegetation has been disturbed by anthropogenic factors, such as burning, fire suppression, livestock grazing, hydrologic alternations, and crop agricultures. (*See generally* Elmore et al. 2003).

The Owens Valley is a hydrologically closed basin in eastern California. The valley is intensively managed by the LADWP, which exports surface and groundwater 400km south to Los Angeles via the Los Angeles Aqueduct. (Elmore et al. 2003). The groundwater table on the valley floor is typically high. (Hollett et al. 1991). A variety of plant communities have been identified in the valley, including sagebrush habitats. Mono Basin area sage grouse were historically present in the valley. Not surprisingly, Elmore et al. (2003) discovered that the water table in the valley has declined in areas where LADWP has drilled wells to pump water for the aqueduct and that large parts (19%) of the valley landscape exhibits a loss of native, live vegetative cover as a result of lowered water tables. This loss of both mesic and semi-arid habitats (and subsequent replacement by exotic weeds) adversely affects sage grouse and other sagebrush obligate species in the valley by eliminating habitat, and degrading and fragmenting the sagebrush habitats that remain. According to the California Department of Fish and Game, the reduction in surface water sources has led to decreases in desert meadow and riparian habitats in California, "which are important in providing water, forbs, and insects" to sage grouse. (Perez 1994: 8).

Other Factors Affecting Sage Grouse Habitat

- **Human disturbance**

Human disturbance is affecting multiple birds on multiple sites in the Desert Creek-Fales PMU. (Bi-State Plan 2004: 51).

- **Feral horses**

Feral horses affect sage grouse populations at several locations in the Mono Basin area and are a "potentially significant population risk" for the 7-Troughs lek in the Bodie PMU. (Bi-State Plan 2004: 86). Connelly et al. reviewed the impacts of wild horses and burros on sagebrush-steppe habitat and greater sage-grouse. (Connelly et al. (2004): 7- 36 – 7-37).

- **Wildfire**

Wildfire is often mentioned as a significant threat to sage grouse habitat. Connelly et al. reviewed the impacts of wildfire on sagebrush-steppe habitats and greater sage-grouse. (Connelly et al. (2004): 7-4 – 7-7). Wisdom et al. stated that wildfire often leads to cheatgrass invasion of sagebrush habitats. (Wisdom et al. 2003: xiv). Wisdom et al. also noted that cheatgrass invasion following wildfire is often due to other factors, including inappropriate grazing and other human disturbance. (Wisdom et al. 2003: xiv). Wisdom et al. concluded that "the number and size of

wildfires across the Great Basin and Nevada have increased dramatically in the past 20 years, and that trend continues." (Wisdom et al. 2003: 10-1). Wisdom further stated:

> Reducing the spread of cheatgrass in these native shrublands, through mitigation of pervasive human disturbances [including inappropriate grazing] that facilitate its spread, is probably the most important consideration is reducing the frequency, intensity and area of associated, undesirable wildfires.

(Wisdom et al. 2003: 10-1).

- **Insecticides**

Beck and Mitchell (2000) recommend against applying insecticides to sage grouse summer habitat (noting that Johnson and Boyce (1990) found that insects are essential to chick development and are required by chicks of all ages for normal development). Blus et al. (1989) documented sage grouse die-offs from exposure to organophosphorus insecticides applied to cultivated crops adjacent to rangeland in southeastern Idaho.

Overutilization for Commercial, Recreational, Scientific or Educational Purposes

A species must be listed if it "is endangered or threatened" because of "over utilization for commercial, recreational, scientific, or educational purposes." 50 C.F.R.§ 424.11(c)(2); 16 U.S.C. § 1533(a)(1)(B).

Given the declines in sage grouse populations across the West (Connelly and Braun 1997), many hunters and biologists have expressed concern over the possible impacts of continued sport hunting on the species. In addition, the impacts of hunting may disproportionately affect small and isolated populations of sage grouse. Connelly et al. (2004) reviewed impacts of hunting on greater sage-grouse populations. (Connelly et al. (2004): 9-1 – 9-11).

Autenrieth (1981) emphasized that sage grouse harvest rates should be more conservative in xeric (dry) areas close to urban centers than in more mesic (moist) areas. Connelly et al. summarized Autenrieth's analysis: "forbs are readily available to grouse throughout mesic ranges and grouse do not congregate in restricted feeding areas in August and September as they do in xeric ranges with limited mesic sites." Autenrieth (1981) argued that dispersed birds in more mesic ranges are not as vulnerable to harvest as aggregated birds in xeric ranges nearer urban centers." (Connelly et al. 2004: 9-3).

Connelly et al. (2003) conducted a major study of greater sage-grouse response to harvest and reported that areas open to hunting had lower rates of increase than did areas with no hunting. "Both the moderate and restrictive hunting seasons produced harvests that apparently slowed population recovery. Populations in low elevation habitats, close to urban centers and isolated because of habitat fragmentation, may be less able to withstand a harvest rate that has little or no effect on populations in more extensive, contiguous, remote, or mesic areas." (Connelly et al. 2004: 9-5, *citations omitted*).

Gibson confirmed these scientists' findings, stating that isolated populations of sage grouse in the Mono Basin area are adversely affected by hunting. Gibson studied the effects of hunting on

the Mono Basin area population and found that "data from Long Valley indicate that, in an isolated population, hunting mortality can depress and hold population levels of sage grouse well below carrying capacity." (Gibson 1998). Gibson concludes that the population depression from hunting "should be of widespread concern in light of long term population declines and range fragmentation in this species." (Gibson 1998).

> While greater sage-grouse populations declined further in the 1990s and states reduced harvest opportunities, influence of harvest received little attention until late in the decade. Robert Gibson (personal communication) of the University of Nebraska examined population dynamics of 2 populations of greater sage-grouse in Mono County, California using data over a 45-year span. One population was isolated and the other was contiguous with populations in Nevada. Data used consisted of lek counts, numbers of birds shot per hunter in autumn, juveniles per hen in brood counts and in the fall bag, and number of birds inspected at check stations. He reported that the population contiguous with Nevada fluctuated independently of hunting mortality. However, the isolated population fluctuated, in part, with number of birds examined at check stations the previous autumn. Gibson (1998) concluded in an unpublished abstract that hunting mortality could "depress and hold population levels of sage grouse well below carrying capacity" and that this "should be of widespread concern in the light of long term population declines and range fragmentation in this species."

(Connelly et al. 2004: 9-3 – 9-4).

In 2001, Gibson concluded that the Long Valley population is "heavily impacted by hunting." (Gibson 2001). He continues by stating that:

> 84% of the annual variation in spring lek counts is jointly explained by the prior years value…and by the numbers of birds shot in a 2 day hunting season the preceding fall…"Harvest" accounts for 27% of the overall variance in spring numbers and 63% of the variance not explained by prior population size. ***In short, changes in population size in this area have been driven by DFG hunting regulations over the past 40 years.***

(Gibson 2001: 2, emphasis added).

Gibson added that reducing hunting permits may not be sufficient to recover the population. "Despite much reduced permit numbers over the past 10 years, this population has not rebounded the way it did when the season was closed for several years each in the 1960s and 1980s." (Gibson 2001: 2).

The Bi-State Plan noted that in the Bodie area, "[d]irect mortality of sage-grouse from hunting is a potentially significant population risk." (Bi-State Plan 2004: 74). Further, in the South Mono area, the Bi-State Plan presents strong evidence that sage grouse population levels are linked to hunting. The U.S. Geological Survey noted that

> Counts of male grouse on leks are correlated with hunting pressure. When the species has been hunted lek counts for male birds are approximately 100-200 individuals. When hunting seasons have been closed, lek counts have increased and

> stabilized at 400 to 500 birds…Additionally, no appreciable recruitment is possible by their calculations and all hunting mortality is additive with other causes.

(USGS 2003: 9).

The U.S. Geological Survey also cited Gibson, who suggested that

> [Z]ero bird harvest is associated with an increasing population associated with a carrying capacity of around 500 birds. Allowable harvest of one bird will offset recruitment and lower stable population size to around 200 birds. Two bird seasons are associated with a declining population and is not supportable by recruitment.

(USGS 2003: 10).

The effects of hunting on Mono Basin area sage grouse populations support Gibson's findings. Between 1984-1987, when the California Department of Fish and Game closed sage grouse hunting in Mono County, the trend in population increased, reaching levels approaching 200 percent of the long-term average. (Bi-State Plan 2004: 172-173). After sage grouse hunting was reopened, the population "steadily declined." (Bi-State Plan 2004: 173). According to CDFG, the Long Valley population "has not rebounded from reduced hunting pressure over the past 5 years [1996-2001]," highlighting "the vulnerability of this population." (CDFG 2002: 5).

The Bi-State Plan calls for continued hunting in both the Bodie and South Mono areas. Despite recent reports of increased attendance on some leks in the Bodie and South Mono PMUs, hunting these populations could continue to suppress local populations and jeopardize the Mono Basin area sage grouse rangewide.

Effects of Disease and Predation

A species must be listed under the ESA if it "is endangered or threatened" because of "disease or predation." 50 C.F.R.§ 424.11(c)(3); 16 U.S.C. § 1533(a)(1)(C).

Connelly et al. (2004) reviewed impacts of predation, parasites, and disease on greater sage-grouse populations. (Connelly et al. 2004: 10-1 – 10-20).

Disease

Naugle et al. documented that West Nile virus is a "significant new stressor" for sage grouse across their range. Their research reported that the presence of West Nile virus reduced late-summer survival in sage grouse by an average of 25 percent in four study populations. (Naugle et. al. 2004).

Naugle et al. (2004) describes the gravity and magnitude of the threat of West Nile virus to sage grouse.

> If survival in our marked sample is representative of broader impacts of WNv, the virus may be an important new stressor on sage-grouse populations. Survival of adult females

> has been shown to be limiting in sage-grouse populations and declines due to WNv occurred in late summer when survival typically is high. (Naugle et al. 2004: 711).
>
> The emergence of WNv further complicates the difficult task of conserving sage-grouse in western North America. (Naugle et al. 2004: 711).

Small, isolated sage grouse populations are especially vulnerable to outbreaks of West Nile virus. "Of immediate concern are the potential consequences of [West Nile virus] for small populations…of greater sage-grouse in California." (Naugle et al. 2004: 711) Stochastic events such as disease exacerbate risk of extinction due to the combined effect of demographic stochasticity, deterministic stressors, and inbreeding depression in small, fragmented populations. Moreover, because small or isolated populations generally show reduced genetic variation, they are less likely to include individuals resistant to emerging infectious disease. (Naugle et al. 2004; *see also* Oyler-McCance et al. 2005: 1293, "[p]opulations with relatively low levels of genetic diversity can suffer from inbreeding effects and can be more susceptible to parasitic agents and disease.").

Unfortunately, West Nile virus has already affected Mono Basin area sage grouse, killing two birds in the Bodie PMU and one in the Desert Creek-Fales PMU. (Casazza et al. 2005: 10). The small and isolated nature of these populations renders them even more susceptible to disease, and West Nile virus could eliminate entire populations in the near future.

Both Naugle et al. and Walker et al. (2004) stress the importance of conserving and restoring sagebrush habitats to ameliorate the effects of West Nile virus on sage grouse. "If we are to prevent sage-grouse from going extinct on their remaining range, we must find a way to provide high-quality habitats that support robust, genetically diverse populations capable of withstanding stochastic disease events." (Naugle et al. 2004: 711).

Predation

Numerous studies positively correlate predation of sage grouse to reduced and degraded habitat. Writing for the California Department of Fish and Game, Perez noted that "[p]oor nesting cover contributes to high predation of young birds which rely on meadow vegetation and insects" and that "[o]vergrazing exacerbates predation by reducing habitat cover." (Perez 1994: 17). Perez continued that "[s]age grouse nest predation is directly related to the habitat condition. When high predation levels are observed, grazing plans should be reviewed and grazing capacities should be adjusted." (Perez 1994: 18). 56% of monitored sage grouse leks were lost from predation in the Long Valley in 2003, despite a high nest initiation rate. (BLM-Bishop FO, undated(b)). Poor habitat quality may have been the causative factor.

Recent research documented that predators killed 55 of 136 radio-collared sage grouse in the Mono Basin area in 2003 and 2004. (Casazza et al. 2005: 10). The Bi-State Plan notes that "[s]teep declines in the sage-grouse population for any reason…could render the population vulnerable to predation impacts." (Bi-State Plan 2004: 77).

Predation from ravens and other predators is a "major concern" for the South Mono population. (Mono County 2004: 35).

Inadequacy of Existing Regulatory Mechanisms

A species must be listed under the ESA if it is endangered or threatened due to "the inadequacy of existing regulatory mechanisms." 50 C.F.R.§ 424.11(c)(4); 16 U.S.C. § 1533(a)(1)(D). No plan or agreement has been drafted that contains adequate regulatory mechanisms to prevent further decline of Mono Basin area sage grouse and avoid listing the species under the ESA.

In assessing the adequacy of existing regulatory mechanisms to conserve and protect sensitive species, FWS applies its Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE Policy). (DOI 2003, 68 Fed. Reg. 15100-15115). The policy lists the specific criteria that FWS will utilize to assess existing and proposed conservation measures to determine whether they are adequate to protect imperiled species. The policy relies heavily on two factors: the certainty that a conservation effort will be implemented, and the certainty that the conservation effort will be effective. (DOI 2003, 68 Fed. Reg. 15114-15115).

Criteria that will affect FWS's consideration of the certainty that a conservation effort will be implemented include:

1. The conservation effort, the party(ies) to the agreement of plan that will implement the effort, and the staffing, funding level, funding source, and other resources necessary to implement the effort are identified.
2. The legal authority of the party(ies) to the agreement or plan to implement the formalized conservation effort, and the commitment to proceed with the conservation effort are described.
3. The legal procedural requirements (e.g., environmental review) necessary to implement the effort are described, and information is provided indicating that fulfillment of these requirements does not preclude commitment to the effort.
4. Authorizations (e.g., permits, landowner permission) necessary to implement the conservation effort are identified, and a high level of certainty is provided that the party(ies) to the agreement or plan that will implement the effort will obtain these authorizations.
5. The type and level of voluntary participation…necessary to implement the conservation effort is identified and a high level of certainty is provided that the party(ies) to the agreement or plan that will implement the conservation effort will obtain that level of voluntary participation…
6. Regulatory mechanisms (e.g., laws, regulations, ordinances) necessary to implement the conservation effort are in place.
7. A high level of certainty is provided that the party(ies) to the agreement or plan that will implement the conservation effort will obtain the necessary funding.
8. An implementation schedule (including incremental completion dates) for the conservation effort is provided.
9. The conservation agreement or plan that includes the conservation effort is approved by all parties to the agreement or plan.

(DOI 2003, 68 Fed. Reg. 15114-15115).

Criteria that will affect FWS's consideration of the certainty that the conservation effort will be effective include:

1. The nature and extent of threats being addressed by the conservation effort are described, and how the conservation effort reduces the threats is described.
2. Explicit incremental objectives for the conservation effort and dates for achieving them are stated.
3. The steps necessary to implement the conservation efforts are identified in detail.
4. Quantifiable, scientifically valid parameters that will demonstrate achievement of objectives, and standards for these parameters by which progress will be measured, are identified.
5. Provisions for monitoring and reporting progress on implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the conservation effort are provided.
6. Principles of adaptive management are incorporated.

(DOI 2003, 68 Fed. Reg. 15115).

Candidate Conservation Agreement for Mono Basin Area Sage Grouse

In 2001 the California Department of Fish and Game applied for funding from the U.S. Fish and Wildlife Service's Cooperative Endangered Species Conservation Fund[7] for support to develop a Candidate Conservation Agreement (CCA) for sage grouse in Mono County, California. (CDFG 2001b). The CDFG's application acknowledged that sage grouse in Mono County are "genetically differentiated from sage grouse populations elsewhere" and "particularly vulnerable due to their genetic isolation from each other and from other populations." (CDFG 2001b: 1). CDFG also contended that "development and implementation of a Candidate Conservation Agreement should allow the sage grouse population to be maintained at its current level, and may likely preclude it and other species from future listing [under the Endangered Species Act]." (CDFG 2001b: 2).

Candidate Conservation Agreements are formal agreements between the U.S. Fish and Wildlife Service and one or more parties to address the conservation needs of proposed or candidate species, or species likely to become candidate species, before they become listed as threatened or endangered under the Endangered Species Act. Participants to CCAs voluntarily commit to implementing specific actions that will remove or reduce the threats to these species. Thus, CDFG's application for funding from the U.S. Fish and Wildlife Service to develop a CCA for sage grouse in the Mono Basin area is evidence that the department considered sage grouse in the Mono Basin area (1) a distinct population (2) of small numbers and limited distribution (3) that

[7] "The Candidate Conservation Agreement Grants program provides funding to States for development and implementation of Candidate Conservation Agreements to conserve candidate and proposed species and species likely to become candidates on State, private and other non-Federal lands." _____. _____. State of California, Department of Fish and Game, Federal Fiscal Year 2001, Cooperative Endangered Species Conservation Fund/Section 6 Grants to States, Candidate Conservation Agreement Project Proposal. Enclosure C. (no identified author, undated). (Document received in response to California Public Records Act request (01-05-042) filed by American Lands Alliance, Nov. 14, 2002. Document appears to have been attachment to e-mail to/from S. Blankenship, labeled "MONO-Sage Grouse Ranking Factors.wpd").

was deserving of special management usually prescribed for listed and candidate species, or species that might become candidates for listing under the Endangered Species Act.

In its application, as justification for its request for funding for a CCA, CDFG criticized management of Mono Basin area sage grouse. "Since so many different agencies are involved, it is difficult to devise mitigation measures [for land uses that are harmful to sage grouse or sagebrush habitats] likely to result in conservation of the [Mono Basin area] population. Projects are reviewed on a case-by-case basis and mitigation measures are often inadequate." (CDFG 2001b: 1). "In the current situation, mitigation measures are devised in a piece-meal fashion. In some situations, potential mitigation measures are not considered because they are outside the jurisdiction of the permitting agency. Often no mitigation is required." (CDFG 2001b:2). The CDFG application stated that "without a regional, multi-jurisdictional approach, management actions are not likely to change, resulting in continued impacts to sage grouse populations." (CDFG 2001b: 2).

The U.S. Fish and Wildlife Service awarded funding to CDFG to develop a CCA for Mono Basin area sage grouse based on its application. Unfortunately, despite recognizing the need for a CCA, CDFG spent the money on other, related projects, including the development of the Greater Sage-Grouse Conservation Plan for the Bi-State Plan Area of Nevada and Eastern California (Bi-State Plan). (Blankenship 2005.)

Bi-State Sage Grouse Conservation Plan

The Greater Sage-Grouse Conservation Plan for the Bi-State Plan Area of Nevada and Eastern California (Bi-State Plan) is a component of Nevada Governor Kenny Guinn's Sage Grouse Conservation Plan for Nevada and Portions of Eastern California. The Governor's Sage Grouse Conservation Team created local planning groups, including one for the Bi-State planning area, to develop and implement strategies to "create healthy, self-sustaining sage-grouse populations throughout the species' historic range." (Bi-State Plan 2004: 1). The Bi-State Plan identified six goals for conserving sage grouse in the Mono Basin area:

- Ensuring no net loss of sage-grouse breeding populations;
- Maintaining and restoring sagebrush and associated habitats;
- Identifying and eliminating threats to sage-grouse populations, and
- Implementing scientifically sound management strategies.

While the objectives of the Bi-State Plan are an excellent starting point, the plan as drafted will not achieve the identified goals, and does not satisfy the ESA mandate of species recovery.

As a preliminary matter, the Bi-State Plan will not meet the objective of the Nevada Governor's Sage Grouse Conservation Team to "create healthy, self-sustaining sage-grouse populations throughout the species' historic range." In fact, this is not even a stated objective of the Bi-State Plan.

At most, the Bi-State Plan seeks to maintain current populations of sage grouse across in the bi-state planning area. There is no discussion in the plan of restoring historic sage grouse numbers or habitat. The habitat restoration efforts discussed relate to stemming population decline in

existing populations, not expanding the number and range of sage grouse in the bi-state area. Therefore, at best, the Bi-State Plan will prevent further loss of sage grouse throughout the planning area. This does not comport with the requirement of the ESA to develop recovery plans for threatened or endangered species that incorporate "objective, measurable criteria which, when met, would result in a determination…that the species be removed [from protection under the ESA]." (16 U.S.C. §1533(f)(1)).

In contrast, the Bi-State Plan contains no objective, measurable criteria for assessing sage grouse populations or habitat. The plan contains no standards by which to measure recovery and, as mentioned above, does not even aspire to recover the species. Further, as described below, the plan contains numerous deficiencies that render it inadequate to conserve and recover sage grouse in the bi-state area.

Lack of Regulatory Mechanisms

The Bi-State Plan does not contain adequate regulatory mechanisms that meet PECE Policy criteria to avoid listing the Mono Basin area sage grouse under the ESA. The plan's management prescriptions are voluntary, depending wholly on the cooperation and participation of interested parties and agencies, and may be altered or abandoned at any time. There is no penalty for non-compliance or non-cooperation with the plan. There is no prohibition against any activity that will harm sage grouse or sage grouse habitat.

FWS cannot rely on voluntary conservation efforts by federal and state agencies and private parties (as presented in the Bi-State Plan) to delay listing Mono Basin area sage grouse under the ESA. Federal courts deem voluntary measures as "necessarily speculative." ONRC, 6 F.Supp.2d at 1155 (D.Or.1998). Because they are unenforceable and speculative, "voluntary or future conservation efforts by a state [or other entity] should be given no weight in the listing decision. Instead, the [FWS] must base its decision on current, enforceable measures." (Id. at 1155, emphasis added).

Further, FWS cannot rely on the promise of future conservation efforts by federal and state agencies and private parties to delay listing Mono Basin area sage grouse under the ESA. "The plain language of the statute instructs the agency to consider 'existing regulatory mechanisms'…[T]he Secretary…cannot use promises of proposed future actions as an excuse for not making a determination based on the existing record." Biodiversity Legal Foundation v. Babbitt, 943 F.Supp. 23 (D.D.C.1996) (striking down the FWS reliance on possible future actions of the U.S. Forest Service as a basis for "not warranted" determination for the Alexander Archipelago wolf); *see also* Southwest Center for Biological Diversity v. Babbitt, 939 F.Supp. 49 (D.D.C.1996) (holding that FWS determination not to list the Queen Charlotte goshawk could not be based on promises of proposed future actions of Forest Service to provide sanctuary for the bird); Oregon Natural Resources Council *et al*. v. Daley *et al*., 6 F.Supp.2d 1139, 1154 (D.Or.1998) ("ONRC") (holding that FWS cannot consider future efforts, whether regulatory or non-regulatory, in making listing determinations.) Save Our Springs Legal Defense Fund, Inc. v. Babbitt, Civ. No. 96-168-CA (W.D.Tex. 1997) (rejecting FWS determination that listing was not warranted for the Barton Springs salamander because of the efficacy of the conservation agreement between FWS and Texas state agencies was speculative).

Finally, the FWS may not rely on the speculative actions of other federal agencies in making listing determinations. Friends of Wild Swan, Inc. v. U.S. Fish and Wildlife, 945 F.Supp. 1388, 1398 (D.Or.1996). (holding that FWS reliance on land management plans of other federal agencies with future effect is "both arbitrary and capricious and contrary to law")

Table 3. Comparison of existing regulatory framework and Endangered Species Act protection for Mono Basin area sage grouse.

Activity	Management under Current Regulatory Framework	Management under Endangered Species Act Protection
Development of privately owned sage grouse habitat, including nesting and brooding habitat, and leks.	Allowed	Prohibited
Hunting sage grouse.	Allowed in California	Prohibited
Detrimental livestock grazing practices.	Allowed	Prohibited
Detrimental off-road vehicle use.	Allowed	Prohibited
Development on public land, including construction of powerlines, hardrock mining, roads, utility corridors and fences.	Allowed	Prohibited

Of the factors identified by Braun (1998), only the effects of drought and some forms of predation (those unassociated with other human factors) could not be prevented by ESA protection. By contrast, the Bi-State Plan prohibits none of the factors associated with habitat loss, fragmentation, or degradation. The plan would also allow continued hunting of sage grouse in California, despite well-documented effects on fragmented and isolated sage grouse populations.

Many of the causes of sage grouse decline cited by Braun (1998) are present in the Mono Basin area. Threats to sage grouse identified in the Bi-State Plan include:

- Pinyon-juniper encroachment
- Predation
- Residential development
- Wildfire
- Off-road vehicle use
- Roads
- Powerlines
- Wild horses
- Livestock grazing
- Poaching
- Pronghorn competition

- Noxious weeds/invasive species
- Wind energy development
- Agricultural conversion
- Human disturbance
- Hunting
- Fences
- Mineral exploration and extraction
- Water distribution
- Quality of sagebrush habitats
- Quality of meadows and riparian habitats
- Disease
- Pesticides
- Population cycles
- Climate/weather
- Shortage of good quality brood habitat

(Bi-State Plan 2004).

Despite the array of threats presented, the Bi-State Plan offers only limited management prescriptions that are insufficient to respond to documented threats. Examples of the shortcomings are described below.

Pine Nut PMU

The Bi-State Plan identifies 12 threats to sage grouse in the Pine Nut PMU. These include: pinyon-juniper encroachment; predation; urbanization; wildfire; off-road vehicle use (and existing road alignments); power lines; wild horses; livestock grazing; poaching; pronghorn competition; noxious weeds/invasive species; and energy development. These threats are not prioritized.

The Bi-State Plan contains action items to address only four of the 12 threats in the Pine Nut PMU. The plan contains no action items for the remaining threats. All of the action items are voluntary and require additional funding. The plan does not otherwise provide funding to carry out the action items identified.

Desert Creek-Fales PMU

The Bi-State Plan prioritizes eight threats to sage grouse in the Desert Creek-Fales PMU: pinyon-juniper encroachment; urbanization; human disturbance; sagebrush habitat condition; power lines, roads, fences, and other infrastructure; live stock grazing; predation; and hunting. (Bi-State Plan 2004: 39).

The plan contains 10 action items and three additional strategies that include no action items. As with the Pine Nut area, each of the action items are voluntary and require additional funding; none have funding secured. The action items include no new regulatory mechanisms to address known threats, and the plan provides no funding to carry out action items.

As an example, the plan identifies private rangeland in Desert Creek, Fales/Burcham Flat, Sweetwater, and the eastern Antelope Valley as currently "being converted to residential and vacation homes," thus jeopardizing sage grouse populations. (Bi-State Plan 2004: 47). But the plan calls for no new regulations to prevent such development from occurring. Instead, the plan calls only for providing "information, education and funding" to preserve privately-owned habitat. (Bi-State Plan 2004: 47). However, no funding is provided by the plan, nor are any funding sources identified.

With the Desert Creek-Fales population already having undergone a "precipitous decline" and currently undergoing a "steep, downward trend," such speculative measures are insufficient to prevent the population from becoming extirpated. (Bi-State Plan 2004: 37-38).

Bodie PMU

Threats in the Bodie PMU include hunting; predation; fences; utility corridors; livestock grazing; feral horses; changing land use and development; mining; recreation; wildfire; pinyon-juniper encroachment; water distribution; quality of sagebrush habitats; and quality of meadows and riparian areas. (Bi-State Plan 2004: 73).

The plan identifies action items for only six of the 14 known threats. Actions for the remaining eight threats are missing or pending planning group review. As with the previously described areas, all conservation actions are voluntary, adopt no new regulations, and contain no funding. Further, the few conservation actions identified are insufficient to address the identified threats to sage grouse.

The plan's approach to hunting in the Bodie area is instructive. Despite acknowledging that hunting is "a potentially significant population risk" in the Bodie area and that hunting results in mortality of 1.2% of the annual spring population, the plan calls for no new hunting regulations. (Bi-State Plan 2004: 74-75). Instead the plan concludes that "termination of licensed hunting is also a potentially significant population risk" due to the wings hunters provide for samples, revenue from fees and taxes, and political support of hunters(!) (Bi-State Plan 2004: 74-75).

The entire Bi-State Plan is intended to conserve sage grouse populations, yet the plan fails to undertake even the simplest conservation action—ending the direct killing of sage grouse—to achieve its goal. Such deficiencies provide ample evidence that a stronger approach is needed.

White Mountains PMU

Threats in the White Mountains PMU include predation; disease/pesticides; hunting/poaching; population cycles; marginal/limited habitat; water distribution; lack of diverse age structure in sagebrush; non-native weed invasion; habitat fragmentation; mining; livestock grazing; fire ecology; and human disturbance.

The plan identifies 11 unfunded, voluntary, non-regulatory action items to address these threats, although no action items are presented for five threats. Many of the action items relate to sage grouse surveys or speculative future actions such as to "[d]esign [habitat improvement] treatments based on individual site potentials using the most current information possible." (Bi-State Plan 2004: 116). These measures are insufficient to preserve sage grouse populations.

Mount Grant PMU

Threats in the Mount Grant PMU include pinyon-juniper encroachment; power lines; mining; off-road vehicles; wild horses; livestock grazing; wildfire; predation; hunting/poaching; and limited brooding habitat. (Bi-State Plan 2004: 133).

The plan identifies action items for only four of the ten identified threats. As with other areas, these action items are voluntary, unfunded, and non-regulatory. They are all highly speculative.

For example, one action involves realigning a road that traverses a meadow use by sage grouse. The plan calls for the Forest Service to propose remedial action and conduct environmental analysis of the action—in 2012! (Bi-State Plan 2004: 145). Such speculative, unfunded actions can hardly be considered as sufficient safeguards necessary to ensure survival of a declining sage grouse population with low lek and brood counts. (Bi-State Plan 2004: 133-134).

South Mono PMU

Threats in the South Mono PMU include livestock grazing; recreation; hunting/poaching; landfill; predation; wild horses; fences; transmission lines; fire and fire suppression; pinyon-juniper encroachment; water management; urbanization; mining and geothermal development; habitat degradation; invasive exotic plants; road kill hazards; scientific study; herbicides; and lack of information. (Bi-State Plan 2004: 167).

Despite these myriad threats, the plan presents only four action items for the area. Only one of these—pinyon-juniper removal—involves on-the-ground restoration, though the action is left unfunded. (Bi-State Plan 2004: 168). The three remaining action items involve collecting data, developing a management plan for continued hunting, and continuing stakeholder workshops. The plan presents no action items for the remainder of the known threats to the South Mono populations.

As with the Bodie PMU, the plan's approach to hunting is instructive. Despite presenting ample evidence that sage grouse populations respond to harvest levels, the plan does not call for the elimination or even a moratorium on hunting. Instead, the plan urges the California Department of Fish and Game to develop a "comprehensive harvest management strategy" for the South Mono PMU. (Bi-State Plan 2004: 172-174). Such an approach is inconsistent with a serious effort to preserve sage grouse throughout the region.

Braun (2004b) reviewed conservation plans highlighted by the Western Governor's Association that are similar to the Bi-State Plan—laden with voluntary, unfunded and non-regulatory measures to conserve sage grouse. Braun concluded that the reports are "misleading and extremely harmful for rational management of sagebrush steppe to benefit and ensure the survival of the sage-grouse." (Braun 2004b: 3).

Comparison of Bi-State Conservation Plan to FWS Policy for Evaluation of Conservation Efforts When Making Listing Determinations

The conservation activities identified in the Bi-State Plan, while laudable, are not sufficient to prevent listing the Mono Basin area sage grouse under the Endangered Species Act. In a variety of ways, the plan falls short of the criteria presented in the FWS PECE Policy.

The first factor FWS assesses when reviewing existing conservation measures is the certainty that the conservation plan will be implemented. Here, there is little certainty that the Bi-State Plan will be implemented. An assessment of FWS criteria follows.

1. *The conservation effort, the party(ies) to the agreement of plan that will implement the effort, and the staffing, funding level, funding source, and other resources necessary to implement the effort are identified.*

   The Bi-State Plan does not identify needed staffing levels, necessary funding levels, or other resources needed to implement the plan. Many funding sources are not identified at all (e.g., "[i]dentify funding sources…acquire funding." (Bi-State Plan 2004: 48); "[f]unding may come from many different sources and all will be considered when implementing this project." (Bi-State Plan 2004: 138)). Others are mentioned in only a cursory manner (e.g., "[f]unding source: various private, State and Federal programs." (Bi-State Plan, 2004: 48); "[t]he projects that could occur based on the results of data collection would be funded through agency budgets, cooperative programs, challenge cost share grants, or other grants." (Bi-State Plan 2004: 120)). The plan guarantees no funding for management prescriptions, and all identified funding needs and sources are speculative.

2. *The legal authority of the party(ies) to the agreement or plan to implement the formalized conservation effort, and the commitment to proceed with the conservation effort are described.*

   While the plan describes some legal authorities, there is no description of the parties' commitment to proceed with conservation efforts. For example, the plan calls on participants to "[s]upport zoning that will maintain, enhance or preserve critical sage-grouse habitat." (Bi-State Plan 2004: 48). However, there is no description of the commitment from local jurisdictions to support sage grouse habitat preservation in zoning policies, nor any indication that such policies will ever be implemented.

3. *The legal procedural requirements (e.g., environmental review) necessary to implement the effort are described, and information is provided indicating that fulfillment of these requirements does not preclude commitment to the effort.*

   While some legal procedural requirements are described, there is no information indicating that fulfillment of these requirements does not preclude commitment to the effort.

4. *Authorizations (e.g., permits, landowner permission) necessary to implement the conservation effort are identified, and a high level of certainty is provided that the party(ies) to the agreement or plan that will implement the effort will obtain these authorizations.*

   The plan identifies some authorizations necessary to implement conservation measures, but there is no certainty provided that parties to the agreement will obtain the required authorizations. For example, when dealing with the threat of development of privately-owned habitat in the Pine Nut PMU, the conservation plan aims only to "pursue willing parties who are interested in long term sage-grouse conservation" but does not provide any certainty as to which landowners are necessary to ensure sage grouse survival, the likelihood that those landowners are "willing parties," or a strategy for ensuring their participation in conservation efforts. (Bi-State Plan 2004: 25).

5. *The type and level of voluntary participation…necessary to implement the conservation effort is identified and a high level of certainty is provided that the party(ies) to the agreement or plan that will implement the conservation effort will obtain that level of voluntary participation…*

   As with criterion #4, no analysis is provided of the number of landowners necessary to ensure the plan's success, nor is there any certainty that the necessary landowners will participate.

6. *Regulatory mechanisms (e.g., laws, regulations, ordinances) necessary to implement the conservation effort are in place.*

   As described in criterion #5, many regulatory mechanisms necessary to implement conservation measures are not in place, nor is there any indication that they ever will be (e.g., "[u]norganized ORV [off-road vehicle] use should be limited to existing roads and trails in sage-grouse habitat." (Bi-State Plan 2004: 27)). Currently, cross-country ORV use is allowed in the Pine Nut PMU and there is no plan to limit ORV use to existing routes. The plan also promises to "[l]imit power line expansion to existing corridors" in the PMU. (Bi-State Plan 2004: 28). However, there is currently no such limitation on corridor expansion, and there is no plan to enact such limitations through regulation.

   The Bi-State Plan also relies on amendments to BLM management plans to implement conservation strategies. However, the BLM-Carson City Field Office notes that its current land use plan does not identify sage grouse as a priority species; include specific

goals and objectives for sage grouse; identify sage grouse habitat restoration objectives; protect sage grouse habitat from disposal, conversion, or manipulation; contain guidelines to protect sage grouse habitat from grazing, mining, fire, invasive species, or recreation; include monitoring guidance; or contain guidelines to prevent or minimize habitat fragmentation. (BLM 2004c). The BLM also has no timeline for updating the pertinent management plan. (BLM 2004c).

7. *A high level of certainty is provided that the party(ies) to the agreement or plan that will implement the conservation effort will obtain the necessary funding.*

   The plan contains no certainty that funding will be secured for conservation activities. As noted above, most funding sources are not described or only vaguely described. All funding is speculative.

   BLM documents indicate that Bi-State Plan conservation strategies will not be implemented due to lack of funding. The BLM-Carson City Field Office identified sage grouse conservation actions that would require $2.4 million to implement. (BLM, undated: 2). Nonetheless, the agency identified only $381,000 in available funding, leaving a shortfall of over two million dollars. (BLM, undated: 2). The available funding represents only 15% of that necessary to implement the Bi-State plan on BLM holdings.

   The Nevada Department of Wildlife's recent requests for federal appropriations from Senator Harry Reid for sage grouse projects in the Mono Basin area are indication of how expensive habitat improvement can be. The Department requested a total of $677,000 for two projects in the Bodie PMU.

8. *An implementation schedule (including incremental completion dates) for the conservation effort is provided.*

   The Bi-State Plan includes some dates for implementing conservation measures, but many prescriptions do not have dates. As described above, many conservation concerns have no corresponding conservation actions, much less an implementation schedule.

9. *The conservation agreement or plan that includes the conservation effort is approved by all parties to the agreement or plan.*

   There is no indication that all parties to the conservation plan have approved the plan or are committed to its implementation.

There is no certainty that the Bi-State Plan will be implemented. To the contrary, the speculative and unfinished nature of many of the plan's conservation strategies, lack of implementation schedules, funding sources, and commitment to implementation, and missing conservation actions, suggest that the plan's goals will not be realized in the near future.

Similarly, criteria FWS uses to consider the certainty that the conservation effort will be effective also suggest that the Bi-State Plan will fail to adequately protect sage grouse. An assessment of these criteria follows.

1. *The nature and extent of threats being addressed by the conservation effort are described, and how the conservation effort reduces the threats is described.*

   While many of the threats being addressed are described, in many places, the plan does not adequately describe how the conservation effort reduces the threats. Many of the proposed actions (such as hazing predators or cutting pinyon/juniper trees) are remedial only and do not address the underlying causes of the threats. There is no assessment of why pinyon/juniper woodlands are expanding nor a strategy for addressing the cause of this expansion. (Barbour suggests that conifer encroachment is a response to livestock grazing and fire suppression. (Barbour 1988: 767).) Some causes of increased predation are addressed, but there is no effective strategy for eliminating these factors.

2. *Explicit incremental objectives for the conservation effort and dates for achieving them are stated.*

   The plan contains few incremental objectives, and even fewer dates for achieving them. As described above, action items are missing for the majority of threats.

3. *The steps necessary to implement the conservation efforts are identified in detail.*

   For a few action items, the plan contains detailed implementation steps. For the majority however, implementation steps are missing or scarcely described.

4. *Quantifiable, scientifically valid parameters that will demonstrate achievement of objectives, and standards for these parameters by which progress will be measured, are identified.*

   The plan contains very few parameters that demonstrate achievement of objectives. Further, the plan contains no targets for sage grouse populations, no specific short or long-term goals for sage grouse recovery, and no parameters to measure success.

5. *Provisions for monitoring and reporting progress on implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the conservation effort are provided.*

   The plan contains no provisions for monitoring or reporting progress on implementation (nor is an implementation schedule included for a majority of conservation strategies) or effectiveness. As described above, the plan contains no measures of effectiveness or quantifiable parameters for success.

6. *Principles of adaptive management are incorporated.*

Adaptive management is not included in the Bi-State Plan.

The Bureau of Land Management, in its progress report on implementation of the Sage Grouse Conservation Plan for Nevada and Portions of Eastern California (which contains the Bi-State Plan), notes that the plan "contains little in the way of specific conservation actions…" and "does not…provide the specificity of commitment necessary to demonstrate that the species can be conserved through implementation of the plan." (BLM 2004b: 6). The BLM notes that such results are "not unexpected" in conservation efforts that are based on stakeholder interest rather than scientifically driven. (BLM 2004b: 6). Because the plan contains no quantifiable objectives, interim or long-term measures of success, provisions for monitoring progress, or implementation schedule, there is no certainty that the Bi-State Plan will be effective at conserving and restoring the Mono Basin area sage grouse.

The FWS came to the same conclusion when it evaluated conservation measures proposed in the Bi-State Plan in 2004. The FWS evaluated the Bi-State Plan pursuant to the PECE Policy to determine whether it "described individual conservation efforts that should be considered under PECE because they are intended to reduce or eliminate a known threat." (USFWS 2004: 2). After careful review of each of the Bi-State Plan's proposed conservation measures, FWS concluded:

> We have determined through a careful review of these individual conservation efforts in the Bi-State Plan that *one of the 30 individual conservation efforts fully meets PECE*. Overall, the 29 efforts that did not meet PECE were general in nature describing processes, etc. and/or provided incomplete information to determine certainty of implementation or effectiveness.

(USFWS 2004: 4, emphasis added).

Thus FWS has already concluded that the Bi-State Plan is inadequate to prevent listing and ensure protection for the Mono Basin area sage grouse.

BLM-Bishop Resource Management Plan

The BLM-Bishop Resource Management Plan (RMP) represents a typical effort to set guidelines for sagebrush-steppe management on public lands, in this case the Bishop Resource Area (which includes only a portion of Mono Basin area sage grouse range). Unfortunately, sage grouse have continued to struggle since the RMP was adopted in 1993.

Perhaps one reason for the suppressed populations of Mono Basin area sage grouse in the Bishop Resource Area is the small management buffers that are recommended in the RMP to protect active sage grouse leks in the area (*see* BLM-Bishop FO 2004). The RMP includes various management restrictions and guidelines against conducting certain activities within ¼ to ⅓ mile of active sage grouse leks. Some activities, such as livestock grazing, energy development and

recreation, are permitted throughout lekking and brooding areas, except for two months of the year, during which time a 2-mile buffer is imposed around active leks. (BLM-Bishop FO 2004).

Both the size of the buffers and the seasonal restrictions prescribed in the Bishop RMP are insufficient to conserve sage grouse, as we know from other BLM planning efforts on other BLM lands in other states. The BLM confronted the same issue of lek buffers when planning for energy development in sage grouse habitat in Wyoming and Montana. Braun recommended that all surface activity associated with energy development be prohibited within 3 miles of leks to prevent disruption of courtship, and abandonment of leks and nesting habitat. (Braun 2003). Connelly et al. recommended that energy-related facilities should be located at least 3.2 km from active leks. (Connelly et al. 2000). (Braun recommended larger 3-mile buffers based on the uncertainty of protecting sage grouse nesting habitat with smaller buffers). The Fish and Wildlife Service also recommended that "no surface occupancy be allowed within two miles of active leks year-round to protect grouse." (USFWS 2003). But the Wyoming Department of Game and Fish found that 2-mile lek buffers were inadequate "for protection of essential nesting and early brood-rearing habitats." (WGFD 2002). Even the BLM admitted that sage grouse would be impacted by development activities that occur within 2 miles of sage grouse leks or within winter range. (BLM 2003: 4-123).

All these expert studies and agency observations notwithstanding, the BLM approved plans to develop energy resources as close as ¼ mile to active sage grouse leks (e.g., *Final Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plan* and *Final Environmental Impact Statement and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project*). Braun failed to understand how BLM arrived at its ¼-mile buffer: "the BLM has chosen 0.25-mile or 0.50-mile distances from active leks for avoidance of or restrictions on development even though the scientific literature indicates there should be no manipulation of sagebrush habitats within 2 miles of active leks. ***The 0.25-mile or 0.50-mile restrictions seem to have been created to justify existing practices and are not based on any reputable science.***" (Braun 2003, emphasis original, citation omitted). The same criticism could be leveled at the Bishop RMP.

A new study in Wyoming indicates that sage grouse avoid using leks within the vicinity of energy development or a road. Researchers have found mean annual declines in use of leks by maximum numbers of male grouse within 3.2km of a gas drilling rig or within 500m of a road were 32 percent and 19 percent, respectively, compared to 2 percent average annual declines for leks located more than 6.5km (4.04 miles) from gas field disturbance (rigs or roads). The researchers concluded that development activities within 5.5km (3.42 miles) of active leks directly and indirectly influence sage grouse. (Holloran 2004).

Importance of Protecting Mono Basin Area Sage Grouse

As described in this petition, Mono Basin area sage grouse occur in at the periphery of the current range of greater sage-grouse. Protecting peripheral populations of any species is important to the survival of the entire species. It is in these peripheral populations that the evolutionary potential of a species is greatest. (Gadgil and Bossert 1970; Levin 1970; Gadgil 1971). Peripheral populations, such as Mono Basin area sage grouse, often differ genetically

from more centrally located populations, thus adding genetic diversity to the species and providing genetic backgrounds where natural selection can more easily increase the gene frequency of novel alleles or combinations. "Such populations are often of evolutionary significance" (Scott et al. 1993: 35) and "preserv[e] unique genetic material" which is "restricted to peripheral populations of native species" (Scott et al. 1993: 36; Quinn and Karr 1993).

Peripheral populations, such as the Mono Basin area sage grouse, are also often located at the ecological limits of the species, thus exposing novel genetic combinations to environmental circumstances that may later become prevalent in central populations, such as global warming effects. Such testing of the periphery can act to stabilize the entire species in the face of environmental change. The FWS DPS policy itself is acknowledgement of the importance of protecting these distinct population segments.

Mono Basin area sage grouse mostly occur in small populations, and small population size is itself a threat to such species, even if no trend towards even lower numbers is observed. Small populations are at high risk of extinction for several reasons (as stated throughout this petition), including loss of genetic variation through inbreeding or genetic drift, demographic fluctuations (such as variation in births, deaths, or age classes), and environmental fluctuations (such as variations in predation rate, disease or parasitism rates, climate, episodic weather events, competition, food supply and a host of other abiotic or biotic factors).

Sage grouse are a useful, if imperfect, umbrella species for the sagebrush steppe ecosystem. (Wisdom et al. 2003; Rich and Altman 2001; Rich et al. 2003) An "umbrella species" is defined as one "whose conservation confers a protective umbrella to numerous co-occurring species." (Fleishman et al. 2001: 1489). Functionally, an umbrella species should have the following characteristics: "they represent other species, their biology is well known, they are easily observed or sampled, they have large home ranges, are migratory, and are persistent." (Rich and Altman 2001: 10).[8]

Rich and Altman note that sage grouse fit the description of an umbrella species:

> Sage grouse require expanses of sagebrush habitat with a diverse and substantial understory of native grasses and forbs. Their requirements for lek sites, nesting, brood-rearing, and wintering habitat are reasonably well understood. Further, they need large blocks of sagebrush, as much as 2,500 square miles per population, in appropriate spatial mixes across the landscape.

(Rich and Altman 2001: 10)

Wisdom (2003) studied 40 species of concern across the Great Basin and found that the majority (74%) had ranges that significantly overlapped with sage grouse. (Wisdom, et. al. 2003: 8-9). Sage grouse are an ideal umbrella species for species classified as "sagebrush species" with ranges that entirely or mostly overlap the grouse's range. These include: Wyoming ground

[8] Fleischman et al. (2000) defined an umbrella species as (1) a widely occurring species with other species of interest, (2) exhibits a moderate level of ubiquity, and (3) has a high sensitivity to human disturbance. (Fleischman et al. 2000, *cited in* Wisdom et. al. 2003: 8-2).

squirrel (*Spermophilus elegans*) (100% overlap),[9] sage sparrow (*Amphispiza belli*) (99%),[10] Brewer's sparrow (*Spizella breweri*) (94%),[11] sage thrasher (*Oreoscoptes montanus*) (94%),[12] pygmy rabbit (*Brachylagus idahoensis*) (54%),[13] and vesper sparrow (*Pooecetes gramineus*) (52%)[14] (percentages for the latter two species apply to the Great Basin only). When measuring "habitat overlap" (i.e., overlap of a species' habitat associations with the habitat associations of sage grouse), the percentages increase for two of these species: pygmy rabbit (68%) and vesper sparrow (63%) (Great Basin only).[15]

Species of related "shrubland" and "sagebrush-woodland" guilds also have habitats that overlap sage grouse habitat in the Great Basin: white-tailed jackrabbit (*Lepus townsendii campanius*) (71%), Merriam's shrew (*Sorex merriami*) (62%), green-tailed towhee (*Pipilo chlorurus*) (60%), sagebrush vole (*Lemmiscus curtatus*) (59%), northern grasshopper mouse (*Onychomys leucogaster*) (50%) and sagebrush lizard (*Sceloporus graciosus*) (48%). Habitat generalists, such as Brewer's blackbird (*Euphagus cyanocephalus*) (58%) and Ferruginous hawk (Buteo regalis) (49%), also use habitat in sage grouse range. (Wisdom et al. 2003).

In its application for funding from the U.S. Fish and Wildlife Service to develop a Candidate Conservation Agreement for sage grouse in Mono County, California, CDFG suggested that conserving Mono Basin area sage grouse would benefit an array of special status and sensitive species, including many species listed by Wisdom et al. and Rich and Altman above.

> Special Status Species known from the project area which would likely benefit from the project include Bald Eagle, Golden Eagle, Pronghorn, Ferruginous Hawk, Merlin, Prairie Falcon, Loggerhead Shrike, Pygmy Rabbit, White-tailed Jackrabbit, American Badger, Ringtail, and other shrub-steppe species such as Sage Thrasher, Sage Sparrow, and Green-tailed Towhee. Wet meadows found within the Long Valley area could also support populations of Owens Valley Vole, State and Federal Species of Concern. Sensitive plant species which would likely benefit from implementation of a Conservation Agreement include Long Valley milkvetch, *Astragalus johannis-howellii*; Mono milkvetch, *Astragalus monoensis var. monoensis*; Halls Meadow hawksbeard, *Crepis runcinata ssp. hallii*; Mono Lake lupine, *Lupinus duranii*; and Scalloped-leaved lousewort, *Pedicularis crenulata*. Four Conservation Areas as identified in the Owens Basin Wetland and Aquatic Species Recovery Plan are found within the Long Valley study area (Whitmore, Little Alkali, Hot Creek, and Little Hot Creek). The Owens Basin Wetland and Aquatic Species Recovery Plan was written to address aquatic and wetland species within the Owens Basin. Species covered by the plan found within the Long Valley area include Owens tui chub. Long Valley speckled dace, Owens sucker, and Alkali ivesia. The Recovery Plan does not address upland habitats used by sage grouse. Preparation of a Conservation Agreement for sage grouse in Long Valley could tie in

[9] Wisdom et al. (2003).
[10] Rich and Altman (2001).
[11] Rich, T. and B. Altman (2001).
[12] Rich, T. and B. Altman (2001).
[13] Wisdom et al. (2003).
[14] Wisdom et al. (2003).
[15] Wisdom et al. (2003).

> nicely with the Conservation Areas as identified in the Recovery Plan." (CDFG 2001b: 4).

While protecting sage grouse would benefit a suite of other species, scientists note that ideal sage grouse habitat is not preferable for every sagebrush species. (Aaron Holmes, PRBO Conservation Science, pers. comm., July 23, 2004; Rich and Altman 2001; *see also* Wisdom et al. 2003). For example, some species might require different vegetative composition or structure than sage grouse prefer. However, this argues for protecting large sagebrush reserves for sage grouse and other species that include a mosaic of different habitats of varying successional stages to accommodate the variety of sagebrush, shrubland, sagebrush-woodland, and generalist species. (Aaron Holmes, PRBO Conservation Science, pers. comm., July 23, 2004).

Listing sage grouse as threatened or endangered would help drive protection of sagebrush-steppe habitats, and perhaps prevent other species from being listed. Many of the species that would benefit from protecting Mono Basin area sage grouse listing are also in decline. (Knick et al. 2003). By listing sage grouse, the Service would both help protect an ecosystem and avoid having to process other listing petitions to list the obligate species that live there. It would also further the purposes of the Endangered Species Act which is, among other things, to protect the "ecosystems upon which endangered species and threatened species depend." 16 U.S.C. § 1531(b).

Importance of Protecting Sagebrush Ecosystems

The sagebrush-steppe, more poetically known as the "Sagebrush Sea," is a little loved landscape. Historically, the ecosystem covered approximately 270 million acres; now only 150 million acres of mostly degraded habitat remains. (Borland 1998). Of those approximately 150 million acres, only about 2 million acres are protected as Wilderness – less than 2 percent of the region. (Sagebrush Sea Campaign 2001: 3).

Over 100 bird, 70 mammal and 23 reptile and amphibian species depend on sagebrush habitats. Many of the fastest growing communities in the West – the fastest growing region in the country – are also in the Sagebrush Sea. Partly because of this growth, recreational visits to BLM lands are expected to increase 5 percent annually. (BLM 2000).

The conservation of sagebrush is critical to the survival of the sage grouse: "[t]he prudent management of the Great Basin sagebrush habitats is vital to sage grouse conservation and management." (Perez 1994: 4). Rowland recommends maintaining, conserving, and restoring "large blocks of intact sagebrush with a healthy understory of native grasses and forbs" to help conserve and recover sage grouse. (Rowland 2004: 23, *citing* Paige and Ritter 1999 *and* Connelly et al. 2000).

A draft Sage Grouse Management Plan for California sought to increase the total sage grouse population in the state to 10,000 individuals. (Perez 1994: 3). However, in the same draft plan, the California Department of Fish and Game acknowledged that, "since 1960 the availability of sagebrush in California has dropped over 10 million acres." (Perez 1994: 6, *citation omitted*).

This trend must be reversed – sagebrush habitats must be conserved and restored – if sage grouse and other sagebrush obligate species are to persist in California in the future.

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[Map 1 – Discard this page and insert folded 11” x 17” map, “Mono Basin Area Sage Grouse Range Map”]

[Map 2 - Discard this page and insert folded 11” x 17” map, “Mono Basin Area Sage Grouse Extended Range Map”]

[Map 3 - Discard this page and insert folded 11” x 17” map, “Mono Basin Area Sage Grouse Disturbance Map”]

Appendix

Bureau of Land Management Population Management Units/Land Ownership Maps

Mono Basin area Sage Grouse

Range Map

Sage Grouse Data
- Current Range - Mono Basin area Sage Grouse
- Current Range - Other Greater Sage Grouse
- Management Unit
- Lek Area

Land Status
- Urban / Developed

Land Ownership
- Bureau of Land Management
- Bureau of Indian Affairs
- California Department of Fish and Game
- California Department of Parks and Recreation
- Department of Defense
- Local / Regional
- National Park Service
- Other State Agencies
- Private
- U.S. Forest Service

Other Features
- County Boundaries
- River
- Lakes and Reservoirs
- Dry Lakes or Alkali Flat

0 7 14 21 Miles

N

Data sources: Sage Grouse Range data from SageMap, USGS; National hydrology dataset 2001; Caltrans for roads 2002; Multi-source land cover data, CDF 2002 andBLM 1994 for developed; Legacy Project 2003 and BLM for ownership and wilderness data.

Map produced at GreenInfo Network using ESRI ArcGIS software.

Map date: October 21, 2005.

Printed on a HP 1055 CM plotter

GreenInfo Network

Mono Basin area Sage Grouse

Extended Range Map

Sage Grouse Data
- Current Range - Mono Basin area Sage Grouse
- Current Range - Other Greater Sage Grouse
- Management Unit

Land Status
- Urban / Developed

Land Ownership
- Bureau of Land Management
- Bureau of Indian Affairs
- California Department of Fish and Game
- California Department of Parks and Recreation
- Department of Defense
- Department of Energy
- Local / Regional
- National Park Service
- Other State Agencies
- Private
- U.S. Forest Service
- U.S. Fish & Wildlife Service

Other Features
- County Boundaries
- River
- Lakes and Reservoirs
- Dry Lakes or Alkali Flat

0 8 16 24 Miles

N

Data sources: Sage Grouse Range data from SageMap, USGS; National hydrology dataset 2001; Caltrans for roads 2002; Multi-source land cover data, CDF 2002 andBLM 1994 for developed; Legacy Project 2003 and BLM for ownership and wilderness data.

Map produced at GreenInfo Network using ESRI ArcGIS software.

Map date: October 21, 2005.

Printed on a HP 1055 CM plotter

GreenInfo Network

Mono Basin area Sage Grouse

Disturbance Map

Sage Grouse Data
- Current Range - Mono Basin area Sage Grouse
- Current Range - Other Greater Sage Grouse
- Management Unit

Land Status
- Urban / Developed

Barriers
- Agricutural Lands
- Unsuitable vegetation
- Disturbed Land
- Transmission Lines
- Highway or Interstate
- Major Road

Other Features
- County Boundaries
- River
- Lakes and Reservoirs
- Dry Lakes or Alkali Flat

Data sources: Sage Grouse Range data from SageMap, USGS; National hydrology dataset 2001; Caltrans for roads 2002; Multi-source land cover data, CDF 2002 andBLM 1994 for developed; Legacy Project 2003 and BLM for ownership and wilderness data.

Map produced at GreenInfo Network using ESRI ArcGIS software.

Map date: October 21, 2005.

Printed on a HP 1055 CM plotter

0 10 20 30 Miles

N

GreenInfo Network