5. Description of resistance and resiliency and how that ties to the populations and associated habitat. [Responsible: Mike. Due 7/10; Each state rep will write up the narratives for their populations Due to Mike no later than 7/10]

<200 males = C1

200 – 500 males = C2

500 – 1000 males = C3

>1000 males = C4

Management Zone 1: Great Plains

This management zone is made up of four sage-grouse populations as identified by Garton et al. 2011. Most of these populations cross state and provincial boundaries.

Dakotas Population

Garton et al. (2011) reported the minimum male count for this population at 587 and predicted a 66% chance that this population would dip below 200 males in the next 100 years. Montana's portion of this population could be referred to as the greater Cedar Creek Anticline area. It is heavily influenced by a high density of oil well development along the Anticline and also has the potential for additional habitat conversion to cropland. This area was identified as a core area due to a historically high density of sage-grouse and for the seasonal habitat it provides for birds from North Dakota, a likely conduit for genetic connectivity. Overall, this population is small and at relatively high risk.

The Dakotas's population occurs on the far eastern edge of the range of sage-grouse. Much of the population occurs in the Cedar Creek Anticline. Garton et al. (2011) reported the minimum male count for this population at 587 and predicted a 66% chance that this population would dip below 200 males in the next 100 years. Core areas between North and South Dakota are connected by general habitat consisting of limited sagebrush habitat. Sage-grouse movements generally occur east and west between the Dakotas's population and Montana. Connectivity between the sub-populations occurs through Montana's portion of the population. The area is heavily influenced by oil and gas development and conversion of native rangeland are a major threat to the persistence of sage-grouse. Over grazing in localized areas has degraded the sagebrush habitat and can reduce nesting success which is positively correlated to grass cover in North Dakota (Herman-Brunson 2007). Overall, this population is small and at high risk.

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Northern Montana

The Northern Montana Population is predominantly in northeast Montana but extends north into southern Saskatchewan and Alberta, making up these provinces' entire sage-grouse populations. Garton et al. 2011 reported a minimum male count for this population at over 2,700 males and projected a very low probability of the population dipping below 200 males in the next 100 years. The southern portion of this area, south of the Milk River, has a high abundance of sage-grouse, has been designated a core area, and is predominately comprised of public land. Land use in this area is livestock grazing with limited dryland farming and irrigated hay production adjacent to creeks and rivers. In general, habitat in this core area is expansive and intact and faces few if any significant threats, particularly on the public lands. Grouse in this core area make up the majority of birds in this population. North of the Milk River, habitats comprise a relatively low density of silver sagebrush and a correspondingly low density of sage-grouse. The sage-grouse habitats in this area include more private lands and, in some portions of this area, have a long history of grain farming and low to moderate densities of natural gas production. A core area was designated in northern Valley County where relatively intact habitats provide for resident grouse as well as a conduit for spring and fall migrating sage-grouse between Saskatchewan and southern Valley County. This core area is adjacent to considerable farming to the east but is itself relatively stable and lacks significant threats. One or more large conservation easements are in place to protect habitat values on key private lands in northern Valley County. Given the extent and limited threats associated with this population, it is considered to be at low risk.

Powder River Basin

Montana includes the extreme northern tip of the Powder River Basin population. Although this makes up a relatively small portion of the population, it may provide genetic connectivity with other Montana populations. Garton et al. 2011 recognized this population in general as having a relatively high probability of dropping below 200 males in the next 100 years. They also reported the minimum male count for 2007 as having just over 3,000 displaying males. Land use in Montana's portion of this population includes a mix of livestock grazing, coal mining, and shallow coal bed natural gas production. Montana identified relatively small but intact habitats that have limited energy development and may serve as remnant habitat for supporting small numbers of sage-grouse into the future. The expanding threat of energy development across this population and corresponding downward population index trends make this a high risk population.

Yellowstone watershed

The Yellowstone Watershed Population is a large population covering an expansive area south of the Missouri River, making up the majority of sage-grouse habitats in southeast and south central Montana. Garton et al. (2011) reported a minimum male count of over 2,900 males. They further projected a 60% chance of this population dipping below 200 males in the next 100 years. Landownership is predominantly private with scattered tracts and blocks of public land. Livestock grazing and small grain farming are common in this area. Oil and gas developments are scattered across portions of this area. Extensive private lands have the potential for conversion of additional sagebrush habitats to farming and various forms of sagebrush

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eradication. Cropland conversion continues to take place in this area. Core areas have been identified both in the western and southeastern portions of this population, where sage-grouse densities are greatest and habitats remain relatively intact. The western and southeastern core areas are separated by about 70 miles of a mix of habitats, including an interstate highway, the Yellowstone river corridor, and a patchwork of cropland intermingled with occupied sage-grouse habitat. Some portion of this space between core areas may be identified as core habitat in the future as connectivity habitats become better understood and defined.

Management Zone 2: Wyoming Basin

The Colorado portion of this management zone appears to adequately capture redundancy and representation in the priority/core areas. Priority habitats represent 61% of the occupied range in Colorado and 84 % of the breeding birds in the state occur within the priority habitat. Being on the edge of the species range the populations within this management zone are somewhat isolated. Linkage zones have been mapped between the Colorado populations. It is assumed the habitat linkages will allow for movement between populations and will decrease the probability of extinction of the subpopulations by stabilizing population dynamics. Connectivity with the Wyoming portion of the management zone and Colorado's priority habitats with Wyoming's Core habitats) maybe adequate in most areas but there may be some areas that need to be addressed specifically in the northwest Colorado area. This management zone represents the highest abundance of sage-grouse relative to other management zones across the sage-grouse's range. Montana's portion of the zone is very small, only including a portion of Carbon County, which is also the northern tip of the Wyoming Basin Population.

Eagle-south Routt Counties

Representation appears to be captured adequately in this population. Priority habitats capture 68% of the occupied range in this population it also includes 100% of all known active leks and all habitat that was modeled "high probability of use" within 4 miles of leks that has been active in the last 10 year. Redundancy is not captured within this population because it is a fairly small (3 year running average number of males is 108) and fairly isolated population. The greatest threat to this population is loss of habitat from subdivision and housing development as well as the associated infrastructure and roads. Pinyon-juniper encroachment has been, and continues to be, a significant threat to the population as well. This population is mostly resilient but due to its fairly small population size (3 year running average number of males is 108) and fairly isolated population it has little lost resiliency. Populations (males only) in the late 1960s were likely in the high 200s. This population is most at risk due to its fairly small population size and fairly isolated population. A stochastic event could greatly affect this population. The greatest threat to this population is loss of habitat from subdivision and housing development as well as the associated infrastructure and roads. Pinyon-juniper encroachment has been, and continues to be, a significant threat to the population as well.

Jackson Hole

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Laramie

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Middle Park

Representation and redundancy appear to be captured adequately. Priority habitats capture 79% of the occupied range in this population and also includes 95% of all known active leks and 95% of habitat that was modeled "high probability of use". Redundancy is captured reasonably well within this population because although it currently has a 3 year running average of males of 210 the priority habitats include most of the known distribution of birds and connectivity to the North Park population has been known to occur. Housing development has the most current and foreseeable threat. Grand County has experienced a high rate of human population growth in recent years. This high growth rate is projected to continue primarily due to its' proximity to major ski resorts and summer recreational activities. Although this is a relatively small population (current 3-year average is 210 males) we do not believe the population has ever been very large. Since the 1970's, the population counts have been roughly between 200 and 325 males. Connectivity to the North Park population has always been somewhat naturally limited over Muddy Pass although we have documented birds moving over the pass.

Wyoming basin

Need a description here for the Wyoming portion of this population.

In the North Park portion of this population, representation and redundancy appear to be captured well. Priority habitats capture 91% of the occupied range in this population and includes 100% of all known active leks and 100% of habitat that was modeled "high probability of use" within 4 miles of a lek that has been active within the last 10 years. Historically no significant threats were apparent to this population. However, there is renewed interest in oil development in NP. In addition, a large portion (29%) of public land in priority habitat has been leased for energy development. NP has overlapping energy and mineral resources and thus could experience natural gas, coalbed methane, and oil extraction. Although present, the other identified threats are less in NP than in other populations. Priority habitat is in fairly good condition, and a large portion of it is on public lands. This is likely Colorado's most resilient population. Long -term data trends (since the early 1970's) indicate this population has fluctuated roughly between 500 and 1,500 males. Priority habitat is in fairly good condition, and a large portion of it is on public lands.

In the northwest Colorado portion of this population, representation and redundancy appear to be captured adequately. Priority habitats capture 56% of the occupied range in this population and also includes 95% of all known active leks and 95% of habitat that was modeled "high probability of use" within 4 miles of a lek that has been active within the last 10 years.. Most of the sub-management zones within this population have some connectivity with other sub-management zones in this population. This is Colorado's largest population. The northern portion is likely to be more resilient than the south eastern portions of this population because of habitat condition and connectivity. There is more habitat fragmentation in the south eastern portion of this population. According to lek count data, the long-term trend appears to be stable,

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but substantial population fluctuations have occurred regularly. Population peaks have occurred in 1960-70, 1978-80, and in the mid-2000s.

The majority of habitat that supports this population in Montana is identified as core area, both because of the relatively high density of sage-grouse in the area and the likely role this area plays connecting Montana's sage-grouse to Wyoming's birds. In Montana, this area is among the driest of sage-grouse habitats and has a higher prevalence of cheat-grass relative to other parts of Montana. Land use includes livestock grazing and a long history of oil limited production. This portion of the Wyoming Basin Population is relatively small but is within 20 miles of another core area in Wyoming.

Management Zone 3: Southern Great Basin

The Oregon portion of this management zone appears to adequately capture redundancy and representation in the priority/core areas. Within the Nevada portion of this MZ, redundancy and representation are adequately captured within the western Great Basin population, but is at risk within the Warm Springs population. Connectivity of the western Great Basin population between the California, Oregon and Nevada portion has been demonstrated through telemetry and genetic investigations.

Northeast interior Utah

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Sanpete-Emery Counties

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South Central Utah

This population is an expansive, and in certain locations, loosely configured population that is entirely withing Utah. Overall the 2011 population of males was estimated to be 1193 and the population was given a ranking of C3. The state of Utah has devided the population into three management units based on their size, status, and management concerns.

The Bald Hills Management Area supported 68 males in 2011 and is important for linkage in this region of Utah. Currently, the leks in this area are constrained by vegetation fragmentation and human development, however future improvements could strengthen this area's connection to the rest of this population and potential westward to the Hamlin Valley Management Area of the Southern Great Basin population. Key threats include wildfire, enhanced native predator populations, vegetation management (conflicting or lack of), and energy development.

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The Panguitch Management Area supported 304 males in 2011 on more than a dozen leks. These leks are distributed north-south in a series of linked valleys and benches, and constrained by mountains and canyons. Movement of sage-grouse from one valley or bench to another among seasons is necessary to meet their seasonal habitat requirements in the highly variable annual weather conditions of this region. This management area has the highest potential for increase of any in Utah in response to habitat treatments to remove pinyon-juniper that has extensively impacted habitat quantity and quality. Key threats are enhanced native predator populations, vegetation management (conflicting or lack of), energy development, and residential/commercial development.

The Greater Parker Mountain Sage-grouse Management Area is an area supporting 821 males in 2011 that is located on the Awapa Plateau. This area was refined based on 15 years of greater sage-grouse radio telemetry studies which included research on species vital rates, survival, and seasonal movements. Because of these long term research studies, more is known about the Parker Mountain Sage-grouse population dynamics, seasonal habitat use, population threats, and abatement strategies than other populations in Utah. Key threats include; 1) loss or degradation of habitat (primarily due to vegetation succession), 2) conversion of habitat (sagebrush to Pinyon and Juniper or cheat grass at the lower elevations), 3) increased risk of predation because of expanding or changes in the native predator community in response to anthropogenic factors, and 4) habitat fragmentation from loss or degradation of habitat that results in a loss of habitat connectivity in Sage-grouse habitat areas.

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Summit Morgan Counties

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Toole-Juab Counties

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Southern Great Basin

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Northwest interior Nevada

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Quinn Canyon Range

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Management Zone 4: Snake River Plains

At the management zone scale, redundancy and representation is well captured by the priority/core areas. This population represents one of the largest areas of connectivity, as demonstrated by Knick et al. (2011), and supports the largest population of sage-grouse outside of the Wyoming Basin (Garton et al. 2011). The Snake River Plain management zone includes sage-grouse populations in Oregon, Idaho, Nevada, Utah and Montana. Many of these populations are small and found in SW Montana and in Idaho. Two Snake River Plain populations occur in Oregon, the Baker and the Northern Great Basin. The Baker population is entirely within the state's border and while the large Northern Great Basin population is shared with southern Idaho, NE Nevada, and NW Utah. Both of the populations that occur in all or part of Oregon had sufficient information for assessment by Garton et al. (2011).

The Greater Sage-grouse Conservation Assessment and Strategy for Oregon, adopted in 2011 identified core (priority) areas for sage-grouse in the Baker and Northern Great Basin populations. In the entire state, including populations in the Management Zone V (MZV), 6.57 million acres of Core area were identified. The Core area represents about 36.5% of the known sage-grouse distribution in Oregon. The delineation of Core Areas were based on the existing breeding density, connectivity based on expected movements (16 km), and known wintering areas. The exterior boundaries of the Core Areas were adjusted to remove non-habitat and incorporate additional priority habitats adjacent to existing Core Areas.

Within Idaho, there are five identified populations in Management Zone 4, which exists mostly in Idaho but includes a large part northeastern Nevada and eastern Oregon. Three of these populations, Weiser, Sawtooth, and East-central Idaho, are relatively small and isolated but were identified by Garton et al. 2011. The remaining two populations, Northern Great Basin and Snake-Salmon-Beaverhead are relatively extensive but separated by the Snake River and a large belt of agricultural land. These two areas likely are large enough to support current populations. The Idaho Governor's Sage-Grouse Task Force recently characterized sage-grouse habitat by four individual Conservation Areas ("CA") across the state: two north (Mountain Valleys, Desert) and two south (Southwest, Southeast) of the Snake River. Each Conservation Area was then divided into Core, Important, and General Management Zones ("MZs") based upon modeling of sage-grouse breeding bird density, BLM's modeling of habitat connectivity and persistence, scientific on-the-ground knowledge, and the recommendations of the Task Force. Although wildfire, infrastructure, and invasive species pose threats for sage-grouse in all CAs, wildfire and invasive species tend to be a greater issue in the Desert and Southwest CAs than in the Mountain Valley or Southeast CAs. Additionally, sage-grouse habitats in the Desert and Southwest CAs are relatively contiguous, while those in the Mountain Valley and Southeast CAs tend to be more fragmented.

The concepts of redundancy, resistance, and representation within the management zone were not discussed or specifically considered when developing state conservation areas or management zones. However, these areas were designated based on best available data on sage-

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grouse habitats and populations. The three small populations in this management zone may not be viable over the long-term because of isolation and small population size. Thus, it is unlikely that the three small Idaho populations in this zone are resilient to threats and/or disturbances.

Garton et al. (2011) suggested the occurrence of 5 separate sage-grouse populations in southwest Montana. However, radio telemetry studies involving 4 of these populations within the intermountain valleys surrounding Dillon (in southwestern Montana) have been found to commonly intermingle, operating as one population. We therefore treat these 4 entities as one population—the Southwest Montana Population. Consistent with Garton et al. (2011), the Belt Mountains Population is recognized as a population unit in this review.

Baker

Priority habitats adequately represent this population because they have essentially mapped all of this population as priority habitat. However, we do not recommend removing portions of this area from priority habitat because these areas are needed for long-term conservation of this population. The landscape in the areas is more similar to extirpated sites than extant ones. There is no redundancy in this population as everything occurs in one general area.

Baker is more at risk. They are probably less resilient since their connectivity to other populations appears limited (future genetics work will help clarify this). Also, the quality of habitat is more similar to extirpated populations than extant ones. Finally, much of this population occurs on private lands where there are limited regulatory mechanisms, making it uncertain as to whether state-recommended conservation measures and practices will be applied on the majority of lands within this population.

The Baker population has approximately the same distribution as the area covered by the Baker administrative unit identified in Oregon's Sage-grouse Conservation Strategy. The Baker spring population was estimated to be 872 -1,650 birds in 2010 (Hagen 2011), the smallest extant population in Oregon. Garton et al. (2011) based their Baker population assessment on minimum estimate of 137 birds in 2007 and estimated a 61.9% chance there will be fewer than 50 birds in the population by the year 2037, similarly, there is 66.8% chance of fewer than 50 birds by 2137. ODFW lek counts indicated more than 300 males (or 750 birds if applying the Garton et al. (2011) 2.5 sex ratio) in Baker County in 2011. Since systematic counts began in 1989, the number of counted males/lek has remained relatively stable (Hagen 2011). Due to habitat and topography it has been assumed the Baker population has little connectivity with other sage-grouse populations. Recent telemetry information suggests that at least some birds move from the Weiser population in Idaho to Baker County, and Baker population birds move to the Weiser population.

More than 80% of the historic habitat for the Baker Population remains available today but steeper habitat and rugged topography reduces the suitability for sage-grouse. Nearly 300,000 acres in this region were identified as Core Area, and includes much of the current range of the Baker population. Most (68%) of the sage-grouse habitat for the Baker population is in private ownership and 31% is administered by BLM (Hagen 2011). This is the largest proportion of privately managed sage-grouse habitat for any population in Oregon. Principal threats to this population include renewable energy development (primarily wind), transmission, invasive

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weeds, OHV recreation, and juniper encroachment. Recently, thousands of acres of juniper have been treated in this region to benefit sage-grouse and other sagebrush obligates.

Southwest Montana (Bannack, Wisdom, Red Rocks, and Bridges)

The Southwest Montana Population occurs in Beaverhead and Madison Counties, within a 60 mile radius of Dillon, MT. Segments of this population also make seasonal migrations into Idaho. Garton et al. 2011 analyzed the Southwest Montana Population as 4 separate smaller populations, which biased the results of their analysis, suggesting a high probability of each population dropping below 200 males. Telemetry data, however, has demonstrated considerable intermingling between each of these lek complexes, clarifying that these birds represent a single population (and could be more accurately described as 4 sub-populations). Core habitats encompass about 80% of the habitat associated with the Southwest Montana Population. These core areas were identified because of the relatively high density of sage-grouse and the genetic conduit this area provides with Idaho's birds. Habitat threats are generally limited to improper grazing management, isolated sagebrush control efforts, and expansion of conifers into sage-grouse habitat in localized instances. Habitat conversion on the Idaho side of this Management Zone may also affect this population, but to a lesser extent. Both the Centennial and Big Hole valleys are focus areas for native habitat conservation for grayling, sage-grouse and other wildlife, resulting in considerable acreage enrolled in long term and perpetual conservation agreements with private landowners. Given this population's size, limited habitat threats, and ties to Idaho's birds, the Southwest Montana population is characterized as being at a low level of risk.

East central Idaho

Areas within the East Idaho Uplands in the Blackfoot River drainage downstream from Blackfoot Reservoir have historically provided popular sites for greater sage-grouse hunters. The area is generally characterized by a high proportion of private and state land and a local working group has been actively pursuing conservation measures. Nevertheless little information is available on sage-grouse populations other than some limited location and attendance data on a few leks. No lek routes have been established within this area that would allow consistent monitoring of sage-grouse populations. This lack of data is largely due to very difficult access in most years during winter and spring. Analysis of limited data by Garton et al. (2011) suggests that this population has a low probability of persistence. Although causal observation and some historic data suggest the study area provides adequate breeding and nesting habitat, sage-grouse numbers appear to be very low. Initial summer surveys in 2011 suggested sage-grouse were reasonably widespread throughout the area. However, given the apparent overall quality of the habitat, sage-grouse numbers seem surprisingly low and difficult to explain. Factors that could act to reduce sage-grouse populations in this area include sagebrush treatments in breeding habitat, West Nile virus, and loss or fragmentation of winter range.

Snake-Salmon-Beaverhead

Recent data indicates this large population extends into southwestern Montana. This area contains a large amount of publicly managed land (largely BLM and USFS). Within the southern portion of this population, wildfires and invasive species have continued to reduce the

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quality of habitat. The mountain Valley portions of this population appear to have relatively stable habitats. A recent rate of change analysis indicates this population has been stable to increasing from 2007 to 2010. Garton et al. (2011) indicated that this population had virtually no chance of declining below 500 in the next 100 years. Population analysis indicates that sage-grouse fluctuated around 5000 males since 1992.

Sawtooth

This small population in central Idaho did not have sufficient data to allow analysis by Garton et al. (2011). No occupied leks are known to exist at this time. This area is largely encompassed by the Sawtooth National Recreation Area and includes a high proportion of public land. This population declined to 1 male on 1 lek in 1986 and was subsequently increased by translocation during the mid-1980s.

Belt Mountains

This population occurs within a broad intermountain valley that extends roughly from White Sulfur Springs south toward Livingston, within Meagher and Park Counties. This population experienced considerable habitat conversion to small grain cropping in the late 1960s through the 1980s, involving at least one key sage-grouse wintering area (Swenson et al. 1987). Ironically, some of these croplands have since been enrolled into CRP but natural sagebrush recovery appears minimal. Garton et al. (2011) were unable to develop any population predictions due to a lack of sufficient data. This population is at least 50 miles distant from the nearest adjacent population. Timbered and mountainous terrain and expansive non-habitat provide barriers further isolating this population in nearly every direction. Sagebrush control projects, primarily using herbicides, and conversion to cropland have continued to affect portions of the remaining habitat during the past 20 years. More recently, isolated housing developments and limited drilling for oil and/or gas resources have impacted a relatively small portion of remaining sagebrush grassland habitats in this area. The small population size, isolation from other populations, and a history of significant habitat perturbations, some of which continue but perhaps at a slower rate, characterizes this population as high risk.

Weiser

This small population in western Idaho did not have sufficient data to allow analysis by Garton et al. (2011). However, 2010 data indicated the area had 14 occupied leks. Recently some connection with the Baker, OR population has been documented. The area is generally characterized by a high proportion of private land and a local working group has been actively pursuing conservation measures.

Northern Great Basin

Redundancy and representation appear to be captured adequately from an Oregon perspective. In Oregon, priority habitats capture 95% of all known breeding locations, 98% of known wintering locations (which was expected since this was based on telemetry data) and 89% of known summer locations. Priority habitat and low density habitat combined capture all but 3% of known summer, 1% of known breeding, and 1% of known wintering habitat. We do have a question about why the Knick connectivity map is so different from the priority map in the

Oregon portion of this population. Oregon priority mapping took connectivity into account so we would expect these to be more similar.

The Nevada portion of the Northern Great Basin population represents the largest, most contiguous sage-grouse population in Nevada and includes the Santa Rosa, Desert, Tuscarora, North Fork, O'Neil Basin, Islands, Snake and Gollaher Population Management Units. Redundancy and representation is captured by the current designation of priority habitat areas. Portions of this population are well connected with Oregon, Idaho and Utah.

The Oregon portion of the Northern Great Basin is demonstrating some resiliency. There have been several large fires, numerous smaller fires, and some (quantify?) habitat conversion from the Vale project. Populations, even in some of the areas that were converted, appear to be coming back – although they do not have the numbers they previously had. This is the second healthiest population in Oregon.

As in Oregon, the northern Great Basin population in Nevada is demonstrating at least some resiliency. Rehabilitation efforts and the higher elevation/higher precipitation zones of som of several recent wildfires have led to expedited habitat recovery that is once again being utilized by sage-grouse. Winter habitat for subpopulations has been compromised although recent winter snowpack has been below average, allowing birds to utilize an expanded area. Concern remains over the Gollaher and Tuscarora PMUs as these areas have been prone to wildfire and are more susceptible to invasive species such as cheatgrass.

As mentioned above, there are portions of the northern Great Basin population that are at risk, particularly the Tuscarora and Gollaher PMUs. Portions of these areas are lower in elevation and precipitation received and have either experienced conversion to monotypic cheatgrass landscapes or are at risk. In many instances, these areas were historic or are Wyoming big sagebrush habitats.

Oregon represents the western part of this large population which is shared with Southern Idaho, NE Nevada, and NW Utah. Within Oregon, this represents one of the largest populations. The delineation of the Northern Great Basin population doesn't correspond well to any existing assessment for Oregon, but does include almost all of the Vale administrative unit, as well as portions of the Burns administrative unit. In just Oregon, the spring population in the Northern Great Basin is likely several thousand birds, with 2011 spring lek counts approaching 3,000 males (or 7,500 birds if applying the Garton et al. (2011) 2.5 sex ratio) in the Beulah, Malheur River, Owyhee, and eastern portion of White River Wildlife Management Units. Garton et al. (2011) estimated for the Northern Great Basin a minimum population estimate of 9,114 birds in 2007 (includes S. ID, NE NV, NW UT). Modeling suggested there is a 2.5% chance birds will drop below 500 by the year 2037, but a 99.7% chance the population will be below 500 by 2137 (Garton et al. 2011).

Historically this population was likely much larger in Oregon, but extensive sagebrush removal programs occurred during the 1960's and large fires in more recent times have reduced the available sage-grouse habitat. Some the treatments of the 1960's are beginning to be recolonized by sagebrush and should assist with maintaining local populations in the future. Fire remains a threat and is often followed by non-native annual grasses and other invasives which increase the

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probability of frequent fire. Other threats in this region include mining development, renewable energy development, transmission, and juniper encroachment at higher elevations. WNv has also been consistently detected in mosquitoes in this region and the population was subjected to the largest known WNv mortality event involving sage-grouse in Oregon (2006).

This large population extends into northeastern Nevada, northwestern Utah, and eastern Oregon. This area contains a large amount of publicly managed land (largely BLM). Despite efforts to manage wildfire risks, wildfires and invasive species have continued to reduce the quality of habitat in portions of this area. The Murphy fire complex recently affected roughly 600,000 acres of habitat for this population. A recent rate of change analysis indicated that at least part of this large population (based in Idaho) has been stable to increasing from 2007-2010. Garton et al. (2011) indicated that this population had virtually no chance of declining below 50 in 30 or 100 years. Population analysis indicated that sage-grouse will fluctuate around a carrying capacity that will decline from an estimated 6,770 males in 2007 to 1787 males in 2037 if current trends continue (Garton et al. 2011).

Management Zone 5: Northern Great Basin

There are four sage-grouse populations identified in this management zone, one of which (Central Oregon) is entirely within Oregon. Two populations (Western Great Basin, Klamath) are shared with Nevada and/or California, while the Warm Springs Valley population occurs entirely within Nevada. Only two of the populations (Central Oregon and Western Great Basin) had sufficient information for a population assessment by Garton et al. (2011).

The Greater Sage-grouse Conservation Assessment and Strategy for Oregon, adopted in 2011 identified Core (priority) Areas for sage-grouse in the Central Oregon and Western Great Basin populations. In the entire state, including populations in the Management Zone IV (MZIV), 6.57 million acres of Core Area were identified. The Core Area represents about 36.5% of the known sage-grouse distribution in Oregon. The delineation of Core Areas were based on the existing breeding density, connectivity based on expected movements (16 km), and known wintering areas. The exterior boundaries of Core Areas were adjusted to remove non-habitat and incorporate additional priority habitats adjacent to existing Core Areas. Core Areas were not identified for sage-grouse in the Klamath population which are believed extirpated in Oregon, with the last confirmed observation in Oregon in 1993 (Hagen 2011).

Multiple Core Areas were identified within each of the Central Oregon and Western Great Basin populations in Oregon. Core Area maps will help in the siting of large-scale industrial developments, recognizing that siting such developments in Core Areas will likely be more of a challenge to avoid impacts to sage-grouse habitats. Generally, the recommendation is to avoid impacts to sage-grouse habitat in Core Areas and to mitigate at a no net loss with a net benefit for impacts to sage-grouse in non-Core Area habitat. The Greater Sage-grouse Conservation Assessment and Strategy for Oregon includes voluntary conservation guidelines that are designed to maintain or enhance the quality of sage-grouse habitat in Oregon, and are applicable to all sage-grouse habitat (Hagen 2011). If the prescribed conservation guidelines are followed and the existing sage-grouse habitat is protected and enhanced it is expected these areas will provide the necessary representation and redundancy for these populations to persist into the foreseeable future.

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Central Oregon

This population appears to have lost, or is rapidly losing its overall resiliency. Resiliency depends in part on the timeframe of our analysis. Based on Garton et al.'s SAB chapter, this population appears fairly resilient in 30 years, but not in 100 years. Also, the landscape's characteristics in this population are more similar to landscapes that exist where there are extirpated populations of birds than landscapes with extant populations.

Redundancy and representation appear to be captured adequately. In Oregon, priority habitats capture 95% of all known breeding locations, 98% of known wintering locations (which was expected since this was based on telemetry data) and 89% of known summer locations. Priority habitat and low density habitat combined capture all but 3% of known summer, 1% of known breeding, and 1% of known wintering habitat. Most of the sites within this population (with the possible exception of the southwestern site) probably have some connectivity with other sites in this population, though we do not currently have a robust genetics study to verify that. Although a lot of the known habitat is mapped, we do not recommend removing any of these habitats from the priority mapping. Since this populations' habitat/landscape appears more similar to landscapes in extirpated populations than extant populations, we do not feel we can lose any of the priority habitats within this populations.

The Central Oregon population has approximately the same distribution as the area covered by the Prineville administrative unit identified in Oregon's Sage-grouse Conservation Strategy. Approximately 700,000 acres of habitat for the Central Oregon population has been identified as Core Area. This is a relatively large population, with the minimum spring population estimated at 1,775-2,084 birds in 2010 (Hagen 2011). The population has declined steadily since 1980 (average, -0.004%/yr [Hagen 2011]). There is a 15.2% chance the population will decline below 500 by 2037, and a 91.3% chance that fewer than 500 birds will be in the population by 2137 (Garton et al. 2011).

It is estimated to have only 53% of historic sage-brush habitat, having lost more historic habitat than any other sage-grouse administrative unit in Oregon. The area also has more privately owned sage-grouse habitat (48%) than other management zone populations in Oregon. This population faces a wide suite of threats, including juniper encroachment, renewable energy development (both wind and geothermal), transmission, roads, OHV recreation, and residential development. Projections based on historic trends suggest this population is at risk, but in the last 2 years there have been a number of positive developments including thousands of acres of habitat improvement under the NRCS's Sage-grouse Initiative and increasing local interest sage-grouse conservation.

Klamath

There is no priority habitat mapped in this population for Oregon because we have not documented birds there recently. Klamath, at least in Oregon has lost its resiliency as there are no documented birds there. From an Oregon perspective, Klamath is most at risk, followed by Central and then the Western Great Basin. Since we are not familiar with the status of the smaller NV population within this MZ, but suspect this may fall between Klamath and Central populations.

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Sage-grouse in the Oregon part of the Klamath population are thought to be extirpated. As recently as the early 1990's, a few birds attended leks in Oregon, but there have been no confirmed sightings since 1993 despite periodic survey efforts. A few birds exist on the California side, particularly in the vicinity of Clear Lake National Wildlife Refuge. Oregon has permitted the trapping of birds from the Western Great Basin population to augment the population around Clear Lake.

The Klamath Population in Oregon likely had limited connection with sage-grouse populations to the east due to barriers of unsuitable habitat and was likely an extension of the population in NE California. Habitat in Oregon was severely compromised by juniper encroachment. Significant juniper treatments have taken place in the former Oregon range, particularly by BLM, and there is potential of limited habitat for sage-grouse in the future. Juniper encroachment, and invasive weeds, have also compromised the habitat it in California. Large treatments of juniper have been conducted on the Clear Lake NWR and in the vicinity in hopes of expanding suitable habitat in that area.

The Klamath population is all that remains from a population that once extended throughout the Devil's Garden Area of California, which had at least 46 known leks as recently as the 1970s, and was well connected to populations in Oregon and the Western Great Basin. By the early 2000s, only one known lek remained on the Clear Lake National Wildlife Refuge, with less than 10 males. Since 2005, birds have been translocated from Oregon and Nevada to prevent extirpation. A small amount of priority habitat is mapped for the area, but not connected to the Western Great Basin or Central Oregon populations. Redundancy is not adequate and resistence is poor. This population would be at immediate risk of extinction with supplementation. There is no priority habitat mapped in this population for Oregon because we have not documented birds there recently.

Warm Springs Valley

This is a small population that exists in southern Washoe County within the Virginia Population Management Unit. Only two confirmed active leks comprise this population; however, lek size is relatively large (avg. >40). The identified priority habitat encompasses the majority of use areas. Extensive research has been conducted within this particular PMU. Some individuals have dispersed to the southern portion of the western Great Basin population during the winter, so there is the possibility of genetic interchange. There is an indication of this within work conducted by Oyler-McCance suggesting a relationship with the Lassen population in California. Representation and redundancy are at risk within this population due to its small size, proximity to urbanized setting and threats from invasive species.

The Warm Springs population in southern Washoe County may be close to a threshold if additional threats occur. This population is very near to urbanization, has experienced large wildfire and energy development in the form of a utility scale transmission line (345kV Alturas line) and water transfer pipeline (Vidler Water), and is experiencing some pinyon and juniper encroachment. However, the core use area of the population (Spanish Flat) remains intact and benefits from higher elevation precipitation regimes.

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Western Great Basin

Redundancy and representation appear to be captured adequately in the Oregon portion of this population based on the fact that priority habitats include most of the known distribution of birds (see rationale in Central above). The Nevada portion of this population includes the Buffalo/Skedaddle, Massacre, Vya, Sheldon, Black Rock, Pine Forest and Lone Willow Population Management Units. Currently identified priority habitat encompasses an area greater than the 85% core breeding density as reconstructed by the Nevada Department of Wildlife using methods described by Doherty et al. (2010), but utilizing the 10-year average for lek attendance rather than the most recent peak. Redundancy and representation are adequately captured both within the Nevada portion of this population and certainly within the Western Great Basin population as identified by Garton et al. (2011).

Over 8 analysis periods conducted by Garton et al. (2011), average rates of change were <1.0 in 3 of those periods and the minimum population estimate was determined to be 5,904 males in 2007 based on counts at 393 leks. Garton et al. indicates that this population has a 0% chance of declining below Ne=500 within the next 30 years. From an Oregon perspective, is the most robust population in Oregon and therefore is the most resilient. We still have healthy sage-grouse populations in the Pueblos, Steens, Hart Mountain, and Trout Creek areas.

Within the Nevada portion of the western Great Basin, populations are experiencing a slight increase. When considering habitat characteristics, populations appear to be most stable within the Lone Willow, Sheldon, Black Rock and Vya Population Management Units if no further threats are realized. Klamath is most at risk, followed by Central and then the Western Great Basin. Since we are not familiar with the status of the smaller NV population within this MZ, but suspect this may fall between Klamath and Central populations.

Within the Nevada portion of the western Great Basin population, the Lone Willow population (connected with Oregon) faces threats from lithium and uranium exploration and extraction. Both the Massacre and Buffalo/Skedaddle PMUs face high risk due to invasive species being pervasive within the understory of lower elevation sagebrush communities. Improper livestock grazing practices and wild horse utilization has caused severe habitat degradation in some instances, especially with respect to meadow, spring and riparian habitats.

Oregon shares the Western Great Basin Population with NE California and NW Nevada. Oregon's portion of the population has some of the best habitat and highest sage-grouse densities in the state, including Hart Mountain National Antelope Refuge and Trout Creek Mountains. The delineation of the Western Great Basin population doesn't correspond well to any existing assessment for Oregon, but does include almost all of the Lakeview administrative unit, as well as portions of the Burns and Vale administrative units. In just Oregon, the spring population in the Western Great Basin likely exceeded 10,000 birds in 2010 (interpolation from Hagen 2011). Garton et al. (2011) estimated for the Western Great Basin a minimum population estimate of 5,904 birds in 2007 (includes NE CA, NW NV). Modeling suggested there is a 6.4% chance birds will drop below 500 by the year 2037, but a 99.1% chance the population will be below 500 by 2137 (Garton et al. 2011).

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In the Oregon portion of the Western Great Basin, >80% of the historical sage-grouse habitat remains intact, and most of the habitat is in public ownership (Hagen 2011). In the Lakeview administration unit, which comprises most of the Western Great Population in Oregon, about 78% of the region is administered by the BLM and the USFWS manages more than 278,000 acres. Invasive weeds and juniper encroachment (particularly on the western edge) represent some of the greatest risks to this population. Renewable energy development (wind and geothermal) and fire also represent risks to the Oregon portion of the population. Feral horses have been identified as a threat to sage-grouse habitat in portions (e.g., Steens, Dry Valley/Jack Mountain Action Areas) of the Western Great Basin. Given the majority of this population occupies federal land, proper and proactive habitat management could ensure the persistence of this sage-grouse population well into the future.

The California portion of the Western Great Basin includes the majority of the Buffalo-Skedaddle Population Management Unit. Priority habitat in California includes 100% of known sage-grouse distribution. This population was part of a much larger population that was connected to the Klamath population into the 1970's. Habitat degradation, including juniper expansion and spread of exotic grasses have been extraordinary in this region. The extant population is well connected and adequately captures redundancy, but further losses would jeopardize the long term existence of sage-grouse in California. Recent population trends have shown consistent increases, demonstrating that the population exhibits positive growth rates during years of favorable environmental conditions. Habitat suitability is low in much of the currently occupied habitat and habitat conditions need to be improved to increase resistance of this population.

Over 8 analysis periods conducted by Garton et al. (2011), average rates of change in the Western Great Basin were <1.0 in 3 of those periods and the minimum population estimate was determined to be 5,904 males in 2007 based on counts at 393 leks. Garton et al. indicates that this population has a 0% chance of declining below Ne=500 within the next 30 years.

The Western Great Basin is most resilient in MZ5, but reducing threats alone is not likely to ensure long-term persistence in some areas. Resiliency needs to be improved in the California portion of the Western Great Basin with increased habitat suitability in terms of shrub densities and native grasses and forbs.

Management Zone 6: Columbia Basin

There are four identified populations in Management Zone 6, which exists mostly in Washington State. Two of these populations, Moses Coulee and Yakima Training Center, are extant populations that were identified and assessed by Garton et al. 2012. The additional populations are Crab Creek and Yakama Nation, both of which were addressed with the aid of translocated individuals. The priority areas likely are large enough to support the current populations and the recovery areas encourage the expansion needed to improve the overall viability. The small size of existing populations and lack of current viability in this management zone means that current management direction (target toward recovery rather than maintenance) is different than in other management zones.

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The priority areas within this management zone capture redundancy and representation within the management zone, assuming that the protections and management prescriptions area adequate within priority/core areas and they are adhered to. The priority areas were specifically chosen to protect the identified populations. However, because the populations in this management zone are not believed to be viable at this time, the area of protection is larger and designed to include recovery areas which are needed to support a larger, more connected, and hopefully viable population in the future. Based on population viability, it is unlikely that any of the populations in this zone are resilient to 'threats' and/or 'disturbances'. The order of descending risk is Yakama Nation, Crab Creek, Yakima Training Center, and Moses Coulee.

Moses Coulee

The Moses Coulee population has been maintaining its number for the last 30 years, largely due to the support of farm programs. However, the lower risk of Moses Coulee does not mean that the population is at no risk. In 2007, 230 males were counted in this population (Garton et al. 2012); they estimated an 88% probability that the population would dip below 200 males by the year 2037 or close to a 100% probability that the population would dip below 200 males by the year 2107. The estimated a 62% probability that the population would dip below 20 males by 2107. Despite these dire concerns, the Moses Coulee population of males was estimated to be about 350 in 2012 (Schroeder et al. 2011).

Major issues in Moses Coulee is the lack of habitat stability due to the abundant private land, habitat fragmentation, and dependence on farm programs. There is public land managed by the Washington Department of Fish and Wildlife, Bureau of Land Management, Washington and Department of Natural Resources, but the public land is relatively sparse compared to the quantity of private land (Stinson et al. 2004). The abundance of private land adds to the management uncertainty. Because of relatively large amounts of enrollment in CRP (Conservation Reserve Program) and SAFE (State Acres for Wildlife Enhancement), there is a great deal of support for sage-grouse in the Moses Coulee area at least for the next decade. Even so, the high degree of fragmentation and 'subsidized' predators (subsidized with road kill, orchards, and nesting and perching structures) increases the overall predation rate.

Yakama Nation

The Yakama Nation population is extremely small with extremely low viability, if any. The area was historically occupied, but the extinction of the endemic population was not precisely documented (Schroeder et al. 2000). During 2006-2008 sage-grouse were translocated to the Yakama Nation in an attempt to re-establish a population. Although it is still to early to evaluate success, the results are not promising at this state. The Yakama Nation faces many threats to their sage-grouse population including poor habitat quality, small population size, lack of connectivity with existing populations, and wild horses. The wild horse population is severe in portions of the Yakama Nation. It is not clear if the Yakama will be able to aggressively deal with the horse issue. On the positive side, the land is owned by the Yakama Nation and the strictly control access. Consequently, they have a great deal of management control as well as interested in recovering a population of sage-grouse on their land.

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Crab Creek

The Crab Creek was occupied by sage-grouse until the mid-1980s (Schroeder et al. 2000). By the mid-1990s the Washington Department of Wildlife and the Bureau of Land Management had acquired and/or consolidated approximately 50,000 acres in the Crab Creek area. Because sage-grouse were a priority for management on many of these acres and management direction was altered in favor of sage-grouse, it was believed that this area could once again support sage-grouse. Translocations were initiated in 2008 (Schroeder et al. 2011). In 2012, the number of males counted on a single lek was 13. Based on survival and productivity, the potential for this population appears promising. However, it is still too early to determine if the re-establishment effort was successful. The primary risk factors for this population include its small size, habitat fragmentation, and the risk of losing acres formerly enrolled in farm programs (CRP and SAFE).

Yakima Training Center

The second most resilient population in this zone is the Yakima Training Center population which is much smaller than Moses Coulee, but is almost entirely public land. Long-term viability is anything but certain. In 2007, 85 males were counted in this population (Garton et al. 2012); they estimated a 26% probability that the population would dip below 20 males by the year 2037 or 50% probability that the population would dip below 20 males by 2107. The number of males counted in 2011 was 72 (Schroeder et al. 2011). The use of the Yakima Training Center for military training activities and the risk of fire have reduced the overall suitability of the habitat supporting this population. A substantial amount of the sage-grouse habitat on the area has been harmed directly and indirectly military training activities, particularly due to wildfires. Despite efforts to manage wildfire risks, wildfires have continued to reduce the quality of habitat in the population. Other key factors in this population are two interstate highways (I 82 and I 90) which border the population on north and west side, powerlines which border the population on the north, west, and south sides, the Columbia River Valley which is natural but reduces movement on the east side, and wind development on the north side. The cumulative effect of these factors is that the population is constricted with little opportunity for expansion. On the positive side, the population occupies and area dominated by public land.

Management Zone 7: Colorado Plateau

The priority areas in the MWR and PPR populations (the only 2 populations in this MZ) capture redundancy and representation as best as can be accomplished. Priority habitats are well mapped and include all high probability of use habitat (which includes breeding, summer, and winter habitat within 4 iles of all known leks) and linkage zones to closest MZ 2 to the north. There is no known connectivity with UT (MZ3 to the west) due to natural habitat fragmentation and large areas of non-habitat.

Piceance Basin

Piceance Basin (Parachute-Piceance-Roan [PPR]): - Within the PPR population, representation appears to be captured adequately. Priority habitats capture 60% of the occupied range in this population and also includes 100% of all known active leks and all habitat that was modeled

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"high probability of use" within 4 miles of a lek that has been active in the last 10 year. Redundancy is not captured within this population because it is a fairly small (3 year running average number of males is 93) and somewhat isolated population. This population is on the very southern edge of the species range. There is some potential for connectivity to the north to the Wyoming Basin. Linkage habitats have been included in our mapping efforts. Representation and redundancy are at risk within this population due to its small size, energy development and the associated infrastructure, especially road development. Piñon-juniper encroachment is also an issue. The Parachute-Piceance-Roan population appears to have some resiliency. The population has been monitored since 2005 and appears to be fluctuating similar to other larger populations in the state. A large majority of priority habitat is privately owned mostly by energy companies. Energy and Mineral Development is the highest ranked threat to GrSG in PPR. Advances in drilling technology and rapid natural gas demand and subsequent rising prices have led to a significant increase in natural gas drilling activity in the PPR. Road and Infrastructure are also ranked high as they are related/interrelated with energy production. Historic habitat has been lost and fragmented also by PJ encroachment.

White River Utah

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East Tavaputs Plateau

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White River Colorado

There is no redundancy and little representation in the MWR population (3-year running average high male count is 6 birds). Priority habitats capture 27% of the occupied range in this population and includes the only known active lek. All habitat modeled "high probability of use" and within 4 miles of any lek (active in the last 10 years) is within priority habitat. Representation and redundancy are at risk within this population due to its small size, proximity to an urbanized setting and, thus, housing development and associated infrastructure and agriculture conversion. This is a very small population located near the town of Meeker and consists of only 1 active lek that was discovered in 2004, and strutting male counts have been on a steady decline since (e.g., from a high of 30 males in 2004 to 6 males in 2012). Most of the occupied habitat is privately owned (90%) and is in 2 disconnected patches of habitat, separated by the White River. One of the patches remains unfragmented. The other patch is located where housing development will primarily occur. Meeker White River has lost resiliency. The population has been monitored since 2004 and the population has been in a steady decline from 30 males to the current 6 males. Housing development is increasing mainly due to energy development in nearby counties. A large part of the habitat was converted to agriculture in the 1960's, which was a primary reason why the population went into decline. Current issue is that some of the lands in pasture and CRP land may now be converted back to crop lands.

Garfield

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Bi-State DPS

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North Mono Lake

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South Mono Lake

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Pine Nut

Need a description here.

White Mountains

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Utah

Sage Grouse Management

Greater Sage-grouse in Utah exist in the Snake River Plain, Southern Great Basin, and the Wyoming Basin Management Zones, as those zones were defined by the Western Association of Fish and Wildlife Agencies in 2006. Habitat for the bird in Utah is found in larger sized blocks, mostly contiguous to extensive populations centered in Wyoming, Nevada and Southern Idaho, and in discontinuous segments separated by non-habitat areas formed by natural features (canyons, wildfire burns) and by areas of anthropogenic influence (agriculture, urban areas) found in Central Utah.

Twelve Management Areas are currently proposed for management of the sage-grouse in Utah. These Management Areas are based on local habitat and land use patterns, and will be the focus of the intensive efforts made by the state and local governments to maintain and increase bird populations over time. Each Management Area contains habitat, non-habitat, and areas for improvement – denominated opportunity areas. These Management Areas were created based largely upon the work of previously established Local Area Working Groups (LAWGs) which have been assessing and monitoring the situation in each of the areas since about 2004, with one as early as 1996. These LAWGs also propose and implement habitat treatment projects, subject to funding. The LWAGs will continue to play a major role in management of the bird into the future, subject to state oversight.

The Box Elder Management Area is in the Northern Great Basin Management Zone, and is essentially an extension of the larger population found in Northern Nevada and Southern Idaho. The Ibapah and Hamlin Valley Management Areas are in the Southern Great Basin Management Zone, and are essentially extensions of the larger populations found in eastern Nevada. The Ibapah Management Area includes habitat found on Goshute tribal lands. The Rich-Morgan-Summit Management Area is in the Wyoming Basin Management Zone, and mostly represents extensions of larger populations in Wyoming. The Sheeprock Mountains and Bald Hills Management Areas are within the Southern Great Basin Management Zone, and generally are composed of topography and geomorphic features similar to the rest of the Great Basin in Nevada. The Panguitch, Greater Parker Mountain, Emery, Carbon and Strawberry Valley Management Areas are listed as part of the Southern Great Basin Management Zone, but are located in geomorphological areas more properly aligned with the Colorado Plateau, and present management challenges in line with the deeply incised canyon and plateau/mesa topography of the Plateau. The Uintah Management Area is within the Wyoming Basin Management Zone, and is connected to the larger populations in Wyoming and Northwestern Colorado.

Although not completely connected, the Bald Hills, Panguitch, Greater Parker Mountain, Emery, Carbon, and Strawberry Management Areas provide a linkage or corridor between larger populations to the east and west.

These populations are located throughout northern and central Utah, and represent sufficient populations to establish redundancy of populations, and representation of birds in different morphological and environments.

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Utah employs a ten year average sum count of male birds on leks within the Management Area as the metric to determine trends in population for each Management Area. Based on this metric, the aggregate population of birds in Utah has been stable for several years. The most recent (2011) figures are

1. Bald Hills (68)
2. Box Elder (755)
3. Carbon (119)
4. Emery (30)
5. Hamlin Valley (89)
6. Ibapah (39)
7. Panguitch (304)
8. Greater Parker Mountain (821)
9. Rich – Morgan -Summit (1223)
10. Sheeprock Mountains (102)
11. Strawberry Valley (82)
12. Uintah (452)

The Local Working Groups, under the guidance of the State's Division of Wildlife Resources and Utah State University, have provided the following descriptions of the condition of and threats to the population within each Management Area:

~~1. **Bald Hills:** The Bald Hills Management Area is located in southwestern Utah, and is considered a linkage population for this region of Utah. This population uses a series of leks throughout the habitat area, with males visiting more than one lek per season. Currently, the population is constrained to the Management Area by vegetation fragmentation and human development; however future improvements could connect this population to the Hamlin Valley Management Area to the west, and further north into Beaver County. This population is regarded as stable with a high potential for growth. Sage-grouse in this area show resiliency to known threats and are not considered as being in jeopardy. Key threats include wildfire, enhanced native predator populations, vegetation management (conflicting or lack of), and energy development. The population has a risk ranking of C2.~~

~~2.~~1. **Box Elder:** The Box Elder Sage-Grouse Management Area is located in northwestern Utah and is part of a significant population center for Sage-grouse in three states – Utah, Idaho, and Nevada. This population is regarded as stable with a potential

for growth. Key threats include wildfire, invasive species, loss of agricultural operations, and habitat fragmentation. The Box Elder Management Area is identified as a unit that can likely sustain increases in Sage-grouse populations with continued reclamation and restoration. Resource management in the area has contributed to large populations to date, and those populations can be enhanced by providing high quality habitat. As a result, this area should be a high priority for funding of habitat enhancement. In connection with the populations in Nevada and Idaho, the population has a risk ranking of C3.

~~3.~~2. **Carbon:** The Carbon Sage-grouse Management Area is located in the northern portion of the Colorado Plateau in central Utah. The area is characterized by highly broken terrain, with deep canyons and mid-elevation plateaus. Sage-Grouse leks in this area are generally small, with birds moving between leks. Telemetry studies show bird movement in these areas is primarily by flight. Other studies in the area suggest that occasionally Sage-grouse migrate to and from adjoining populations in Strawberry Valley. The area boundary was determined by buffering active leks with topographic imagery, and adding areas of known winter use. Key threats include habitat loss and fragmentation due to a variety of factors including energy development, wildfire, invasive species, and predation. West Nile Virus has been reported in Carbon in the last 10 years. The population would have a risk ranking of C2.

~~4.~~3. **Emery:** The Emery Sage-grouse Management Area is located in central Utah. Small, mostly isolated Sage-grouse populations occupy high elevation sagebrush steppe on the eastern slope of the Wastach Plateau. These populations may be considered part of the Greater Parker Mountain Sage-grouse complex, although no direct movement between these areas has been documented. The Emery Sage-grouse Management Area includes all currently used habitat and corridors connecting this habitat. Key threats to the population include woody species encroachment, wildfire, invasive species, predation, and habitat fragmentation. The population has a risk ranking of C4.

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~~5.~~4. **Hamlin Valley:** The Hamlin Valley Management Area is located in southwestern Utah, on the border of Utah and Nevada and is important due to its connection to a large population in Nevada. Although currently isolated from other habitat areas, habitat restoration could link this population to the Bald Hills Management Area. This population consists of a relatively small number of birds that uses less than 10 leks throughout the habitat area. Telemetry data has not shown that males use more than one lek per season, however this population of grouse is known to travel large distances within the Management Area. Additionally, this population spends a portion of its time in Nevada, usually during the summer months. This population is regarded as moderately stable with a high potential for growth. Key threats to the population include wildfire, enhanced native predator populations, vegetation management (conflicting or lack of), wild horse management, and habitat fragmentation. In conjunction with populations in Nevada, the population has a risk ranking of C3.

~~6.~~5. **Ibapah**: The Ibapah Management Area is located in northwestern Utah, and is part of a significant population center for grouse in two states, Utah and Nevada. The Management Area includes Goshute Tribal lands. The area boundary was determined by consulting with Nevada, the West Desert Adaptive Resource Management Local Area Working Group, and DWR and follows vegetation types used by Sage-grouse. Sage-grouse in this area show resiliency to known threats, and are not regarded as being in jeopardy. Key threats to Sage-grouse are fire, invasive species (cheatgrass and knapweeds), potential loss of riparian areas due to water piping, predation, and habitat fragmentation (dispersed recreation and pinyon/juniper encroachment). In conjunction with populations in Nevada, the population has a risk ranking of C3.

~~7. **Panguitch:** The Panguitch Management Area is located in southern Utah, incorporating more than a dozen, often connected leks. This population uses a series of leks throughout the habitat area, with some males visiting more than one lek per season. The population is distributed north-south in a series of linked valleys and benches, and constrained by mountains and canyons. There is a large range in the number of males in attendance among these leks. Movement of Sage-grouse from one valley or bench to~~

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~~another among seasons is necessary to meet their seasonal habitat requirements in the highly variable annual weather conditions of this region. Movements among valleys are not present in each group of Sage-grouse, and not all used areas are known to managers. This management area has the highest potential for increase of any in Utah in response to habitat treatments to remove pinyon-juniper that has extensively impacted habitat quantity and quality. Key threats to Sage-grouse in the Panguitch Management Area are enhanced native predator populations, vegetation management (conflicting or lack of), energy development, and residential/commercial development. The population has a risk ranking of C3.~~

8. ~~**Greater Parker Mountain:** The Greater Parker Mountain Sage-grouse Management Area is located on the Awapa Plateau in the south central part of the state of Utah, and nearby environments. The Greater Parker Mountain LAWG was established in 1996 and is the longest operating LAWG in Utah. The Greater Parker Mountain boundaries were refined based on 15 years of greater sage-grouse radio telemetry studies which included research on species vital rates, survival, and seasonal movements. Boundary refinements included consultations with the Greater Parker Mountain LAWG and DWR. Because of these long term research studies, more is known about the Parker Mountain Sage-grouse population dynamics, seasonal habitat use, population threats, and abatement strategies than other populations in Utah. The Greater Parker Mountain Sage-grouse Management Area includes all connected currently used habitats and the corridors connecting these habitats. Key sage-grouse threats identified by the LAWG include; 1) loss or degradation of habitat (primarily due to vegetation succession), 2) conversion of habitat (sagebrush to Pinyon and Juniper or cheat grass at the lower elevations), 3) increased risk of predation because of expanding or changes in the native predator community in response to anthropogenic factors, and 4) habitat fragmentation from loss or degradation of habitat that results in a loss of habitat connectivity in Sage-grouse habitat areas. The population has a risk ranking of C3.~~

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~~9.~~6. **Rich-Morgan-Summit:** The Rich-Morgan-Summit Sage-grouse Management Area is located in Northeastern Utah, and is a part of significant population center for grouse in three states – Utah, Idaho, and Wyoming. The area boundary was determined by consulting with adjacent states, DWR, the Morgan-Summit Adaptive Resources Management Local Sage-grouse Working Group, and the Rich County Coordinated Resource Management Sage-grouse Local Working Group and follows vegetation types usable by Sage-grouse. This population is regarded as stable with a potential for growth. Sage-grouse in this area show resiliency to known threats, and are not regarded as being in jeopardy. Key threats to Sage-grouse include invasive species, loss of agricultural operations, predation, residential development, and habitat fragmentation through recreational development. In conjunction with populations in Wyoming, the population has a risk ranking of C4.

~~10.~~7. **Sheeprock Mountains**: The Sheeprock Mountains Management Area is located in the Great Basin portion of central Utah, and is a relatively isolated population center for Utah. The area boundary was determined by consulting with adjacent states, the West Desert Adaptive Resource Management local working group, and DWR, and follows vegetation types usable by Sage-grouse. This population is regarded as stable with a potential for growth. Sage-grouse in this area show resiliency to known threats, and are not regarded as being in jeopardy. Key threats to Sage-grouse include wildfire, invasive species (cheatgrass and knapweeds), potential loss of riparian areas due to water piping, predation, and habitat fragmentation (dispersed recreation and pinyon/juniper encroachment). The population has a risk ranking of C1.

~~11.~~8. **Strawberry Valley**: The Strawberry Valley Sage-grouse Management Area is located in central Utah, and is a significant population center for Sage-grouse in Utah. The area boundary was determined by consulting with DWR and the Strawberry Valley Adaptive Resource Management Local Working Group, and follows vegetation types usable by sage-grouse. Significant restoration efforts have been conducted on this population and it is the most intensively managed in Utah. This population is regarded as stable with a high potential for growth. Sage-grouse in this area had suffered significant

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reductions in populations, but these concentrated restoration efforts have have significantly increased this population. The population has a risk ranking of C3.

~~12.~~9. **Uintah:** The Uintah Sage-grouse Management Area is located in northeastern Utah. Within the northern portion of this area is the Diamond Mountain and Browns Park population that is a significant population center for Sage-grouse in three states – Utah, Colorado, and Wyoming. Areas in the central and southern portion of the area are fragmented populations with minimal connectivity and low potential for habitat improvement. The Management Area boundary was determined by consulting with DWR and the Uinta Basin Adaptive Resource Management Local Working Group (UBARM) and follows vegetation types usable by Sage-grouse. This population is regarded as stable with a potential for growth and also has strong connectivity with the tri-state regional sage-grouse population. Sage-grouse in the Management Area show resiliency to known threats, and are not regarded as being in jeopardy. Key threats to Sage-grouse include predation, wildfire, invasive species, noxious weeds, disease, loss of agricultural operations, and habitat fragmentation (naturally occurring, but not topographical, and from existing and future anthropogenic uses). In contrast to populations in Colorado, but in concert with populations in Wyoming, the population has a risk ranking of C4.

None of the LAWGs found livestock grazing to be an issue with sage grouse populations, rather have found that proper grazing management is an appropriate tool for maintaining sage brush, increasing forbs, reducing fuel loads~~,~~ and invasive species, and helping to create fire-breaks.

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