

Part III: Conservation Strategy

PART III. CONSERVATION STRATEGY

Overall Goal

The goal of the Northwest Colorado Greater Sage-Grouse Conservation Plan, as stated on page 1 of this document, is to address the needs of greater sage-grouse, and other sagebrush obligate species, in the context of multiple land ownerships, uses, and species through a Conservation Plan. It may not always be possible to manage for maximum numbers of greater sage-grouse, but by managing for a balance over large areas, important wildlife resources can be maintained while meeting the needs of residents of Northwest Colorado. Signatories of this Plan will strive to select and implement those actions that will meet their needs while contributing to healthier greater sage-grouse habitat and populations.

The Conservation Strategy outlines the goals for greater sage-grouse populations and habitat in Northwest Colorado, further defines the issues believed to be impacting sage grouse populations, and describes a menu of specific conservation actions designed to meet those goals. The conservation actions are specific, measurable tasks that will promote greater sage-grouse conservation in Northwest Colorado. Conservation actions are grouped by issues (limiting factors) described in **Part II: Identification of Issues Affecting Greater Sage-Grouse in Northwest Colorado**.

Identified Issues

The seven issues described in **Part II: Identification of Issues Affecting Greater Sage-Grouse in Northwest Colorado** are: Habitat Quality, Habitat Loss & Fragmentation, Predation, Hunting, Physical Disturbance, Disease & Genetics, and Planning & Outreach. The conservation goals, objectives and strategies included below provide a framework to reach the overall goals of improving greater sage-grouse habitat, reduce predation levels on greater sage-grouse, and increase greater sage-grouse numbers and stability in Northwest Colorado. Due to the interrelationship of habitat components and resource values, several strategies apply to each of the issues. Similarly, a single conservation strategy may address more than one issue. Conservation strategies may be appropriate in some locations and/or circumstances but not in others, while other strategies are well suited for any application. It is the intent of the GSGWG that all possible solutions will be considered so that the best alternative may be selected for each situation. Conservation strategies applied to inappropriate sites may be ineffective and could hinder greater sage-grouse recovery. One of the primary values of implementing this Conservation Plan by Management Zones is that it allows conservation strategies to be tailored to the specific needs of a Zone, ecological site, landowner, and/or agency.

Severity of Impacts

The GSGWG recognizes that issues do not apply equally across each of the Zones in the Northwest Colorado greater sage-grouse population. The geographic spread and range in ecological site capacity between western Moffat County and western Routt County is extremely variable. Land use patterns and human population pressure also vary widely across the area. Thus, both the effect of a specific issue and the severity of impacts of those issues differ greatly across the Northwest Colorado greater sage-grouse population. The following strategies are not blanket strategies for Northwest Colorado. Rather, individual strategies should be applied to address specific objectives on specific sites.

Habitat Quality

Conservation goals, objectives, and strategies in this Plan address each habitat type within Management Zones in the Northwest Colorado greater sage-grouse population. Hausleitner (2003) reported that nest success in Northwest Colorado was positively correlated with plant species richness, percentage of sagebrush canopy cover, and the amount of grass and forb cover, though grass height slightly declined at nest sites from levels at random sites. She also reported that grass height at and one meter away from the nest cup were variables that predicted nest success (Hausleitner 2003) and further recommends that grass heights at nests between 5.9 and 7.1 inches (15-18 cm) appeared adequate in her study area, given high measured nest success. This figure is slightly lower than that reported by Connelly et al. (2000). Hausleitner (2003) also noted that nest site grass height declined by 2.0 to 2.8 inches (5-7 cm) between 2001 and 2002, presumably due to drought conditions, and suggests that this reduction may have been responsible for a decline in nest success from 64 to 49% in those years. Hausleitner (2003) found that nests were located beneath sagebrush shrubs which averaged 31.3 inches (79.4 cm) in height, while randomly measured shrubs averaged only 22.3 inches (56.5 cm). Average sagebrush canopy cover at nest sites was 17% (Hausleitner 2003).

Additional research was conducted in the Axial Basin area of Moffat County in 2003 wherein hand raised greater sage-grouse chicks were exposed to foraging environments with varying levels of forbs. Findings indicate that chicks raised in high-forb areas had higher survival rates than those raised in habitats containing lower quantities of forbs (Huyer 2004).

The data in Table 13 outline habitat conditions that are believed to be a desirable goal for greater sage-grouse habitat in Northwest Colorado at this point in time and are consistent with habitat parameters and grouse ecological needs described in Connelly et al. (2000). However, the GSGWG recognizes that site potential varies substantially throughout Northwest Colorado. Moffat County derived data (Hausleitner 2003) have been added to the table for reference. They are generally consistent with the ranges defined by Connelly et al. (2000). In accordance with the Connelly et al. guidelines (2000), the GSGWG will use locally derived data where available in preference to the more broadly derived guidelines. The GSGWG further believes that there are other structural and physiological parameters not measured by the guidelines, such as sagebrush growth form and vigor, that can also significantly affect the ability of greater sage-grouse to successfully use sagebrush stands. The GSGWG recognizes that individual

Table 13. Characteristics of sagebrush rangeland needed for productive greater sage-grouse habitat (after Connelly et al. 2000, Hausleitner 2003).

CONNELLY ET AL. 2000 GUIDELINES	Breeding (April – June)		Brood-rearing (June – August)		Winter ^e	
	Height	Canopy	Height	Canopy	Height	Canopy
MESIC SITES^a: <i>-sagebrush</i>	15.7-31.5 inches (40-80 cm)	15-25%	15.7-31.5 inches (40-80 cm)	10-25%	9.8-13.8 inches (25-35 cm)	10-30%
<i>-grasses and forbs</i>	>7.1 ^c inches (>18 cm)	≥25% ^d	variable	>15%	N/A	N/A
ARID SITES^a: <i>-sagebrush</i>	11.8-31.5 inches (30-80 cm)	15-25%	15.7-31.5 inches (40-80 cm)	10-25%	9.8-13.8 inches (25-35 cm)	10-30%
<i>-grasses and forbs</i>	>7.1 ^{cf}	≥15%	variable	>15%	N/A	N/A
% Area^b	>80		>40		>80	

^a Mesic and arid sites should be defined on a local basis; annual precipitation, herbaceous understory, and soils should be considered (Tisdale and Hironaka 1981, Hironaka et al. 1983).

^b Percentage of seasonal habitat needed with indicated conditions.

^c Measured as “droop height”; the highest naturally growing portion of the plant.

^d Coverage should exceed 15% for perennial grasses and 10% for forbs; values should be substantially greater if most sagebrush has a growth form that provides little lateral cover (Schroeder 1995).

^e Values for height and canopy coverage are for shrubs exposed above snow.

^f Specific to nest sites.

Table 13 continued

MOFFAT COUNTY DATA (Hausleitner 2003)	Breeding (April – June)		Brood-rearing (June – August)		Winter ^e	
	Height	Canopy	Height	Canopy	Height	Canopy
MESIC SITES^a (Danforth Hills)						
- <i>sagebrush</i> (nest and brood sites)	31.1 inch (79 cm) avg. nest bush height	26% (nest sites)	22.9 inch (58 cm) height at brood sites	10.6% at brood sites	No Winter Data	No Winter Data
- <i>sagebrush</i> (random sites)	22.9 inch (58 cm) avg. random sagebrush height	32% (random sites)	17.3 inch (44 cm) height at random sites	14% at random sites		
- <i>grasses and forbs</i> (nest and brood sites)	5.9-7.1 inch (15-18 cm) avg. grass height at nests	3.7% grass 7.7% forbs 11.4% total canopy at nest sites	8.0 inch (20.3 cm) grass height, 4.4 inch (11.2 cm) forb height at brood sites	6.5% grass 8.0% forb 14.5% total canopy at brood sites	No Winter Data	No Winter Data
- <i>grasses and forbs</i> (random sites)	7.3 inch (18.6 cm) avg. grass height at random sites	7.9% grass 8.1% forbs 16.0% total canopy at random sites	6.7 inch (17.1 cm) grass height, 3.2 inch (8.2 cm) forb height at random sites	5.9% grass 3.8% forb 9.7% total canopy at random sites		

Table 13 continued

MOFFAT COUNTY DATA (Hausleitner 2003)	Breeding (April – June)		Brood-rearing (June – August)		Winter ^e	
	Height	Canopy	Height	Canopy	Height	Canopy
ARID SITES^a (Axial Basin)						
- <i>sagebrush</i> (nest and brood sites)	31.1 inch (79 cm) avg. nest bush height	26% at nest sites	As for mesic sites above	As for mesic sites above	No Winter Data	No Winter Data
- <i>sagebrush</i> (random sites)	17.7 inch (45 cm) avg. random sagebrush height	23% at random sites				
- <i>grasses and forbs</i> (nest and brood sites)	5.9-7.1 inch (15-18 cm) avg. grass height at nests	3.7% grass 7.7% forbs 11.4% total canopy at nest sites	As for mesic sites above	As for mesic sites above	No Winter Data	No Winter Data
- <i>grasses and forbs</i> (random sites)	5.1 inch (13 cm) grass heights at random sites	4.8% grass 4.7% forbs 9.5% total canopy at random sites				

Management Zones or portions of Zones may not be capable of achieving these desired conditions on all sites. A key part of the success of this Conservation Plan will be the reasoned adjustment of expectations to the capability of each ecological site. Connelly et al. (2000) recognize the importance of this step. They say, on page 978, “Local biologists and range ecologists should be involved in the process when developing height and cover requirements.” The GSGWG intends to follow that advice in developing locally appropriate targets.

To meet all life cycle needs, greater sage-grouse must range across a broad landscape composed of plant communities in various seral stages. Fire suppression and other factors over a period of years have resulted in large stands of mature and over-mature sagebrush with little herbaceous understory and diversity in places. A broad range of habitat manipulation techniques may be appropriate to manage quality of greater sage-grouse habitats. Desired outcomes from these techniques are outlined in the conservation action table.

Properly planned prescribed or natural fire and other habitat modification treatments have the potential to interrupt plant community succession and provide higher quality habitat through improved plant species composition and greater herbaceous diversity to provide food and cover for nesting, brood-rearing, and wintering purposes. Improper application of fire, or excessive and/or improperly placed habitat conversions could negatively impact the amount and quality of greater sage-grouse habitat, especially winter habitat. The habitat requirements of greater sage-grouse throughout the year must be considered and balanced with existing conditions to determine how habitat treatment can be used as a management tool. The GSGWG will generally operate within the habitat management guidelines defined by Connelly et al. (2000) but will depart from them as necessary when locally derived data are available and are at odds with the guidelines.

Domestic and wild ungulate herbivory are dominant land uses on public and private lands in Northwest Colorado. Sound grazing management promotes the use of forage resources while having a neutral or positive effect on plant vigor. Proper livestock grazing can maintain and/or enhance desirable plant communities by preventing the invasion of noxious weeds, improving vegetation palatability and promoting residual cover. Proper grazing can also increase plant diversity and improve riparian areas. Improper grazing has the potential to reduce the availability of food and cover for greater sage-grouse by affecting the composition and structure of grasses, forbs, and shrubs. It is important to consider greater sage-grouse habitat requirements when evaluating big game population objectives and livestock management.

Healthy and productive rangelands are the foundation of a profitable and sustainable ranching industry and abundant wildlife. Private lands are believed to contribute some of the highest quality greater sage-grouse habitat in Northwest Colorado. Therefore, emphasis should be placed on maintaining these lands as viable economic units in order to preserve large areas of habitat and open space. The alternative is habitat fragmentation and increased human impacts on sage grouse when agricultural lands are sold for development (Knight et al. 1995, Odell and Knight 2001, Maestas et al. 2003).

Best management practices, as defined in the Northwest Colorado Greater Sage-Grouse Conservation Actions, are believed to be beneficial long-term options for managing grazing to benefit greater sage-grouse. Specific grazing guidelines must be adapted to fit the needs of the livestock operator, the specific area, and the current condition of the plant community. The goal of specific grazing guidelines is to provide suitable habitat for greater sage-grouse by utilizing Northwest Colorado Conservation Actions for domestic and wild ungulates. However, if the data indicate plant community composition or vigor are lacking, then the suggested utilization levels, intensity, timing, distribution, and/or duration of domestic and wild ungulate grazing should be adjusted to encourage the desired plant response.

Openings in the sagebrush canopy occur naturally on the landscape in Northwest Colorado and often provide important seasonal microhabitats used by greater sage-grouse. It is the intent of the GSGWG to promote management of big sagebrush habitat in Northwest Colorado within its range of natural variability. The following goals encourage greater sage-grouse recruitment and survival and are recommended to meet greater sage-grouse habitat requirements.

The conservation actions that follow often refer to specific seasonal habitats with different characteristics. These seasonal habitats are described in **Part I** of the Plan.

Habitat Quality Goals:

- ✓ Identify and assess greater sage-grouse habitats across Northwest Colorado.
- ✓ Manage sagebrush habitats in Northwest Colorado on a landscape scale within the range of natural variability.
- ✓ Restore the ecological role of fire in managing sagebrush habitats where appropriate.
- ✓ Enhance existing and potential greater sage-grouse habitats where need and opportunity exist.
- ✓ Manage seasonal greater sage-grouse habitats on a site-specific basis to provide breeding, nesting, brood rearing, and winter habitats.
- ✓ Provide for a level and system of domestic livestock grazing that maintains and improves both the long-term stability of greater sage-grouse populations and habitats and the livestock industry in Northwest Colorado.
- ✓ Provide for a level of grazing by wild ungulates that maintains and improves the long-term stability of greater sage-grouse populations and habitats and the recreational and economic benefits derived from wild ungulates in Northwest Colorado.
- ✓ Develop desired plant communities that provide for a level of livestock grazing that promotes a thriving livestock industry and healthy greater sage-grouse populations.

Conservation Actions Table I. Improving Habitat Quality

I. CONSERVATION ACTIONS - IMPROVING HABITAT QUALITY		
Issues	Objectives	Strategies
<p>A. Quality and quantity of sagebrush</p> <p>(all seasonal habitats)</p> <p>(Strategies address Listing Factor A)</p>	<ol style="list-style-type: none"> 1. Manage sagebrush habitats on a landscape level. 2. Develop desired conditions for sagebrush communities' composition and distribution in seasonal greater sage-grouse habitat. 3. Take necessary actions to correct deficiencies and improve sagebrush habitats. 4. Monitor the sagebrush overstory and vegetative understory to determine progress toward meeting desired conditions for greater sage-grouse. 	<ol style="list-style-type: none"> a. Map broad habitat types across landscapes using remote sensing. b. Repeat inventory and mapping of sagebrush habitats on a 10-year cycle or as determined by the GSGWG. c. Track treatments or other alterations in sagebrush cover type, such as brush beating and prescribed fire, on an annual basis. d. Use site-specific habitat assessments to identify and map quality greater sage-grouse seasonal range and identify deficient areas. e. Ensure vegetation treatments in sagebrush areas are compatible with greater sage-grouse needs. f. Conduct habitat enhancement treatments as needed. g. Monitor progress toward objectives.
<p>B. Age distribution of sagebrush</p> <p>(all seasonal habitats)</p> <p>(Strategies address Listing Factor A)</p>	<ol style="list-style-type: none"> 1. Manage sagebrush habitats on a landscape level within the range of natural variability. 2. Manage stands for multi-age sagebrush within range of natural variability. 	<ol style="list-style-type: none"> a. Identify areas of over-mature stands of sagebrush for treatment that do not appear to be serving as quality habitat. b. Initiate successional processes, on an appropriate scale, in identified old age stands through disturbance such as fire use, prescribed fire, brush beating, plowing, or chemical treatment. c. Develop and implement grazing management practices that influence sagebrush growth. d. Conduct long-term planning for sagebrush treatments on a landscape scale. e. Monitor progress toward objectives.
<p>C. Quality and quantity of sagebrush understory, including forbs.</p> <p>(breeding habitat and summer-late brood-rearing habitat)</p> <p>(Strategies address Listing Factor A)</p>	<ol style="list-style-type: none"> 1. Identify and describe vegetative understories in current and potential greater sage-grouse habitat 2. Develop desired conditions for vegetative understories in greater sage-grouse habitat by seasonal habitat and population zone. 3. Take necessary actions to correct deficiencies and improve vegetative understories. 4. Monitor the vegetative understory to determine progress toward meeting desired conditions for greater sage-grouse. 5. Identify and implement Best Management Practices (BMPs) and other vegetative treatments to improve sagebrush/grass plant communities and species diversity. 6. Maintain and where possible, improve forb component in the understory. 	<ol style="list-style-type: none"> a. Use site-specific habitat assessments to identify and map quality greater sage-grouse seasonal range and identify areas deficient in understory quality and quantity to meet greater sage-grouse life cycle needs. b. Analyze habitat by greater sage-grouse life cycle needs within each Management Zone using the best available data. c. Identify and implement local guidelines and BMPs that will improve understory habitat quality and quantity within the capability of the site. d. Maintain residual herbaceous cover through grazing management within the capability of the site. e. Make annual measurements of vegetation understory in greater sage-grouse habitats. f. Reclaim and/or re-seed areas disturbed by treatments when necessary, using seed mixtures high in native bunch grasses and desirable forbs. g. Restore understory vegetation in areas lacking desirable quality and quantity of herbaceous vegetation where economically feasible. h. Conduct vegetation treatments to improve forb diversity (e.g., brush beating, burning) and reclaim or re-seed disturbed area, if needed.

I. CONSERVATION ACTIONS - IMPROVING HABITAT QUALITY

Issues	Objectives	Strategies
		<ul style="list-style-type: none"> i. Develop management techniques to increase forb diversity and density in sagebrush steppe, within limits of ecological sites and annual variations. j. Monitor impacts of Mormon crickets and grasshoppers on forbs. k. Monitor progress toward objectives.
<p>D. Quality and quantity of wet meadows</p> <p>(summer-late brood-rearing habitat)</p> <p>(Strategies address Listing Factor A)</p>	<ul style="list-style-type: none"> 1. Manage wet meadows and riparian areas on a landscape basis. 2. Identify, describe and map existing and potential wet meadows and riparian habitats suitable for brood-rearing habitat. 3. Enhance existing riparian areas or create small wet areas to improve nesting & brood-rearing habitat. 4. Monitor the vegetative understory to determine progress toward meeting desired conditions for greater sage-grouse. 5. Work with willing local interests to ensure sufficient water is available annually in key sage grouse brood-rearing habitat. 	<ul style="list-style-type: none"> a. Review existing BLM riparian inventory and remote sensing information to identify distribution and current conditions of mesic/moist areas that fall within greater sage-grouse range. b. Inventory existing wet meadows or riparian areas on state and private land including the presence of noxious weeds. c. Repeat inventory of selected riparian areas and wet meadows every 10 years or as determined by the GSGWG. d. Identify & prioritize important mesic areas in need of restoration, or enhancement and restore degraded areas. e. Identify opportunities or needs to create small wet areas. Implement such projects where economically feasible. f. Encourage livestock operators to design and implement livestock grazing management practices to benefit riparian areas. g. Modify or adapt pipelines or developed springs to create small wet areas. h. Locate projects to minimize potential loss of water table associated with wet meadows. i. Protect existing wet areas where necessary. j. Monitor the success and failure of projects and land management practices as they relate to desirable brood-rearing habitat. k. Monitor impacts of Mormon crickets and grasshoppers on wet meadows. l. Monitor progress toward objectives. m. Work with willing landowners to continue to irrigate hay meadows that provide brood rearing habitat. n. Work with willing landowners to keep water rights associated with existing irrigated meadows. o. Where possible, work with willing landowners to provide late summer irrigation in critical brood rearing areas. p. Work with willing land managers to provide livestock impoundments, guzzlers and spring developments for improved sage grouse habitat. q. Control upland woody vegetation from encroaching on and adversely impacting riparian areas.

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Issues	Objectives	Strategies
<p>E. Vegetation encroachment</p> <p>(all seasonal habitats)</p> <p>(Strategies address Listing Factor A)</p>	<ol style="list-style-type: none"> 1. Manage pinyon/juniper areas to reduce encroachment into sagebrush/grass communities. 2. Open lek vegetation that has been invaded by sagebrush and other shrubs. 3. Integrate weed management with sage grouse needs. 	<ol style="list-style-type: none"> a. Plan for small prescribed fires and managed natural fires that mimic natural openings in sagebrush cover when and where feasible. b. Remove encroaching trees and tall shrubs mechanically (chainsaws, chaining, etc.) or by other methods, where needed to maintain visibility at lek sites and security from predation in other seasonal habitats. c. Consider herbicide application when and where appropriate. d. Map and inventory leks with potential for restoration. e. Roto-beat or treat with other mechanical methods on specified areas and re-claim or re-seed as necessary. f. Monitor progress toward objectives.
<p>F. Desirable seasonal habitat for greater sage-grouse.</p> <p>(all seasonal habitats)</p> <p>(Strategies address Listing Factor A)</p>	<ol style="list-style-type: none"> 1. Identify, describe and map current and potential greater sage-grouse habitat in Northwest Colorado. 2. Maintain and enhance desired conditions for leks. 3. Maintain and improve habitat conditions in nesting/early brood rearing habitat to reach desired conditions. 4. Maintain and improve habitat conditions in late brood rearing habitat to reach desired condition. 5. Maintain and improve habitat conditions in winter range. 6. Improve the quality and quantity of insects by improving the forb composition and wet meadow habitat associated with early and late-brood rearing habitats. 	<ol style="list-style-type: none"> a. Identify and map important greater sage-grouse habitat by Management Zones - winter range, nesting, early brood rearing, late-brood rearing, leks. b. Use site-specific habitat assessments to evaluate important greater sage-grouse habitats identified above. c. Inventory important seasonal habitats that do not meet desired habitat conditions and determine reasonable mitigation options. d. Identify seasonal activities that may impact greater sage-grouse use of leks. e. Prioritize important seasonal habitats that may be enhanced by management and/or vegetation treatments according to how areas are meeting greater sage-grouse requirements. f. Implement previously identified actions that target the improvement of habitat attributes. g. Analyze habitat by greater sage-grouse life cycle needs within each population zone using the best available data. h. Monitor progress toward objectives.
<p>G. Livestock grazing</p> <p>(breeding habitat and summer-late brood-rearing habitat)</p> <p>(Strategies address Listing Factor A)</p>	<ol style="list-style-type: none"> 1. Provide for a level and system of domestic livestock grazing that maintains and improves both the long-term stability of greater sage-grouse populations and habitats and the livestock industry in Northwest Colorado. 2. Develop desired plant communities that provide for a level of livestock grazing that promotes a thriving livestock industry and greater sage-grouse populations. 3. Use grazing management practices that enhance greater sage-grouse habitat, while providing for flexibility and adaptability to current range conditions. 4. Reduce resource conflicts between livestock and sage grouse on leks and in nesting areas. 	<ol style="list-style-type: none"> a. Evaluate effects of different grazing systems on greater sage-grouse productivity, survival and habitat use. b. Coordinate grazing management with livestock operators to reduce resource and timing conflicts on leks and prime nesting habitat when possible. c. Apply grazing management practices to achieve desired conditions including maintenance of residual herbaceous vegetation appropriate for the site. d. Encourage implementation of grazing systems that provide for areas and times of deferment while taking into consideration the resource capabilities and needs of the livestock operator. e. Encourage the development and utilization of BMPs with willing land managers that are compatible with desired habitat conditions for greater sage-grouse.

I. CONSERVATION ACTIONS - IMPROVING HABITAT QUALITY

Issues	Objectives	Strategies
		<ul style="list-style-type: none"> f. Allotment management plans and other grazing management plans will be developed and evaluated on a site-by-site basis to consider the diversity and capability of range sites that exist in Northwest Colorado. g. Manage livestock to enhance riparian conditions. h. Monitor condition and level of use on browse and grass in identified conflict areas. i. Monitor and evaluate impacts of grazing management systems on livestock industry viability. j. Monitor progress toward objectives.
<p>H. Wild ungulate grazing (breeding habitat and summer-late brood-rearing habitat)</p> <p>(Most strategies address Listing Factor A, Strategies a, b, c, d, e, f also address Listing Factor D)</p>	<ul style="list-style-type: none"> 1. Provide for a level of grazing by wild ungulates that maintains and improves the long-term stability of greater sage-grouse populations and habitats in Northwest Colorado. 2. Develop desired plant communities that provide for a level of wild ungulate populations that are compatible with sustainable greater sage-grouse populations and desired ecological conditions for greater sage-grouse throughout their range. 3. Evaluate effects of wild ungulates on greater sage-grouse lek attendance patterns, forage availability, and habitat use. 4. Reduce resource conflicts between wild ungulates and sage grouse on leks and in nesting areas. 	<ul style="list-style-type: none"> a. Maintain wild ungulate populations in accordance with DAU plans for the area. b. Review the big game herd objectives in DAU plans and modify as necessary to improve conditions for greater sage-grouse. c. Incorporate greater sage-grouse habitat guidelines into habitat management plans for wild ungulates. d. Encourage coordination of DAU plans for all ungulates. e. If necessary, implement special big game hunting seasons to meet harvest objectives. f. Improve accuracy and precision of census procedures and harvest estimates for wild ungulates within Northwest Colorado. g. Manage big-game population levels and habitat to minimize or avoid resource conflicts on grouse habitats. This includes creating big game habitat elsewhere to move them off prime sage grouse habitat. h. Identify and map potential big game/greater sage-grouse conflict areas. i. Monitor condition and level of use on browse and grass in identified conflict areas. j. Maintain residual herbaceous cover, appropriate for the site, to reduce predator effectiveness. k. Monitor progress toward objectives.
<p>I. Water quality (summer-late brood rearing habitat)</p> <p>(Strategies address Listing Factor A and Factor E contamination issues)</p>	<ul style="list-style-type: none"> 1. Manage vegetation and artificial structures to increase water-holding capability of areas. 2. Prevent head cutting through wet meadows. 3. Evaluate non-point sources of pollution. 4. Ensure oil & gas activities do not degrade water quality. 	<ul style="list-style-type: none"> a. Manipulate vegetation on uplands and in drainages to slow movement of sediment using various techniques. b. Adjust big game herd objectives to lessen impacts on riparian areas where problems exist. c. Manage livestock grazing to protect the uplands and enhance riparian conditions where possible. d. Install catchment structures to slow run-off, hold water, and eventually raise water tables. e. Partner with EPA for 319 funds. f. Permit oil and gas activities to minimize sedimentation throughout greater sage-grouse range, and exclude birds from pit sites. g. Monitor progress toward objectives.

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Issues	Objectives	Strategies
<p>J. Fire management</p> <p>(all seasonal habitats)</p> <p>Strategies address Listing Factor A)</p>	<ol style="list-style-type: none"> 1. Prescribe small acreage fires, rotational burning, or other treatments to create mosaic patterns in selected areas. 2. Allow natural fires to burn when prudent and possible. 3. Determine if fire standards are appropriate for long-term greater sage-grouse habitat management. 	<ol style="list-style-type: none"> a. Coordinate and plan fires with BLM/Forest Service fire management teams and Moffat County, which incorporate life requirements for greater sage-grouse. b. Reclaim and/or re-seed after disturbance, if needed. c. Map/Inventory habitats and burns to assess condition. d. Implement White River FO, NW Fire Management Plan, and the Moffat County Fire Management Plan. Coordinate with LSFO Field Management Plan (2000). e. Determine the appropriate role of fire use for the benefit of greater sage-grouse habitat. f. Monitor progress toward objectives
<p>K. Insecticide use</p> <p>(breeding habitat and summer-late brood-rearing habitat)</p> <p>(Strategies address Listing Factor E)</p>	<ol style="list-style-type: none"> 1. Manage the use of insecticides on public, state, and private land to minimize impacts on greater sage-grouse by selecting the most appropriate and least harmful chemicals, application, season of use. 	<ol style="list-style-type: none"> a. Develop cooperative agreements with County, BLM, state, NRCS, and private landowners which will schedule insecticide applications to reduce the negative impact to greater sage-grouse during the nesting and brood-rearing period. b. Recognize the secondary impacts of insecticide treatments on greater sage-grouse habitat and evaluate the need, timing and location of such treatments. c. Explore alternative pest management options in greater sage-grouse habitats during important times of the year. d. Monitor progress toward objectives.
<p>L. Herbicide use for sagebrush treatment</p> <p>(all seasonal habitat)</p> <p>(Strategies address Listing Factor E)</p>	<ol style="list-style-type: none"> 1. Manage the use of herbicides for vegetative treatment on public, state, and private land to minimize impacts on Greater Sage-Grouse by selecting the most appropriate and least harmful chemicals, application, season of use. 2. Incorporate Greater Sage-Grouse life cycle needs when considering herbicide treatments. 	<ol style="list-style-type: none"> a. Discourage use of herbicides that may have detrimental effects on forbs in quality greater sage-grouse habitat. b. Schedule and manage herbicide use and application methods across ownership boundaries to minimize large-scale impacts to high quality greater sage-grouse habitat. c. Design sagebrush treatment projects (size, kill rate and rate of recovery) to incorporate greater sage-grouse needs and existing habitats. d. Consider timing of application to reduce impacts to grouse during important biological periods. e. Conduct outreach sessions for applicators, agencies, and landowners to encourage properly designed and scaled herbicide application projects and the associated benefits to greater sage-grouse. f. Monitor progress toward objectives.
<p>M. Weed infestations</p> <p>(all seasonal habitats)</p> <p>(Strategies address Listing Factor A)</p>	<ol style="list-style-type: none"> 1. Control exotic and noxious weeds in greater sage-grouse habitats. 	<ol style="list-style-type: none"> a. Work cooperatively to develop chemical and biological weed management strategies in key greater sage-grouse habitat. b. Locate and map weed infestations in greater sage-grouse habitat in coordination with existing county weed mapping.

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Issues	Objectives	Strategies
		c. Coordinate with county weed control program to ensure that treatment of weed infestations is compatible with greater sage-grouse habitat needs. d. Monitor progress toward objectives.

Habitat Loss and Fragmentation

The sagebrush steppe has been identified as one of the most imperiled ecosystems across the west (Noss and Peters 1995). Much of this peril is caused by permanent or long-term loss and fragmentation of sagebrush communities through human activities (West and Young 2000). For the purposes of this Plan, habitat loss is defined as permanent or long-term (e.g. 30 years or more) removal of land from effective sage grouse habitat. Habitat fragmentation is defined as the progressive breakup, in excess of the range of natural variability, of sagebrush communities into increasingly small fragments. Several recent summaries of sage grouse and sagebrush steppe trends (Connelly et al. 2000, Crawford et al. 2004, Knick et al. 2003, Paige and Ritter 1999) identify various human and natural activities with the potential to cause loss or significant fragmentation of sage grouse habitat.

Similar trends are occurring in Northwest Colorado. Habitat loss and/or fragmentation pose a significant risk to continued use of sage grouse habitats in many areas of Northwest Colorado. Principal factors resulting in habitat loss and fragmentation in Northwest Colorado are conversion to agriculture, particularly small grains, large scale and long term conversion of sagebrush to grassland environments, oil and gas development including pipeline corridors, surface coal mining, small acreage (e.g. 40 acre and less) residential development, power line construction, road development and fence development. These disturbances have fragmented historically contiguous patches of sagebrush habitat. Smaller remnant patches and strips of sagebrush are often abandoned by greater sage-grouse or, when used, potentially expose greater sage-grouse to higher rates of mortality through predation or exposure.

The GSGWG acknowledges that many of the above issues are affecting sage grouse habitats. However, there have been many historical and recent efforts at habitat enhancement to sustain functionality of sagebrush ecosystems. The GSGWG has compiled a list of habitat projects in Appendix C.

The minimum patch size required to provide effective sage grouse habitat has not been identified anywhere in the west (Knick et al. 2003) and probably varies considerably by site. Sage grouse summer home ranges in the literature range from 1 to 2.5 square miles (Connelly 1983) with larger home ranges reported in more fragmented sites. Danvir (2002) reported that most (83%)

sage grouse nests located in a study in northern Utah occurred in patches of sagebrush greater than 100 meters in diameter (i.e. patches 2 acres in size and greater). Brewer's sparrow has been located nesting in sage patches as small as a half acre (Short 1984), while the sage sparrow, a sagebrush community obligate, abandons sagebrush areas less than 320 acres (Paige and Ritter 1999). Research designed to identify minimum patch sizes for sage grouse use of habitat and thresholds at which sage grouse use declines or is eliminated is greatly needed. The specific rate and amount of habitat alteration and loss in Northwest Colorado is not known. Research efforts to establish these figures are also needed. Acreages of sagebrush treated on public lands and private lands in recent years are not currently maintained in a central location and the information is not readily available for private lands. The acreage of private land vegetation treatments is anticipated to be greater than the amount of acreage treated on BLM lands.

Long-term loss of greater sage-grouse habitat through conversion of sagebrush to agricultural production and other land development activities has significantly reduced the amount of suitable habitat in some areas of Northwest Colorado. This has been particularly true northwest of Craig toward Great Divide and east from Craig into Routt County. Much of this converted acreage is still in annual small grain production. Significant acreage has been returned to perennial grassland in the past 15 years, but much was replanted with aggressive species of non-native grasses that have limited sagebrush reestablishment to date. Most of these replanted areas do not yet provide suitable sage grouse habitat. This lack of greater sage-grouse response is believed to be due to the lack of big sagebrush in most of these converted fields. The restoration process for cleared sagebrush areas is lengthy and often delayed or reversed by land management actions intended to favor grass cover over sagebrush establishment. Remnant sagebrush islands in extensive agricultural areas of Northwest Colorado are often too small to provide effective sage grouse nesting habitat.

Many of these replanted areas are supported by the Conservation Reserve Program (CRP), a part of the U.S. Farm Bill designed to return highly erodible farm lands to perennial vegetative cover through payment of 10- or 15-year leases. Most of the leases on CRP lands in Moffat and Routt counties are due to expire in 2007. If the CRP program is altered to the point that most Northwest Colorado lands no longer qualify or lands are not re-enrolled, more than 50,000 acres of land in perennial cover, some of which is actively used by sage grouse and more which could be in the future with habitat enhancement, could be at risk of re-conversion to tillage or other activity.

Large areas of sagebrush habitat have also been converted to native grassland by mechanical, chemical or fire treatments. Large block treatments have limited future sagebrush management opportunities in some areas. The size of many of these treatments exceeds the range of natural variability for sagebrush sites. Re-establishment of sagebrush on large areas treated with chemicals, especially tebuthiron, and fire, particularly hot wildfires, often exceeds 15 years. The restoration process for cleared sagebrush areas can be lengthy and often delayed or reversed by lack of seed source and land management actions intended to favor grass cover over sagebrush establishment.

Uncontrolled infestations of noxious weeds can also eliminate extensive areas of greater sage-grouse habitat by crowding out more desirable plants and by changing nutrient cycling and fire recurrence intervals. Many types of development in sage grouse habitat can increase the opportunity for weeds to invade new areas. Cheatgrass dominance of sagebrush understories is a concern in more arid portions of Northwest Colorado. Encroachment of leafy spurge and whitetop into wet meadows and riparian areas and areas of knapweed, yellow toadflax and Dalmatian toadflax in upland environments are also of concern. Weed infestations are generally considered an impact on habitat quality in this Plan and are treated in that section, but large areas of uncontrolled noxious weeds can also constitute a significant loss of sage grouse habitat.

Oil and gas development has occurred historically in Northwest Colorado but has dramatically increased in intensity since 2003. Much of the new development is occurring in occupied greater sage-grouse habitat. Accelerated development is planned for the area west and north of the Great Divide town site, an area of significant sage grouse use. Additional development is proposed in the Upper Little Snake Valley and deep coal-bed natural gas exploration is occurring west of Craig. Oil and gas development can result in both habitat loss and fragmentation. Pad sites, access roads and service facility footprints do not provide useful sage grouse habitat for the life of the facility, often 30 years or more. Minimizing the size of these areas during construction and early and effective reclamation of as much of the footprint as possible can reduce the amount of habitat and the length of time affected. Oil and gas facilities are also believed to have additional fragmenting impacts on adjacent undeveloped habitat by deterring sage grouse use of adjacent areas. The extent of this displacement is not well understood for sage grouse, but two recent studies have shown serious impacts on greater sage-grouse lek attendance and long-term persistence of sage grouse populations in areas of intense energy development (Holloran 2005, Naugle et al. 2006a). Lyon and Anderson (2003) also reported greater sage-grouse impacts from natural gas development related road traffic. Information from sagebrush nesting passerine birds in Wyoming indicates a displacement effect for those birds extending at least 100 yards out from developed sites and roads (Ingelfinger 2001). Minimized activity in developed areas may limit the impact of this displacement, but off-site mitigation, including habitat protection, development or enhancement, may be necessary to maintain sage grouse populations in areas where oil and gas development is occurring. Beck (2006) provides a useful summary of oil and gas development effects on a variety of prairie grouse species, including greater sage-grouse.

Strong indications that oil and gas development activity will continue to accelerate in greater sage-grouse habitat in Northwest Colorado have increased the need to pursue creative solutions to sage grouse/oil and gas conflicts. This is particularly true in high intensity developments and across large spatial scales where traditional methods of impact resolution are inadequate. The Little Snake BLM Resource Management Plan, released in draft form in February, 2007, is a forum for development of these approaches, which could include agreements to waive traditional greater sage-grouse protection approaches at the well level for a negotiated agreement that provides better overall protection for greater sage-grouse by minimizing habitat fragmentation, maximizing undisturbed sagebrush patch sizes and minimizing surface disturbance.

Surface coal mining and surface facilities associated with underground coal mining occur in several locations within Northwest Colorado and also result in long-term loss of greater sage-grouse habitat. Potential mine expansions into adjacent sage grouse habitat raises concern for the future success of greater sage-grouse on those potential mine sites. Effective reclamation, especially when shrub stands including sagebrush and a variety of forbs are re-established, should eventually return most mined areas to suitable sage grouse habitat, but the long life of mine sites and slow re-growth of sagebrush can make for lengthy loss of useful habitat. Off-site mitigation, including habitat protection, development or enhancement, may be necessary to maintain sage grouse populations in areas where coal mining is occurring. When possible, these off-site activities should occur prior to development or expansion of mining activities to enhance the ability of sage grouse populations to remain viable through subsequent development.

The several surface coal mines in Northwest Colorado produce high quality reclamation, but have generally had difficulty re-establishing shrubs. The highly diverse, forb rich seed mixes planted on reclaimed mines have proven highly attractive to Columbian sharp-tailed grouse in Routt County (Boisvert 2002) and in Moffat County (Collins 2004), however. Collins (2004) reported higher nest success and chick survival (in some years at least) on reclaimed mined land than in native sagebrush range. Feeding trials with sage grouse chicks in Moffat County demonstrated that forb rich understories enhanced chick survival (Huwert 2004). These three studies imply that mined land reclamation could play host to significant numbers of grouse. Columbian sharp-tailed grouse are more adaptable and less tied to big sagebrush than are greater sage-grouse however, allowing them to make fuller and earlier use of reclaimed mine lands. Greater sage-grouse use of Northwest Colorado reclaimed mine lands is limited so far and will likely remain so until sagebrush re-colonizes the sites. If sagebrush establishment techniques can be improved, reclaimed mine lands could become a potential benefit to greater sage-grouse also.

Commercial and residential development of sagebrush habitats has been limited in the recent past in Moffat County, but shows signs of increasing. Current areas of small acreage (i.e. 40 acres and less) development in Moffat County are north and west of Craig in the Cedar Mountain, Big Gulch, and Sand Springs areas as well as the Bakers Peak and Wilderness Ranch areas at higher elevation. Development of sagebrush areas in Routt County has been significant and continues in areas around Hayden and Steamboat Springs. This development permanently removes land from suitable sage grouse habitat and fragments surrounding habitat. Free ranging domestic pets from these developments can significantly reduce the ability of the surrounding area to support avian and other wildlife. Excessive grazing of small pastures, particularly by horses, can also increase the loss of habitat to these developments. Land protection through conservation easements and management agreements as well as clustered or otherwise managed development of subdivisions can be effective means of reducing habitat loss and fragmentation from development. Odell and Knight (2001) and Maestas et al. (2003) demonstrated significant changes in species composition and lower species richness as rangeland was converted to exurban residential development.

Roads and pipeline corridors can fragment habitat by decreasing use of intact sagebrush habitats on either side and by opening travel corridors for predators into sagebrush stands. They can also serve as important vectors for the spread of weeds into otherwise intact habitats. The impacts on sage grouse appear to increase with the width of the corridor. Pipelines generally return to usable habitat once re-vegetated, so long as sagebrush is allowed to establish on the disturbed area while roads remain a concern during the life of the road. Clustering these developments will reduce impacts in undeveloped areas, but care must be taken to ensure that the total width of the corridor, particularly the distance between sagebrush areas, does not become excessive. Knight and Kawashima (1993) documented increased raven use of highway rights of way over surrounding areas.

Electric power lines and fences are believed to fragment sage grouse habitat by causing avoidance of adjacent habitats, increasing predator density and effectiveness, opening predator travel routes through sagebrush areas and causing direct mortality as a result of bird strikes. Steenhof et al. (1993) demonstrated rapid colonization of electrical lines by raptors and corvids and potentially higher nest success rates for birds nesting on transmission lines than on other substrates. Both ravens and red-tailed hawks are attracted to power poles as nest sites and both were more numerous along power line corridors than control areas (Knight and Kawashima 1993).

Water storage projects may also affect greater sage-grouse habitat by direct inundation of habitat and through the indirect effects resulting from development of an attractive recreational and residential site. Several existing and former water storage projects have and still have implications for greater sage-grouse habitat, including Elkhead Reservoir and the former Ralph White Reservoir. Despite the ongoing expansion of the Elkhead dam, demand for water storage is increasing. Concerns for endangered fish in the Yampa River and other issues make smaller tributary streams in upland settings suitable for greater sage-grouse more likely sites for future water developments than the mainstem river and principal tributaries. A study commissioned by the Colorado River Water Conservancy District evaluated a number of off main channel potential reservoir sites (Montgomery Watson 2000). Many of those sites are located in greater sage-grouse habitat and could affect sage grouse if developed.

Habitat Loss/Fragmentation Goals:

- ✓ Evaluate and quantify the effects of various causes of habitat loss and fragmentation in Northwest Colorado.
- ✓ Develop Management Zone specific thresholds for sagebrush habitat loss or fragmentation per Connelly et al (2000).
- ✓ Minimize the long-term or permanent loss of sagebrush habitat in Northwest Colorado. Encourage a “no net loss” of sagebrush habitat beyond the range of natural variability approach to sagebrush habitat.
- ✓ Maintain large blocks of undeveloped sagebrush ecosystem, consistent with the range of natural variability, distributed across the landscape.
- ✓ Encourage agricultural practices that minimize sage grouse habitat loss and fragmentation.
- ✓ Prevent noxious weed infestations and other undesired vegetation from destroying or seriously fragmenting sage grouse habitats.
- ✓ Eliminate where possible or otherwise modify, reduce, or mitigate surface disturbance, fragmentation, or loss of greater sage-grouse lek, nesting, brood rearing or winter habitats.
- ✓ Design sagebrush treatments intended to restore or enhance greater sage-grouse habitats to minimize fragmentation or long-term loss of habitats.

Conservation Actions Table VII. Habitat Loss and Fragmentation

II. CONSERVATION ACTIONS – HABITAT LOSS AND FRAGMENTATION		
Issues	Objectives	Strategies
<p>A. Agricultural practices/CRP (Strategies address Listing Factor A)</p>	<p>1. Minimize impacts of agricultural conversion on sage grouse. 2. Maintain the CRP program and improve its benefit to wildlife by altering seed mixes. 3. Encourage easement, management, and restoration programs that provide incentives in greater sage-grouse habitats.</p>	<p>a. Maintain or reestablish sagebrush patches of sufficient size and appropriate shape to support sage grouse between agricultural fields. b. Work with FSA and others to maintain the CRP program and enroll important sage grouse habitats currently in grain production. c. Encourage use of sage grouse friendly seed mixes, including bunchgrasses, forbs and big sagebrush, in CRP and other grassland plantings d. Rehabilitate old low diversity, sod bound CRP fields with sage grouse friendly seed mixes including bunchgrasses, forbs, and big sagebrush. e. Encourage interest and enrollment of key greater sage-grouse habitats in the Grassland Reserve Program.</p>
<p>B. Encroachment by weeds and undesirable vegetation (Strategies address Listing Factor A)</p>	<p>1. Identify areas where undesirable vegetation is encroaching on greater sage-grouse habitat. 2. Treat areas where undesirable vegetation has become or is at risk of becoming a factor in greater sage-grouse habitat loss or fragmentation.</p>	<p>a. Work with existing weed management programs to incorporate greater sage-grouse habitat needs. b. Identify large areas of introduced plant species that are not meeting greater sage-grouse habitat needs and reseed with native species where appropriate. c. Identify areas where pinyon or juniper trees are encroaching on good quality sagebrush habitat and</p>

II. CONSERVATION ACTIONS – HABITAT LOSS AND FRAGMENTATION

Issues	Objectives	Strategies
		<p>treat as needed.</p> <p>d. Manage fire, transportation and vegetation treatments to minimize undesirable vegetation where possible.</p>
<p>C. Oil and gas development</p> <p>(Strategies address Listing Factor A)</p>	<ol style="list-style-type: none"> 1. Minimize greater sage-grouse habitat loss to oil and gas activities while ensuring continued development. 2. Reduce fragmentation of greater sage-grouse habitat by oil and gas development activities. 3. Minimize disturbance to greater sage-grouse associated with oil and gas development. 4. Reduce cumulative impacts of oil and gas development. 5. Actively seek opportunities to achieve better situations for greater sage-grouse facing oil and gas development than would be achievable using traditional approaches, through pursuit of creative solutions to impacts, especially at large scales. 	<ol style="list-style-type: none"> a. Plan and construct roads to minimize duplication b. Cluster development of roads, pipelines, electric lines and other facilities and use existing, combined corridors where possible. c. Use early and effective reclamation techniques, including interim reclamation, to speed return of disturbed areas to use by grouse. (may require multiple reclamation efforts) d. Reduce long-term footprint of facilities to the smallest practical space. e. Utilize reclamation seed mixes consisting of native bunchgrasses, forbs and appropriate subspecies of big sagebrush. f. Practice reclamation techniques that speed recovery of pre-existing vegetation. (e.g. brush-beating of sage brush for site clearance, retention of topsoil with native seed) g. Avoid aggressive, non-native grasses (e.g. intermediate wheatgrass, pubescent wheatgrass, crested wheatgrass, smooth brome, etc) in reclamation seed mixes. Under some circumstances, short term non-invasive species may be used for interim reclamation. h. Use directional drilling where biologically significant habitats are involved, to minimize impact to greater sage-grouse habitat, if such techniques are technically feasible and cost effective. i. Minimize pad size and other facilities to the extent possible, consistent with safety. (Where directional drilling is utilized, larger pads are needed for multiple wells.) j. Cooperate with county weed programs to control noxious weed infestations associated with oil and gas development disturbances. k. Minimize width of field surface roads. Avoid engineered and graveled roads when possible to reduce the footprint. l. Avoid breeding/nesting season (March 1 – June 30) construction and drilling when possible in sage grouse habitat. m. Limit breeding season (March 1 – May 1) activities near active sage grouse leks to portions of the day after 9:00 a.m. and before 4:00 p.m. n. Reduce daily visits to well pads and road travel to the extent possible in sage grouse habitat. o. Utilize well telemetry when practical to reduce daily visits to wells. p. Gate field service roads or otherwise limit regular public access on field service roads, consistent with landowner wishes and direction. q. Reduce noise impacts from compressor stations by

II. CONSERVATION ACTIONS – HABITAT LOSS AND FRAGMENTATION

Issues	Objectives	Strategies
		<p>locating stations at least 2500 feet away from leks or by decibel reduction equipment.</p> <p>r. Upon indications that substantial drilling may occur, a plan that evaluates impacts to sage grouse from entire field development would be preferable to individual well analysis. (where possible)</p> <p>s. Study, monitor and attempt to quantify impacts to sage grouse from oil and gas development, including the accuracy and importance of lek and nesting radius buffers used in this Plan and incorporate findings into future management decisions.</p> <p>t. Evaluate need for near-site and/or off-site mitigation to maintain sage grouse populations during oil and gas development and production.</p> <p>u. Share greater sage-grouse data with industry to allow planning to reduce impacts.</p> <p>v. Avoid locating above-ground facilities within 0.6 miles of greater sage-grouse lek sites to the maximum extent practical. Conservation Plan signatories, particularly agencies, should encourage, assist, and facilitate implementation of project alternatives where avoidance is desirable. Where avoidance is not possible, incorporate impact minimization and funding strategies developed by resource agencies, landowners and project proponents into the project to maintain the integrity of greater sage-grouse habitat.</p> <p>w. Explore and implement creative solutions to limit the cumulative or landscape effects of oil and gas development through voluntary incentives and negotiated agreements (e.g. minimize surface disturbance in exchange for exception of timing stipulations, etc.).</p> <p>x. The GSGWG recommends application of proposals to provide incentives to companies that voluntarily agree to limit surface disturbance. Voluntary approaches provide incentives for companies to limit fragmentation by voluntarily limiting their development to 5% across the NWCO planning area and 1% in new leases and defined sage grouse areas in exchange for exceptions to timing restrictions. Some companies have said they would be willing to limit disturbance, which would be a great benefit to sage grouse. The GSGWG recommends that its 5% proposal or other voluntary strategies be applied rather than relying solely on prescriptive measures.</p> <p>y. Although the GSGWG believes that voluntary adaptive management approaches can be more effective than prescribed regulatory approaches, the Work Group also recognizes the need to define some disturbance buffers when sage grouse habitat has not been adequately mapped. For the purposes of this Conservation Plan, and when habitat mapping has not been completed, the GSGWG defines the following two habitat types.</p>

II. CONSERVATION ACTIONS – HABITAT LOSS AND FRAGMENTATION

Issues	Objectives	Strategies
		<ul style="list-style-type: none"> • A lek protection zone is defined as 0.6 miles radius around an active lek. The GSGWG agrees to accept this definition for 3 years with the intent to reevaluate this buffer at that point to determine if this buffer distance remains appropriate. Disturbance within this zone should be limited to the maximum extent practical. Where mapping has been completed and areas determined not to be habitat, or geographical relationships and topographic barriers provide screening for the lek, then exceptions can occur. A large proportion of Northwest Colorado has already been leased under ¼ mile NSO stipulations. • Nesting and early brood-rearing habitat is defined as a 4-mile radius around an active lek. Mapping can better define the areas within the 4-mile radius that are actually sage grouse nesting habitat and where to apply sage grouse stipulations. The 4-mile radius is not a No Surface Occupancy (NSO) or Avoidance Area. Rather it is an area of consideration where disturbance guidelines should be applied when, and if, possible. <p>z. Consult private surface owners prior to defining COAs on private surface.</p>
<p>D. Coal mining</p> <p style="text-align: center;">(Strategies address Listing Factor A)</p>	<ol style="list-style-type: none"> 1. Minimize area impacted and duration of impact on greater sage-grouse habitat from surface mines and above ground facilities of underground mines 2. Engage in effective mitigation measures to carry over greater sage-grouse displaced from the mine site or to supplement off mine sage grouse populations. 	<ol style="list-style-type: none"> a. Limit facility footprint in greater sage-grouse habitat to that necessary for safe and effective mining. b. Structure reclamation soil profiling and revegetation seed mixes to create high quality greater sage-grouse habitat as quickly post mining as possible. c. Determine whether sage grouse will move to mitigation areas as mine sites develop in active habitat. d. Conduct effective enhancements to adjacent or nearby habitats to maintain greater sage-grouse population numbers. e. Complete mitigation measures prior to mine site development or expansion where possible to minimize greater sage-grouse population disruption. f. Share greater sage-grouse data with industry to allow planning to reduce impacts. g. Utilize reclamation seed mixes consisting of native bunchgrasses, forbs and appropriate subspecies of big sagebrush. Under some circumstances, short term non-invasive species may be used for interim reclamation.
E. Land development	<ol style="list-style-type: none"> 1. Minimize the amount of quality sage grouse habitat eliminated by residential and 	<ol style="list-style-type: none"> a. Participate with County land use decision makers in identifying key greater sage-grouse habitats.

II. CONSERVATION ACTIONS – HABITAT LOSS AND FRAGMENTATION

Issues	Objectives	Strategies
<p>(Most Strategies address Listing Factor A, Strategies b, c address Listing Factor D)</p>	<p>commercial land development consistent with private property rights.</p> <p>2. Minimize the disruption of greater sage-grouse populations around residential developments.</p>	<p>b. Encourage County adoption of important greater sage-grouse areas for protection.</p> <p>c. Encourage counties to consistently forward development proposals to CDOW for comment.</p> <p>d. Encourage use of planned subdivision developments and land preservation subdivisions, where applicable, to cluster impact in smaller portions of development area.</p> <p>e. Maintain sagebrush environments of sufficient size and shape around developments in greater sage-grouse habitat.</p> <p>f. Encourage the voluntary use of conservation easements and other land protection vehicles with willing sellers in greater sage-grouse habitats.</p> <p>g. Educate rural residents about the impacts of free-ranging pets on sage grouse and other wildlife and encourage responsible pet ownership.</p> <p>h. Educate rural residents about the importance of good grazing management in keeping small tracts weed free and capable of providing wildlife habitat.</p> <p>i. Incorporate greater sage-grouse issues into the Code of the West publication for new landowners.</p>
<p>F. Roads/recreation.</p> <p>(Strategies address Listing Factor A and Listing Factor E)</p>	<p>1. Develop a transportation management plan across land ownership boundaries in important greater sage-grouse habitat.</p> <p>2. Consider greater sage-grouse needs when planning recreation areas.</p>	<p>a. Minimize amount of unnecessary or duplicate roads in greater sage-grouse habitat.</p> <p>b. Limit width of roads to minimum necessary to ensure function and safety</p> <p>c. Identify areas during transportation planning for seasonal or permanent closures of roads which fragment greater sage-grouse habitat.</p> <p>d. Work with OHV, recreational hunting groups and private landowners to develop guidelines/restrictions that will minimize vehicle damage to important greater sage-grouse habitat and reduce fragmentation of existing habitat.</p> <p>e. Avoid important greater sage-grouse habitats when designing recreation areas.</p> <p>f. Manage primitive camping opportunities to limit impacts to quality habitat and reduce fragmentation of existing habitat.</p>
<p>G. Fence construction</p> <p>(Strategies b, f, g address Listing Factor A, Strategies a, c, d, e address Listing Factor C)</p>	<p>1. Reduce the impact of existing fences in key habitats on sage grouse where feasible.</p> <p>2. Design and install new fences to minimize impacts on sage grouse in key habitats where feasible.</p>	<p>a. Minimize the width of cleared area along fences to reduce predator effectiveness.</p> <p>b. Add high visibility top wire (e.g. vinyl coated or ribbon wire) to fences in areas of high sage grouse activity or where significant bird strikes occur, as around leks.</p> <p>c. Install perch preventers on wood fence posts where raptor perching is a concern.</p> <p>d. Remove old fence posts, especially from rises and ridge tops.</p> <p>e. Locate new construction off rises and ridge tops where feasible.</p> <p>f. Avoid use of woven wire wherever possible.</p>

II. CONSERVATION ACTIONS – HABITAT LOSS AND FRAGMENTATION

Issues	Objectives	Strategies
		g. Minimize duplication of fences
<p>H. Power line and pipeline maintenance and construction</p> <p>(Most Strategies address Listing Factor A, Strategies c, e address Listing Factor C)</p>	<ol style="list-style-type: none"> 1. Provide utility access to residents in Northwest Colorado while minimizing adverse impacts to greater sage-grouse populations in the area. 2. Minimize potential impacts to greater sage-grouse populations from utility construction and maintenance 3. Improve communication between Utility Companies, CDOW, and Publics to better accommodate greater sage-grouse needs. 	<ol style="list-style-type: none"> a. Consult with the Colorado Division of Wildlife (CDOW) during transmission and distribution line siting and new gas line projects to minimize impacts to greater sage-grouse populations. Utility construction will avoid critical periods and sensitive areas where technically and economically feasible. b. Schedule regular maintenance to minimize impacts to greater sage-grouse populations during critical periods. Maintenance in emergency situations will be unrestricted. c. Avian protection devices, which include raptor perch deterrents, will be utilized when deemed appropriate to protect greater sage-grouse populations. CDOW will be consulted to determine appropriate measures to be taken. d. Share new lek/habitat/biology information as it becomes available with members of the Colorado Rural Electric Association, other electric transmission/distribution and gas utilities, the CDOW, and the Working Group. The information will be handled under the terms of existing or future confidentiality agreements. e. Seek input from affected landowners and the CDOW on power line modifications proposed for greater sage-grouse protection.
<p>I. Reservoirs and water development</p> <p>(Strategies address Listing Factor A, Strategy d also addresses Listing Factor E)</p>	<ol style="list-style-type: none"> 1. Work with water development interests to consider greater sage-grouse habitat when planning future projects. 	<ol style="list-style-type: none"> a. Work with water development interests to seek avoidance, changes to, or mitigation for water projects that could displace greater sage-grouse and their habitat. b. Where reservoir projects appear likely, work towards a cooperative partnership that considers mutual benefits for greater sage-grouse and water interests. c. Where reservoir projects appear likely, convene Northwest Colorado Greater Sage-Grouse Working Group to represent greater sage-grouse concerns and address conservation actions relating to reservoir development. d. Where reservoir projects appear likely, consider the potential impacts to greater sage-grouse from indirect effects such as recreation, real estate development, and road realignment.

Predation

The difference of opinion encountered by the GSGWG about the impact of predation on the Northwest Colorado greater sage-grouse population is discussed in **Part II** of this Plan. Initial efforts to resolve questions about the effects of predation on greater sage-grouse in Northwest Colorado will focus on research to determine the amount and impact of predation on population trends. A radio-telemetry based study to determine greater sage-grouse movement patterns and habitat use, survival rates of adults, juveniles and chicks, and causes of mortality in several locales within Northwest Colorado was conducted from 2001 through 2003 and looked at survival and habitat use of more than 200 radio-marked sage grouse. Adult female annual survival rates ranged from 48-65% (a two-year survival rate in some cases) and yearling survival rates ranged from 71-78% (Hausleitner 2003). Both are within the range of survival reported for successful populations in the West and do not indicate excessive loss of adult and yearling females to predation in the areas studied. The study also attempted to identify the specific predator or class of predator responsible for greater sage-grouse mortalities whenever possible, though this proved to be difficult information to gather in many cases. Hausleitner (2003) also looked at nest predation rates in portions of Northwest Colorado and the class of predator responsible. Nest success was reported to be high, averaging 57% across the two years of the study. Of nests predated during the study, Hausleitner (2003) reported that 70% were destroyed by mammals, 5% by avian predators, and that the class of predator could not be identified at 25% of the predated nests. The GSGWG believes that this study provides valuable information on the impact of predation on greater sage-grouse in specific areas, as well as information on other limiting factors. Study results will be used to fine-tune this Conservation Plan and management efforts proceeding from it. Additional research will begin in 2004 to look at chick dispersal and chick survival rates and will continue through 2007 in Axial Basin and on Cold Spring Mountain.

A separate study was initiated by the GSGWG in the summer of 2001 to attempt to determine relative predator numbers (especially numbers of red fox and coyote) occurring in fragmented (low greater sage-grouse numbers) versus un-fragmented (high greater sage-grouse numbers) areas of Northwest Colorado. Andelt (2003) found that red fox visitation, and presumably population numbers, were higher in fragmented areas than in less fragmented habitats. The fragmented areas also have lower sage grouse populations than the less fragmented habitats, although the author cautioned against linking higher red fox populations and lower sage grouse populations based on the evidence of his preliminary study (Andelt 2003). Additional work is needed to further address the level of predator populations in Northwest Colorado.

As discussed above, red fox and raccoon are increasingly believed to be “non-native” predators in sagebrush environments (Kamler and Ballard undated manuscript, Connelly et al. 2000) and should perhaps be managed as such in areas where they become a limiting factor on greater sage-grouse populations. Based on local knowledge, the GSGWG thinks there has also been an increase in ravens and crows in sage-grouse habitat. The potential effect of a recently introduced predator could be significantly greater than the effect of predators which have evolved over time with greater sage-grouse. Schroeder and Baydack (2001) recommend manipulating habitat

quality as a proven indirect method of reducing predation on sage grouse but suggest that direct predator control may become necessary as habitat becomes more fragmented or as sage grouse populations become smaller and more threatened with extinction.

Traditional predator control techniques may promote greater sage-grouse conservation in specific areas where loss of sage grouse to predation is the limiting factor. Removal of predators can be difficult and expensive, but may be necessary under some circumstances. Research indicates that control of mammalian predators must occur at high levels for extended periods to have long-term success. Cote and Sutherland (1997) found that predator control can often increase the hatching success of bird species, but is not as effective in increasing breeding bird population size the following spring (i.e. more chicks hatched but were not necessarily carried through the next winter). Take of sufficient predators to affect prey populations is unpalatable to segments of society. To minimize societal discontent, direct predator control for the enhancement of greater sage-grouse populations should focus on specific areas where predation has been identified as a limiting factor, and be as narrowly focused as possible (i.e. targeting species depredating greater sage-grouse or removal of specific individuals). Public policy decisions have an impact on the management possibilities of some predator species and associated prey species.

Predation Goals:

- ✓ Obtain current predator population estimates through scientific research.
- ✓ Identify areas where predation impact on greater sage-grouse is a limiting factor.
- ✓ Develop predation control methods to address site-specific predation concerns that are consistent with the Wildlife Commission's Mammalian Predator Management Policy.
- ✓ Develop or adopt new methods to control predators or their reproductive processes, on a site-specific basis, that would be acceptable to society.
- ✓ Design, modify or remove existing or proposed construction, such as fences and power lines, to minimize predator effectiveness in greater sage-grouse habitats where economically and technically feasible.
- ✓ Design habitat treatments to minimize predation.
- ✓ Develop research-based estimates of predation impact on specific segments of greater sage-grouse populations in Northwest Colorado.
- ✓ Reduce predator effectiveness.

Conservation Actions Table VIII. Predation

III. CONSERVATION ACTIONS - PREDATION		
Issues	Objectives	Strategies
<p>A. Predator/prey interactions</p> <p>(Most Strategies address Listing Factor C, Strategy c addresses Listing Factor A)</p>	<ol style="list-style-type: none"> 1. Modify situations that may increase predation. 2. Initiate a study to develop a better understanding of predator/prey relationships. 3. Initiate research to monitor predator populations and interactions with greater sage-grouse. This may include the percentage of greater sage-grouse in predator diets, determination of the percentage of egg predators vs. live bird predators, or other predation factors. 4. Modify predator management where necessary. 	<ol style="list-style-type: none"> a. Study impacts of power lines, fences and roads on predation rates. b. Modify power lines and wood fence posts (to remove raptor perches) in important greater sage-grouse areas, where feasible and where predator concerns have been identified. c. Avoid fragmenting existing habitats during new power line and fence design, where feasible and where predator concerns have been identified. d. Remove trees, remove/modify raptor perches, and maintain quality sagebrush habitat, where predation concerns on greater sage-grouse have been identified. e. Begin site-specific predation management considering all predator species (including fox and raccoons) where necessary and appropriate. f. Develop studies with a University, DOW or private consultants to answer predator/prey relationship questions. g. Investigate new technology for impeding successful reproduction of predators. h. Encourage longer season/higher bag limits on red fox, raccoon, and skunk. i. Manage red fox and raccoons as “non-native” species in the sagebrush steppe to prevent further range expansion and reduce population numbers.

Hunting

The GSGWG agrees to support continued hunting of greater sage-grouse in Northwest Colorado under constraints described below. This hunting agreement was developed cooperatively with CDOW biologists and managers and is supported by those wildlife professionals. Hunting provisions in the Conservation Plan are consistent with CDOW policy and procedure for the establishment and analysis of hunting seasons. Greater sage-grouse Management Zones should maintain at least 100 males, counted on leks in the spring and measured by a three-year running average to be considered for hunting. One hundred counted males per area has been adopted by the Colorado Wildlife Commission as the minimum population level for which they will consider a hunting season for grouse species. The GSGWG feels that hunting seasons should be evaluated and administered by Management Zone as described above. Management Zones were specifically developed to be similar to Game Management Unit boundaries to facilitate their use as indicators for hunting season decisions. The GSGWG will recommend to the Division of Wildlife and the Wildlife Commission that greater sage-grouse Management Zones that do not meet the minimum population level be closed to hunting until spring male counts recover. Hunting should only be permitted in those areas where CDOW completes lek monitoring each

spring. Large, sudden, and/or unexplained population declines in any Management Zone should also be carefully observed and used to trigger temporary closures of greater sage-grouse seasons if necessary. This agreement and support for continued greater sage-grouse hunting is based on trust that the Colorado Division of Wildlife will follow the criteria for monitoring and evaluation established in this Plan. This agreement was one of the initial areas of cooperation within the GSGWG. The hunting agreement has been operational since 1988 and has been successfully used by the GSGWG and Division of Wildlife biologists to recommend both closing and reopening areas for sage grouse hunting in Northwest Colorado in recent years.

The GSGWG agrees that the structure of greater sage-grouse seasons can have dramatic effects on the harvest of greater sage-grouse. It is the intent of the GSGWG that greater sage-grouse hunting seasons in Northwest Colorado provide the benefits of hunting described in this Plan while protecting greater sage-grouse populations from significant population declines due to hunting. CDOW harvest reports, check station data, and wing barrel returns (CDOW unpublished data) have shown historically that greater sage-grouse harvest is heaviest on weekends, with most of the harvest occurring on the opening weekend of the season. Addition of more weekends to the season can add substantially to the harvest of sage grouse, particularly when a big game season, such as antelope, is also underway. The GSGWG recommends that greater sage-grouse hunting seasons in Northwest Colorado only include one weekend and do not overlap with rifle antelope season opening weekends. The GSGWG believes that successful greater sage-grouse hens are most susceptible to harvest prior to the early part of September. To protect successful hens to the extent possible, the GSGWG recommends that greater sage-grouse seasons not begin before the second weekend in September. GSGWG members feel that greater sage-grouse bag and possession limits should be determined by annual sage grouse population performance, so this Plan does not make any recommendation on bag and possession limits.

GSGWG members agree that harvest and subsequent impacts of that harvest on Northwest Colorado greater sage-grouse populations needed to be monitored annually by CDOW. Information describing the impact of hunting on greater sage-grouse populations was derived from the study of large populations. The impact of greater sage-grouse hunting on small or isolated populations has not been well studied. Generally speaking, a given proportion of greater sage-grouse harvest could have greater impacts on small populations than large populations, particularly in popular hunting areas. While recognizing that this information can be difficult to obtain, the GSGWG encourages CDOW to evaluate the impacts of hunting on greater sage-grouse populations of different sizes.

Hunting Goals:

- ✓ Maintain recreational hunting of greater sage-grouse in Northwest Colorado where lek counts permit.
- ✓ Modify or adjust greater sage-grouse hunting regulations within Northwest Colorado to maintain at least 100 counted male minimum population levels in each Management Zone that is hunted.
- ✓ Monitor hunting/harvest levels and refine impacts of hunting on greater sage-grouse populations of varying size and level of isolation.

Conservation Actions Table IV. Hunting

IV. CONSERVATION ACTIONS - HUNTING		
Issues	Objectives	Strategies
<p>A. Impacts of hunting marginal greater sage-grouse populations.</p> <p style="text-align: center;">(Strategies address Listing Factor D)</p>	<ol style="list-style-type: none"> 1. Regulate hunting season annually, considering population status by Management Zone. 2. Monitor harvest and population numbers. 	<ol style="list-style-type: none"> a. Maintain open hunting seasons by GSGWG Management Zone only if the previous 3 year running average (as monitored by spring lek surveys) meets a 100 male minimum. b. Maintain current 7 day, one weekend season structure with a 2nd Saturday in September opening, subject to annual review and considered for change only by consensus recommendations of the GSGWG. c. No hunting season should be held in a Management Zone if annual lek monitoring is not done. d. If for some reason, the CDOW is not able to conduct annual lek monitoring, then the CDOW should notify the GSGWG of the plans to discontinue monitoring, recognizing that emergencies may occur. e. Refine estimates of relative hunting impacts on large, small, contiguous and isolated populations.

Physical Disturbance

Greater sage-grouse are most sensitive to disturbance while on leks during the breeding season. Physical structures should not be built within sight of greater sage-grouse leks whenever possible. Facilities producing high noise levels should be located far enough from lek sites so as not to conflict with greater sage-grouse breeding activities. On and off-road vehicle use should be managed to avoid active grouse leks during the breeding season. New roads should be constructed to minimize the exposure of strutting grouse to disturbance. Where disturbance of sage grouse breeding activity by large herds of livestock and/or big game wildlife is suspected, possible impacts on leks need to be evaluated. Development activities near lek sites should be delayed until the end of the breeding season. Other human activities within view or within 0.6 miles of active leks should be delayed until birds have ceased displaying for the day whenever possible.

Visits to leks for counting or trapping of birds should not occur more often than necessary and should be done in the least disturbing manner possible. Flush counts of birds should only be used when other methods do not produce adequate data. Division of Wildlife sponsored or authorized research on greater sage-grouse in Northwest Colorado should be carefully analyzed to ensure that the data obtained is worth the impact generated. All sage grouse research should be designed to minimize impacts to sage grouse consistent with obtaining valuable research information. Handling of birds should be done consistent with Division of Wildlife and university (if applicable) animal care and use standards and the Division of Wildlife sage grouse trapping and handling protocol (CDOW unpublished manuscript).

Viewing of greater sage-grouse on leks is increasing in popularity and is one of the best ways to interest the public in greater sage-grouse conservation. Disturbance of birds on greater sage-grouse leks by wildlife viewers should be minimized, however. The GSGWG and CDOW should select several leks for public viewing which have good access and which can be viewed without disturbing birds. The location of these leks, location of viewing areas and guidelines for safe viewing of greater sage-grouse leks should be made available to the public. The exact sites of other leks should not be made widely available to minimize human disturbance of breeding activities on these other leks.

Sage grouse nesting habitat is defined as sagebrush habitat within a 4-mile radius of a lek, until mapping more precisely defines specific nesting habitat.

Off-road vehicle use during the nesting season in greater sage-grouse nesting habitat should be carefully managed to minimize the flushing of nesting hens and the physical destruction of nests. Cross-country travel is believed to have a more significant impact on sage grouse nests than use of trails and roads.

Livestock managers should be encouraged to minimize physical disturbance through the use of loose herding and other techniques. Various concentrated livestock management techniques, such as rotational grazing, may be used to try and improve vegetation condition. Managers should attempt to strike a balance between sage-grouse disturbance issues and improved vegetation condition. Where more concentrated livestock use is desirable to meet range or grouse habitat goals, the impacts of such use on greater sage-grouse nesting success should be carefully considered. It has also been suggested that large herds of migrating big game, particularly elk, may have significant impacts on nesting greater sage-grouse. Suspected problem areas need to be identified and the impacts of elk on nesting greater sage-grouse in those areas quantified. Management targeted at encouraging elk movement through particularly sensitive nesting habitats or the break-up of large herds may be desirable.

Ground disturbing activities in greater sage-grouse nesting habitats should be delayed until the end of the nesting season. The GSGWG should act to inform rural homeowners of the impacts of uncontrolled dogs and cats on nesting greater sage-grouse and encourage homeowners to control those pets.

Disturbance of greater sage-grouse in brood-rearing habitat should be minimized to reduce the flushing or break-up of broods. Developed vehicle routes should avoid greater sage-grouse brood habitat, particularly wet meadows and riparian corridors, to the extent possible. Off-road vehicle use of wet meadows should be discouraged. Sage grouse hunting seasons should be set to minimize the early break-up of greater sage-grouse broods. Sage grouse hunting seasons in Northwest Colorado are set to begin the second weekend of September. Greater sage-grouse broods have generally matured by this point. Recreationists should be encouraged to control dogs in greater sage-grouse brood habitats.

Disturbance of greater sage-grouse on important winter ranges by human activities should not occur during severe winter conditions. Disturbances to greater sage-grouse on winter ranges during normal winter conditions should be minimized to the extent possible. When possible, construction and development activities should not occur during winter months within greater sage-grouse winter habitat.

Physical Disturbance Goals:

- ✓ Minimize physical disturbance from human activities on or within viewing/hearing distance of leks between 15 March and 15 May.
- ✓ Minimize physical disturbance from human activities in nesting/brood-rearing areas between 15 April and 15 July.
- ✓ Minimize physical disturbance from human activities in wet meadows between 15 July and 1 September.
- ✓ Minimize physical disturbance from human activities in winter range between 16 December and 15 March.
- ✓ Allow for the substitution of an effective adaptive management plan to replace the prescriptive goals when that adaptive plan provides better management of greater sage-grouse than the prescribed approach.

Of the various seasonal disturbance periods, the GSGWG is most concerned with minimizing sage grouse disturbance during breeding and nesting periods. It is not the intent of the GSGWG to apply timing restrictions to all parts of Northwest Colorado year around. Not all areas of Northwest Colorado provide all four of these seasonal habitats. While the GSGWG believes it is important to minimize disturbance to breeding and nesting sage grouse across Northwest Colorado, it is the intent of the GSGWG that disturbance goals for brood range and winter range be applied to specific areas where problems have been identified and when severe conditions exist (e.g. drought, severe winter conditions). The GSGWG recognizes that there are many circumstances where disturbance can have a positive effect on sage grouse and that there are circumstances where disturbance cannot be totally avoided (e.g. livestock stock ponds in the middle of sage grouse habitat). Livestock fences, stock ponds and other range improvements should be exempted from the disturbance guidelines above and the 0.6 mile lek protection zone. Voluntary efforts should still be made to minimize disturbance within 0.6 mile of a lek.

Conservation Actions Table V. Reduction of Physical Disturbances in Greater Sage-Grouse Habitats

V. CONSERVATION ACTIONS - REDUCTION OF PHYSICAL DISTURBANCES IN GREATER SAGE-GROUSE HABITATS		
Issues	Objectives	Strategies
<p>A. Recreation</p> <p>(Strategies address Listing Factor E)</p>	<p>1. Reduce physical disturbance to greater sage-grouse during important biological periods or on important habitats (nesting, brood-rearing and winter).</p>	<p>a. During transportation planning, identify areas for seasonal or permanent road closures of roads to reduce impacts to greater sage-grouse where conflicts exist.</p> <p>b. Manage on-road travel and OHV use in key sage grouse areas to avoid disturbance during important times (winter-nesting periods).</p> <p>c. Encourage recreationists to control pets in greater sage-grouse habitats.</p> <p>d. Avoid important greater sage-grouse habitats when designing and planning recreational facilities.</p>
<p>B. Change in rural population</p> <p>(Strategies address Listing Factor C and Listing Factor E)</p>	<p>1. Develop education programs for current and new residents unaware of greater sage-grouse needs.</p>	<p>a. Educate homeowners about the impacts of free-ranging pets on greater sage-grouse chick survival.</p>
<p>C. Disturbance at lek sites and brood rearing areas</p> <p>(Strategies a, f, g address Listing Factor A, Strategies d, h address Listing Factor B, Strategy b addresses Listing Factor C, and Strategies c, e address Listing Factor E)</p>	<p>1. Mitigate or reduce conflicts with sage grouse during important biological periods and in important habitats where concerns have been identified.</p> <p>2. Manage on-road travel and OHV use in key grouse areas to avoid disturbance at important times where concerns have been identified.</p> <p>3. Manage livestock and big game to minimize disturbance on leks during important periods.</p> <p>4. Determine the effects of disturbance from livestock and big game at lek sites during important periods.</p>	<p>a. Authorize oil and gas permits to minimize activity during important biological periods.</p> <p>b. Remove/modify raptor perches within view of active leks, where feasible and where concerns have been identified.</p> <p>c. Limit seasonal access into lek and brood-rearing areas as needed.</p> <p>d. Identify and select leks for public viewing to minimize disturbance elsewhere.</p> <p>e. Adjust hunting seasons and harvest on big game to minimize physical disturbance to grouse during important biological periods.</p> <p>f. Redistribute big game animals away from lek and nesting areas where and when practical.</p> <p>g. Develop study to determine if there are significant disturbances from livestock and big game at lek sites.</p> <p>h. Limit number of daily trips for commercial use in key greater sage-grouse habitats.</p>
<p>D. Sage grouse lek viewing</p> <p>(Strategies address Listing Factor B)</p>	<p>1. Identify and publicize suitable leks where sage grouse viewing can be accommodated without harm.</p> <p>2. Develop incentives to encourage sustainable viewing opportunities on private land.</p> <p>3. Develop viewing guideline protocols.</p>	<p>a. Evaluate impacts of sage grouse viewing on leks.</p> <p>b. Identify and publicize leks where sage grouse viewing can be accommodated without harm.</p> <p>c. Coordinate with existing and future wildlife watching books and web sites to ensure that sage grouse viewing remains appropriate</p> <p>d. Develop and publish viewing guidelines that minimize disturbance to sage grouse.</p> <p>e. Develop facilities (parking, blinds, etc.) as needed at identified viewing leks.</p>

V. CONSERVATION ACTIONS - REDUCTION OF PHYSICAL DISTURBANCES IN GREATER SAGE-GROUSE HABITATS

Issues	Objectives	Strategies
		<ul style="list-style-type: none"> f. Discourage use of leks where viewing is detrimental to sage grouse. g. Encourage sustainable viewing on private lands. h. Develop incentives to encourage sustainable viewing opportunities on private land. i. Monitor the impacts of viewing on lek attendance.
<p>E. Research and inventory impacts</p> <p>(Strategies address Listing Factor B)</p>	<ul style="list-style-type: none"> 1. Minimize impacts of research activities on sage grouse populations while conducting effective research programs. 2. Minimize impacts of annual lek counts on breeding sage grouse. 	<ul style="list-style-type: none"> a. Conduct research in accordance with Division of Wildlife and participating university animal care and use standards and Division of Wildlife sage grouse trapping and handling protocol. b. Collect as much information as possible from each sage grouse handled to reduce need for recaptures or capture of additional birds for equivalent data. c. Assess benefits of information collected versus impacts inflicted when designing research projects (cost-benefit analysis specific to impact). d. Continue to foster GSGWG review and participation in research question development and study design. e. Minimize disturbance during lek counts to the extent compatible with accomplishing needed counts. f. Avoid flush counts unless absolutely necessary.
<p>F. Disturbance on important wintering grounds</p> <p>(Most Strategies address Listing Factor E, Strategy c addresses Listing Factor C)</p>	<ul style="list-style-type: none"> 1. Minimize disturbance on identified important wintering areas for greater sage-grouse. 	<ul style="list-style-type: none"> a. Manage big-game populations to minimize or avoid conflicts on greater sage-grouse winter habitats and to encourage moving them off prime grouse habitat through the development of big-game habitat elsewhere. b. Close important winter areas to people, vehicles, and other uses during severe winters wherever possible. c. Remove/modify raptor perches on important wintering grounds, where possible. d. Adjust hunting seasons and harvest on big game to minimize physical disturbance to greater sage-grouse during important biological periods.

Disease and Genetics

There are occasional references in the literature to greater sage-grouse population declines resulting from disease outbreaks. None are known to have occurred in Colorado. West Nile Virus was documented to kill greater sage-grouse in Wyoming in 2003. It was first detected in the Northwest Colorado greater sage-grouse population in the summer of 2006, but has been found in mosquitos in the County for several years. It is expected to become a regular occurrence now that it has occurred in Northwest Colorado. Radio-collared greater sage-grouse have provided a ready way to monitor for the disease. CDOW sage grouse technicians are instructed to regularly monitor radioed greater sage-grouse during the most likely season for West Nile Virus to appear and to submit suspicious mortalities for testing. Until more is known about how the disease will present itself in Northwest Colorado, CDOW is in a monitoring mode to detect and track the course of infections.

Hausleitner (2003) tested her trapped greater sage-grouse for a variety of disease pathogens. The population of greater sage-grouse in the Axial Basin and Danforth Hills does not appear to be infected with avian influenza, *Salmonella pullorum*/*S. typhoid*, *Mycoplasma gallisepticum* or *M. melagridis*. Individual sage grouse tested positive for *M. synovial*, but were not necessarily infected with the disease. To determine any impacts of the disease, individuals need to be experimentally injected with pathogen and then associated with body condition, serum chemical constituents and fitness measures (Hausleitner 2003). Collection of sage grouse parasite and disease organism samples while handling birds for other research would provide additional information about the risk of disease outbreaks at little additional cost.

The loss of genetic variability has been suggested in Gunnison sage-grouse and isolated populations of greater sage-grouse. One of the results of the statewide Colorado Greater Sage-Grouse Conservation Plan (CCP) will be to evaluate the viable population level for each of the greater sage-grouse populations in Colorado. This effort will assess the genetic fitness of each population and its susceptibility to loss of genetic variability. The large areas of contiguous range, multiple populations and suspected interchange between populations in Northwest Colorado are believed to minimize the concern that genetic depression is likely to occur. The GSGWG will remain aware of the potential for genetic depression to occur in isolated populations. Research results from radio-telemetry studies should be assessed to identify potentially isolated populations. Telemetry locations on radioed chicks in the winter of 2005-2006 showed substantial movements between Northwest Colorado Management Zones, including some of those farthest from the core areas in central Moffat County. Collection of genetic reference samples from birds handled for other research purposes would add additional information about the risk for genetic depression at little additional cost. Oyler-McCance et al. (2005) suggest that greater sage-grouse on Cold Spring Mountain are genetically distinct from those in Middle Park and Eagle-South Routt. Genetic testing of greater sage grouse in eastern Moffat County and western Routt County may provide more clarity on the genetic links between the Northwest Colorado population and its neighbors to the east. In the meantime, any transplants of greater sage-grouse should move along North-South lines instead of East-West lines.

Disease and Genetics Goals:

- ✓ Monitor populations for disease outbreaks and develop and implement additional conservation actions if serious outbreaks develop in the future.
- ✓ Evaluate the risk of genetic depression if any isolated populations of greater sage-grouse are discovered through future research.

Conservation Actions Table IV. Disease and Genetics

VI. CONSERVATION ACTIONS - DISEASE AND GENETICS		
Issues	Objectives	Strategies
<p>A. Effects of disease and genetics on local greater sage-grouse population.</p> <p>(Most Strategies address Listing Factor C, Strategies c, d address Listing Factor E)</p>	<ol style="list-style-type: none"> 1. Improve knowledge of disease in greater sage-grouse populations. 2. Improve knowledge of genetics in greater sage grouse and relation to minimum viable populations. 	<ol style="list-style-type: none"> a. Collect greater sage-grouse parasite and disease organism samples while handling birds for other research. b. Collect blood samples from greater sage-grouse to determine if they have diseases or other physical problems. c. Collect samples for genetic research, especially from eastern Moffat County and western Routt County. d. Conduct minimum viable population modeling by Management Zone. e. Monitor radio-collared and other greater sage-grouse for West Nile Virus and other disease outbreaks.

Planning and Outreach

Planning and outreach needs are apparent both within the GSGWG and between the GSGWG and the general public. Effective implementation of this Conservation Plan requires the application of adaptive management strategies in which conservation efforts are continually monitored and adjusted. The GSGWG will continue to fill a role in coordination of greater sage-grouse conservation activities, compilation and dissemination of information on greater sage-grouse in Northwest Colorado, and evaluation of progress in the implementation of this Conservation Plan. The development of this Plan has brought people of many different viewpoints and backgrounds together for the conservation of greater sage-grouse. A great deal of progress has been made within the GSGWG in understanding the needs and desires of the various viewpoints held by the members of the group, but much work remains. Agency professionals, livestock producers, and others must become more tolerant, understanding and respectful of each other’s perspectives and continue to focus on areas of mutual interest.

The GSGWG will meet at least twice annually, but likely much more often, to review the status of greater sage-grouse in Northwest Colorado, the status of this Conservation Plan and to coordinate approaches to implementation and monitoring. The GSGWG will annually review greater sage-grouse population performance, habitat and other data collection, conservation actions implemented, and progress toward conservation goals, and will make needed changes in the Conservation Plan and the direction of conservation efforts. The GSGWG will specifically review population estimates to determine whether changes in hunting seasons should be recommended to CDOW and the Wildlife Commission. An annual work plan will be prepared that will describe conservation actions to be implemented that year. The GSGWG will also prepare an annual report for the USFWS describing greater sage-grouse conservation activities conducted in the previous year and progress toward population goals. These annual GSGWG meetings will provide the necessary guidance and coordination for greater sage-grouse

conservation efforts and also serve to maintain working relationships and increase mutual understanding between GSGWG members.

The GSGWG will continue to increase awareness of greater sage-grouse status in Northwest Colorado, develop and distribute information about greater sage-grouse management, encourage consideration of greater sage-grouse in land management and land use planning decisions, and educate members of the public in ways to minimize human impacts on greater sage-grouse.

Planning and Outreach Goals:

- ✓ GSGWG will annually plan, monitor and report progress toward implementation of this Conservation Plan.
- ✓ Increase public knowledge of and support for greater sage-grouse conservation in Northwest Colorado.
- ✓ Wildlife professionals, livestock producers, and other entities will continue to become more tolerant, understanding and respectful of each other’s perspectives and focus on areas of mutual interest.
- ✓ Develop partnerships with local HPP committees, private landowners, federal land users, state and federal agencies, private conservation groups, and other interested or affected parties to identify projects mutually beneficial to greater sage-grouse, wild ungulates, and domestic livestock.
- ✓ Aggressively seek joint ventures with private conservation groups and other interested and affected parties to improve and/or acquire important greater sage-grouse habitats. Acquisition in this statement refers to protection of greater sage-grouse habitat through a variety of means ranging from management agreements through leases and conservation easements to fee title ownership where appropriate.

Conservation Actions Table VII. Planning and Outreach Activities

VII. CONSERVATION ACTIONS - PLANNING AND OUTREACH ACTIVITIES		
Issues	Objectives	Strategies
<p>A. Annual coordination</p> <p>(Most Strategies generally address Listing Factor D-GSGWG coordination is part of the regulatory framework, Strategy f addresses Listing Factor A)</p>	<ol style="list-style-type: none"> 1. The GSGWG will meet at least twice per year. Attendance includes but is not limited to, current members, private landowners, BLM, NRCS, CDOW, and FWS. The meeting agenda would include planning for the upcoming year and reviewing the previous year’s progress. 2. Annually review status of greater sage-grouse populations within Northwest Colorado to determine if changes in hunting seasons should be recommended to the Wildlife Commission. 	<ol style="list-style-type: none"> a. Develop long-term structure and procedures for the GSGWG to follow as it transitions from planning to implementation. b. Develop annual work plans to ensure completion of resource objectives. This should include proposed projects, resource objectives and a completion report of previous year’s activities. c. Provide Fish and Wildlife Service with a copy of the annual work plan and accomplishment report for previous year. d. Gather together information past and future greater sage-grouse conservation actions and serve as a clearinghouse across agency boundaries for information on treatments and other actions taken to benefit greater sage-grouse.

VII. CONSERVATION ACTIONS - PLANNING AND OUTREACH ACTIVITIES

Issues	Objectives	Strategies
	<p>3. Consider economic impacts to stakeholders in planning process.</p>	<p>e. Periodically review the Northwest Colorado Greater Sage-Grouse Conservation Plan and update its provisions as necessary to achieve goals.</p> <p>f. Schedule field tours to evaluate projects designed to enhance greater sage-grouse habitat.</p> <p>g. Review lek data and anecdotal material gathered by resource agencies and private landowners to annually assess current local greater sage-grouse population status.</p> <p>h. Determine how decisions will affect the economic viability of the stakeholders and provide incentives for change.</p> <p>i. Include stakeholders in the planning process in order to provide a win-win situation while working towards common goals.</p>
<p>B. Outreach and education</p> <p>(Education Strategies a, b, c, d, e address multiple Listing Factors depending on the content of information presented. Strategy f addresses Listing Factor D, Strategy g addresses Listing Factor E, Strategy h addresses Listing Factor C, Strategy i addresses Listing Factor A)</p>	<p>1. Increase awareness of greater sage-grouse status and decline.</p>	<p>a. Develop educational materials for schools, churches, clubs, etc. to describe the current status of the greater sage-grouse. Materials may include posters, pamphlets, etc.</p> <p>b. Create an educational video about greater sage-grouse conservation for use in schools, public events, and other forums.</p> <p>c. Create a user-friendly greater sage-grouse management guide for landowners and others.</p> <p>d. Communicate and coordinate with other greater sage-grouse working groups and others interested in greater sage-grouse issues to exchange ideas and information.</p> <p>e. Take advantage of opportunities to convey greater sage-grouse conservation information at public events.</p> <p>f. During the county planning process, create and strengthen zoning regulations and ordinances that regulate growth and reduce negative impacts to greater sage-grouse habitat.</p> <p>g. Encourage recreationists to control pets when recreating in potential greater sage-grouse habitats.</p> <p>h. Educate homeowners about the impacts of free-ranging pets on greater sage-grouse chick survival.</p> <p>i. Extend information & education on ecosystem management.</p>
<p>C. Other threatened & endangered species influences on greater sage-grouse.</p> <p>(This Strategy mostly addresses Listing Factor D)</p>	<p>1. Identify other T&E species that nest, migrate, or otherwise use resources in sagebrush/grass habitat.</p>	<p>a. The effects of other T&E species on greater sage-grouse cannot be controlled by this Plan. However, The USFWS will consider the effects of specific actions related to greater sage-grouse on threatened or endangered species. At the present time, the black-footed ferret is the only federally listed species occurring in greater sage-grouse habitat in Northwest Colorado. Moffat County black-footed ferret populations are designated “experimental, non-essential” under section 10(j) of the Endangered Species Act and should not be a factor in sage grouse management. Although their habitats overlap, it is unlikely that actions to benefit greater sage-grouse would conflict with black-footed ferret habitat.</p>