Part IV: Implement-ation and Monitoring

PART IV. IMPLEMENTATION AND MONITORING

Implementation Process

The Northwest Colorado Greater Sage-Grouse Working Group (GSGWG) has spent untold hours since 1996 working on the details of this Conservation Plan, making sure the words convey the exact meaning intended. Without effective implementation, however, this Plan will remain exactly that—just words. The GSGWG has already begun the implementation of many of the habitat conservation strategies listed above (see Appendix C). Effective implementation of this Conservation Plan will require that the GSGWG remains an active and involved force in planning, coordinating, conducting, and evaluating the application of conservation strategies described in this Plan. The GSGWG is uniquely qualified to serve as a coordinating body among agencies and between the public and private sectors to ensure the consistent and effective application of greater sage-grouse conservation efforts.

The Conservation Plan must be a living document to be successful. Using the principles of adaptive management, the GSGWG will be responsible for periodically evaluating the management hypotheses and conservation goals, objectives, and strategies developed in the Conservation Plan and adjusting them to meet changing realities. This Conservation Plan and the GSGWG's efforts in developing and implementing it are for the long-term. Continual operation for many years, perhaps forever, will be required to meet the goals of the Conservation Plan and ensure the continued persistence of greater sage-grouse in Northwest Colorado.

Good adaptive management requires a commitment to monitoring. The GSGWG will be involved in monitoring the trend of greater sage-grouse populations within Northwest Colorado, status of greater sage-grouse habitats in Northwest Colorado, the application of conservation strategies from this Plan, the effectiveness of those strategies, and the response of greater sage-grouse populations and habitats to the strategies.

It is the purpose of this section to describe the manner and process by which greater sage-grouse conservation activities will proceed and the priority assigned to various Management Zones and conservation activities. It is expected that this implementation process will be conducted in the same manner in which the overall Plan was written – through an open discussion process and consensus decision-making. Implementation of conservation actions on private lands and by private individuals and organizations is voluntary. There will be situations, however, when the voluntary nature of this Plan will conflict with an agency's legal or ethical responsibility to act. Nothing in this Plan relieves any agency of their responsibility or authority to manage lands or resources to protect wildlife, habitat or other public uses, whether required by policy or statute.

Working Group Structure and Role

The Northwest Colorado Greater Sage-Grouse Working Group represents diverse interests and a variety of agency and private sector viewpoints. It has a ten-year history of working together and a proven record of implementing management actions to further the cause of greater sage-grouse conservation in Northwest Colorado during the development of this Conservation Plan. The GSGWG was originally organized as a committee under the Northwest Colorado

Coordinated Resource Management Steering Committee, a citizen group organized to support and participate in coordinated resource management issues within the Little Snake Field Office of the Bureau of Land Management. The GSGWG has long outlasted its parent. The Coordinated Resource Management Steering Committee became inactive many years ago while the GSGWG has continued to function on its own. The GSGWG has operated with open membership, without designated leadership, and by complete consensus of participants in decision making.

The informal structure the GSGWG has used in developing the Conservation Plan will probably not be sufficient once the GSGWG transitions from plan writing to full-time implementation. A more formal structure will be necessary in furthering the work of the GSGWG. The original operating guidelines (finalized in May, 1997) of the GSGWG are included below. They may serve as a basis for formalizing a new working group structure. While the CRM Steering Committee is no longer functional, other portions of the guidelines still have merit. Formalizing the work group structure in a separate, stand-alone set of Standard Operating Procedures (based on the original operating guidelines) will be one of the first tasks needing completion as the GSGWG begins to implement the Conservation Plan. The GSGWG should still strive to maintain consensus decision making, diverse and open membership while developing a process to select officers and run meetings.

The GSGWG will meet at least twice each year to conduct business. Other meetings may well be necessary during active implementation periods. Regular semi-annual meetings should be scheduled in the fall or winter to develop the annual work plan for the following field season and to review progress from the past season and in the late spring or early summer to evaluate that year's lek counts and verify the appropriateness of hunting season recommendations.

The GSGWG will prepare an annual work plan each year to set out implementation goals and targeted locations for the year's implementation efforts. The GSGWG will annually compile an accomplishment report listing and detailing conservation actions applied in Northwest Colorado to implement this Conservation Plan. These annual reports will be appended to this Conservation Plan and shared with other local work groups, the statewide Greater Sage-Grouse Conservation Plan steering committee, the U.S. Fish and Wildlife Service and other work group partners.

The Role of the Conservation Plan

The body of the Northwest Colorado Greater Sage-Grouse Conservation Plan describes greater sage-grouse biology and habitat, trends in land use and greater sage-grouse populations, limiting factors and issues believed to cause those population trends. The associated conservation strategies are designed to maintain and enhance greater sage-grouse populations and habitat. The Conservation Plan provides a road map for the GSGWG to use in developing more specific, site-based work plans. The primary implementation of this Conservation Plan will be conducted and documented through the annual work plan and performance report developed by the GSGWG.

This Conservation Plan represents the best efforts of the GSGWG in identifying and prioritizing conservation strategies that will be necessary to maintain greater sage-grouse in Northwest Colorado. While every effort was expended to maintain flexibility in the application of the conservation strategies, changing circumstances with time will certainly require course corrections as implementation of this Plan continues through time. The Plan is structured and intend to be a living document. It is expected that revisions to the Plan will occur through time. Revisions will be developed through consensus decision making by the GSGWG and with the concurrence of signatories to the Conservation Plan.

Greater Sage-Grouse Management Zones

This Implementation and Monitoring section of the Plan divides Northwest Colorado greater sage-grouse habitat into 10 Management Zones. These Management Zones will serve as the smallest areas for greater sage-grouse conservation planning, habitat management, and evaluation under this Conservation Plan. Greater sage-grouse habitat in Northwest Colorado is too extensive and too diverse to effectively manage as a single unit. These Management Zones were designed to include areas of greater sage-grouse habitat with similar vegetation, climatic potential, different greater sage-grouse population trajectories, dominant land ownership, and land use differences. Management Zones serve as manageable building blocks to ensure the conservation of greater sage-grouse across Northwest Colorado.

The importance of Management Zones to the effective implementation of the Northwest Colorado Greater Sage-Grouse Conservation Plan cannot be overstated. All of the GSGWG's management philosophy is tied to the use of these Management Zones. While greater sage-grouse in all of the Northwest Colorado Management Zones are clearly linked together, the GSGWG intends to set population objectives, implement the strategies from the Conservation Plan, and measure progress as if each of the 10 Management Zones was a separate population.

Because breeding season counts are the most reliable method available for determining population trend and response to management actions, Management Zones are drawn around greater sage-grouse breeding complexes. Dividing lines are primarily topographic divides, rivers and streams, or extended distances of unoccupied breeding habitat, although some political boundaries are also used. Great care was taken in dividing the Zones not to separate greater sage-grouse leks that clearly appeared to be geographically related. Though not necessarily representing definitive populations or biologically separate sub-populations, Zones are believed to include discrete groups of breeding birds and their suspected nesting and brood rearing habitats. Winter range use is poorly understood in Northwest Colorado at this time, but it is likely that there is significant movement between Zones in the winter. Where possible, Zone boundaries are similar to Division of Wildlife Game Management Unit boundaries to facilitate adjustment of hunting regulations in the various Zones. Management Zones were also structure to be consistent with historic greater sage-grouse data collection areas dating back decades (e.g. Cold Springs, Blue Mountain, Moffat County North Central, Moffat County East, Moffat County South). Management Zone boundaries are shown in Figure 35.

Zone 1
Zone one is bounded on the west and the north by the Utah and Wyoming State Lines respectively. The east boundary is Vermillion Creek to Highway 318. The south boundary is Moffat County Roads 10 and 34 as far as the Green River and then the base of the Diamond Breaks to the Utah State Line. Geographic features include Browns Park and Cold Spring Mountain. Major drainages include Beaver Creek, Talamantes Creek, and the Green River.

Zone 2
Zone 2 is bounded on the west by the Green River, Moffat County Roads 10 and 34, and Vermilion Creek north to the Wyoming State Line, which then defines the north boundary. The Little Snake River and the Yampa River define the east and south boundaries respectively. Geographic features include Douglas Mountain, Sand Wash, and Powder Wash. Sand Wash and Powder Wash are also the major drainage basins.

Zone 3a
The Little Snake River defines the west boundary of Zone 3a. Zone 3a is bounded on the north by the drainage divide between Greasewood Gulch and Bighole Gulch and on the east by the drainage divide between Spring Creek and Lay Creek. Highway 40 and Highway 318 define the south boundary. Geographic features include the Godiva Rim, and drainage basins include Spring Creek, Sand Creek, Red Wash, and Greasewood Gulch.

Zone 3b
Zone 3b is bounded on the west by the drainage divide between Greasewood Gulch and Bighole Gulch to the Little Snake River. The north boundary is made up of the Little Snake River and the Wyoming State Line. The east boundary is the drainage divide between Willow Creek and Slater Creek. The south boundary is the drainage divide between Fourmile Creek and Fortification Creek, then Moffat County Road 38 running west as far as Highway 13, then south down Highway 13 to the drainage divide between Timberlake Creek and Big Gulch and west along the drainage divide. Great Divide is the major defining geographic feature. Drainage basins include Bighole Gulch, the Little Snake River, Timberlake Creek, Fourmile Creek and Willow Creek.

Zone 3c
Zone 3c is bounded on the west by Spring Creek and the drainage divide between Spring Creek and Lay Creek and on the north by the drainage divide between Timberlake Creek and Big Gulch. Highway 13 south to the Yampa River defines the east boundary and the Yampa River is the south boundary. Zone 3c includes the town of Lay. Drainage basins include Lay Creek, Big Gulch, and Blue Gravel Creek.

Zone 4a
Zone 4a is bounded on the west by the drainage divide between Willow Creek and Slater Creek and the Wyoming State Line on the north. The drainage divide between Slater Creek and Elk River makes up the east boundary. The south boundary largely follows the drainage divide

between Slater Creek and Elkhead Creek. California Park is the major geographic feature of Zone 4a, which also includes the town of Slater. Roughly 2/3 of Zone 4a is in Routt County. Drainage basins include Slater Creek, the Little Snake River, and headwaters of Elkhead Creek.

Zone 4b

Zone 4b is bounded on the west by the Williams Fork River to the Yampa River to Highway 13 north to Moffat County Road 38. The north boundary is roughly the drainage boundary between Slater Creek and Elkhead Creek. The east boundary is roughly the Elk River to the Yampa River, south along the drainage divide between Trout Creek and Oak Creek as far south as Routt County Road 29. The south boundary is Routt County Road 29 to near Routt County Road 53, then the drainage divide between the Williams Fork River and the Yampa River. Geographic features include Sleeping Giant, Twentymile Park, and Breeze Basin. The town of Hayden is located in Zone 4b and the majority of this zone is in Routt County.
Drainage basins include the Yampa River, Elkhead Creek, Fish Creek, Trout Creek, and Grassy Creek.

Zone 5

The west boundary of Zone 5 follows the White River, then the drainage divide between Crooked Wash and Wolf Creek north to Twelvemile Gulch, then Twelvemile Gulch to the Yampa River, west to the Little Snake River, and then along the Little Snake River north to Highway 318. The north boundary is defined by Highway 318 from the Little Snake River to Highway 40, then Highway 40 to the Yampa River, and finally by the Yampa River to the Williams Fork River. The northeast boundary is roughly the Williams Fork River to Hamilton and the drainage divide between Williams Fork and the Yampa Rivers between Hamilton and Routt County Road 53. The south boundary is approximately the drainage divide between Williams Fork/Milk Creek and the White River and Strawberry Creek drainages to the south as far as Moffat County Road 57, then along the drainage divide between Strawberry Creek and Crooked Wash to the White River. Geographic features in Zone 5 include Axial Basin and Crooked Wash. The town of Hamilton is in this zone. Portions of Zone 5 are in Rio Blanco County. Major drainage basins include the Williams Fork River, Milk Creek, Morgan Creek, and Deception Creek.

Zone 6

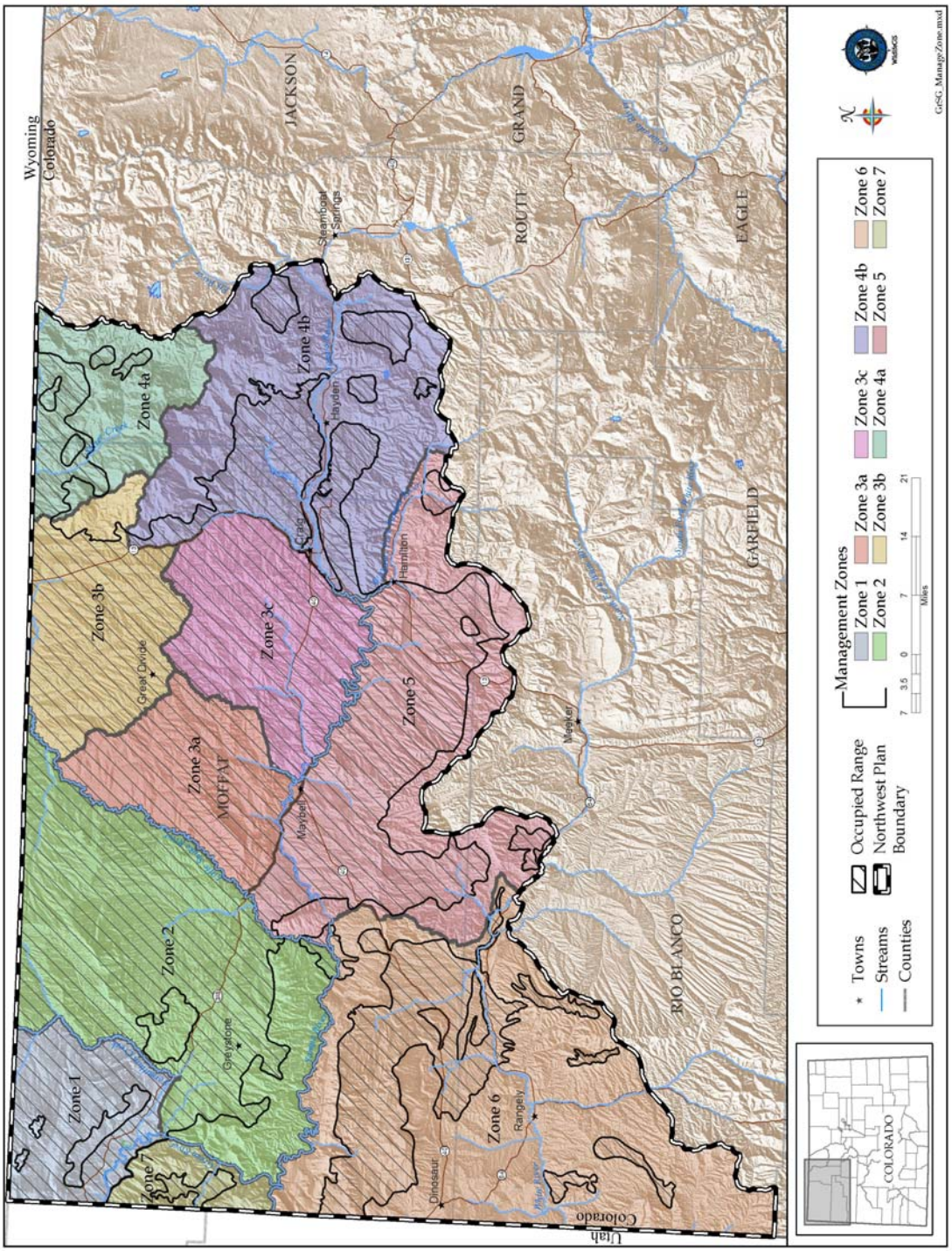
Zone 6 is bounded on the west by the Utah State Line. The north boundary follows the Green River, the Yampa River, and Twelvemile Gulch. The east boundary is Twelvemile Gulch and the drainage divide between Wolf Creek and Crooked Wash to the White River, then follows the drainage divide between Douglas Creek and Yellow Creek to Calamity Ridge, and then runs southwesterly to the Utah State Line. The Garfield County Line is the south border. Blue Mountain is a major geographic feature of Zone 6. The towns of Rangely, Dinosaur, and Elk Springs are in this zone. Much of Zone 6 is in Rio Blanco County. Drainage basins include Wolf Creek, Red Wash, Douglas Creek, and the White River.

Zone 7
Zone 7 is bounded on the west by the Utah State Line, on the north by the base of the Diamond Breaks and on the east and south by the Green River. Geographic features include Diamond Mountain and Wild Mountain. Pot Creek is the primary drainage basin.

Zones 3a, 3b, and 3c and Zones 4a and 4b are the most connected of all of the Management Zones. There is clearly close association between greater sage-grouse in Zones 3a, 3b, and 3c. The different management challenges and population trajectories are the basis for separating these Zones from one another. Management Zones 3a, 3b, and 3c together comprise the majority of the old Moffat County North Central. Current and historic greater sage-grouse population data resulting from wing collections in Zones 3a, 3b, and 3c are analyzed as one unit. Zones 4a and 4b represent a similar situation east of Highway 13, the old Moffat County East data area. Wing data for Zones 4a and 4b has also been collected together historically.

The GSGWG felt that greater sage-grouse could be more effectively managed in these Zones by considering portions of both large areas individually. Zones 3a, 3b, and 3c and Zones 4a, and 4b are distinguished from one another by different patterns of land ownership, habitat quality and capabilities, and historic land uses. Zones 3a, 3b, and 3c have each demonstrated different greater sage-grouse population trends in recent years. These differences may result from contrasts in habitat capability, condition or management between sub-Zones or from historic undercounts on private land, but they are more effectively managed separately.

Figure 35. Management Zone map



Greater Sage-Grouse Inventory

Greater sage-grouse are primarily inventoried by counting males displaying on leks. These counts provide an index of population trend. Colorado Division of Wildlife biologists estimate that an average of 54% of the male greater sage-grouse associated with each lek are observed during these spring counts (Beck and Braun 1980, Walsh et al. 2004). Data indicates that greater sage-grouse populations average two females for every male (Connelly et al 2000). Several techniques have been proposed for generating estimates of breeding population size (males and females) from these figures. Each of the techniques requires several assumptions that can cloud the analysis.

Prior to 1985, attempts were also made to count greater sage-grouse broods along established routes in Northwest Colorado. These routes did not produce reliable data, however, and were discontinued. The routes were heavily influenced by water availability. In dry years when grouse numbers were low, birds gathered along watercourses where they were easily seen. In wetter years when sage grouse numbers were high, birds often spread over wider areas making them more difficult to find, resulting in a lower population estimate than was warranted.

Wing barrel collection stations were first developed by the Arizona Game and Fish Department to measure sage grouse harvest and to gather additional information on sage grouse demographic parameters. Arizona's techniques were modified by Hoffman and Braun (1975) for use in Colorado. Greater sage-grouse age and sex ratio as well as nesting success information from wing collection are valuable pieces of information for management purposes and are used in setting hunting season dates and bag limits and in monitoring the health and status of greater sage-grouse populations. Production information is currently collected from harvested sage grouse wings but a reliable field brood index/census method would be welcomed to supplement the wing data.

Figure 36. Whole population lek counts—three year running average

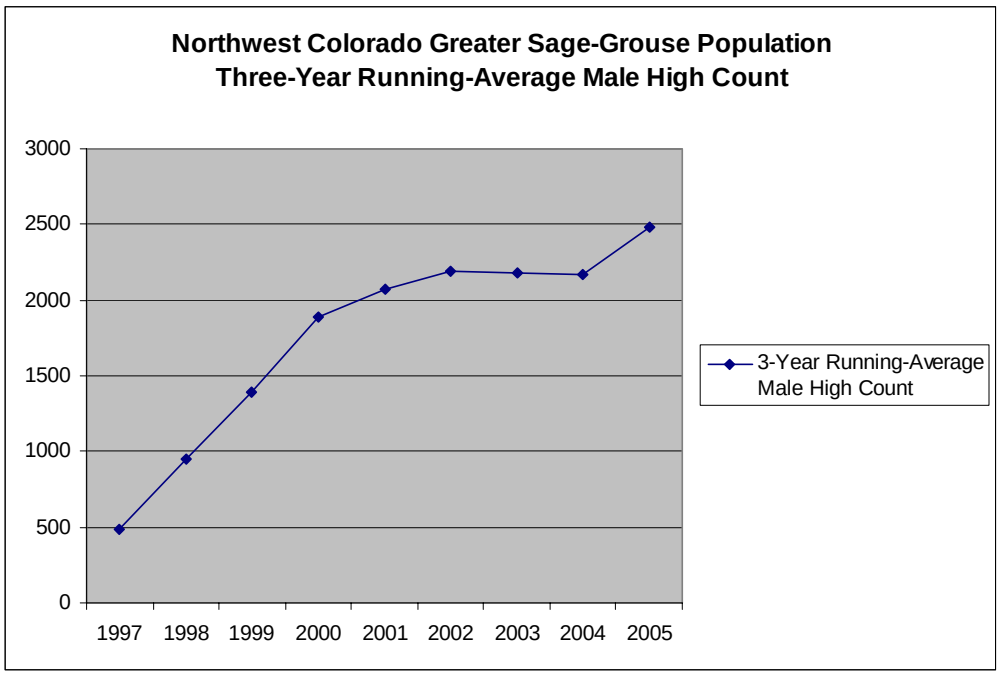


Figure 37. Management Zone 1 lek counts—three year running average

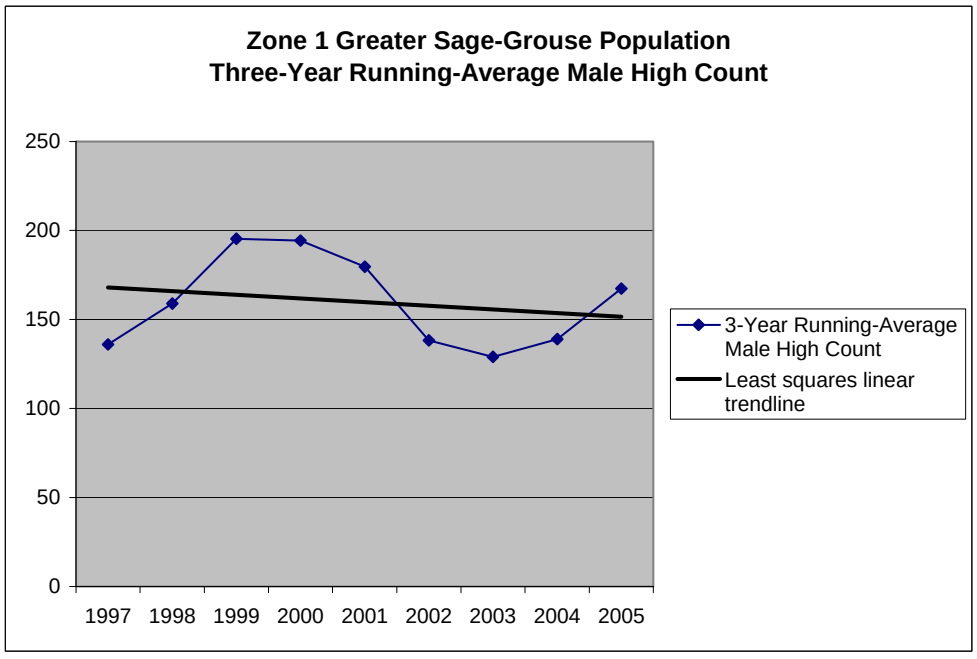


Figure 38. Management Zone 2 lek counts—three year running average

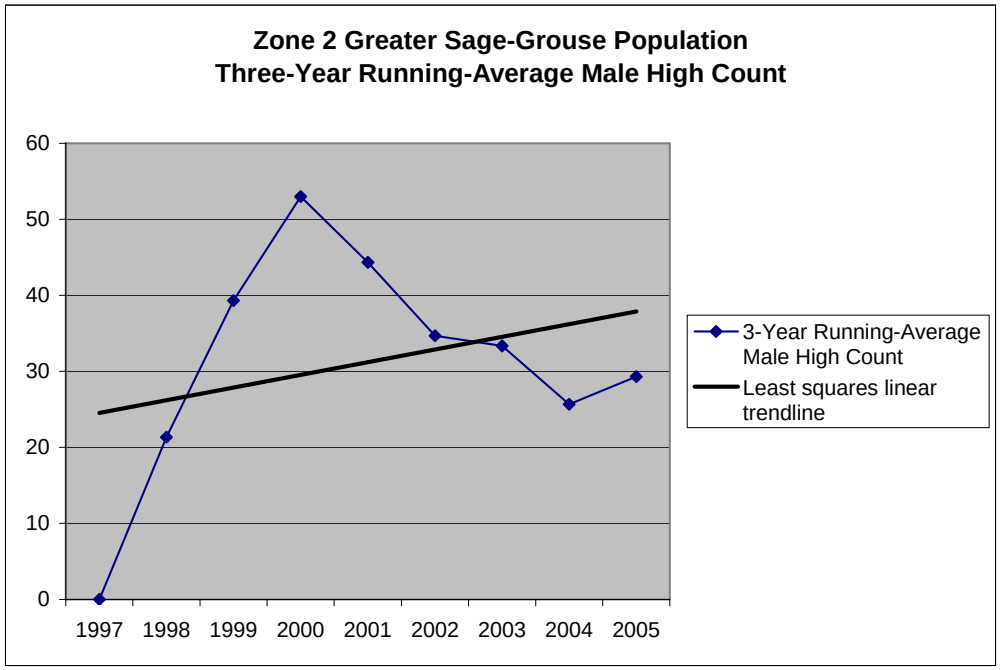


Figure 39. Management Zone 3a lek counts—three year running average

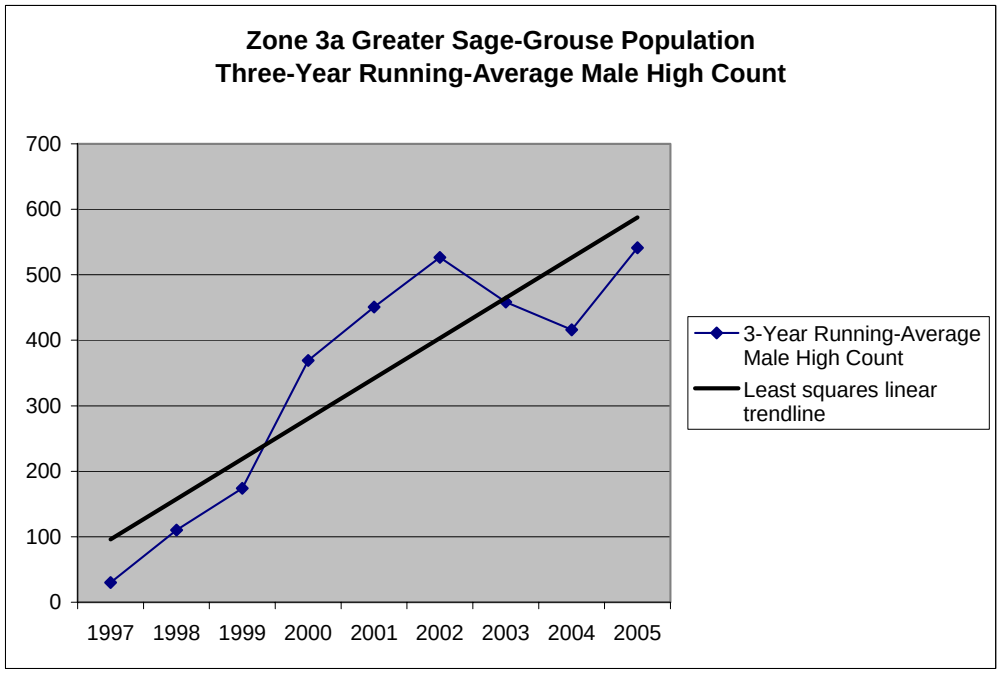


Figure 40. Management Zone 3b lek counts—three year running average

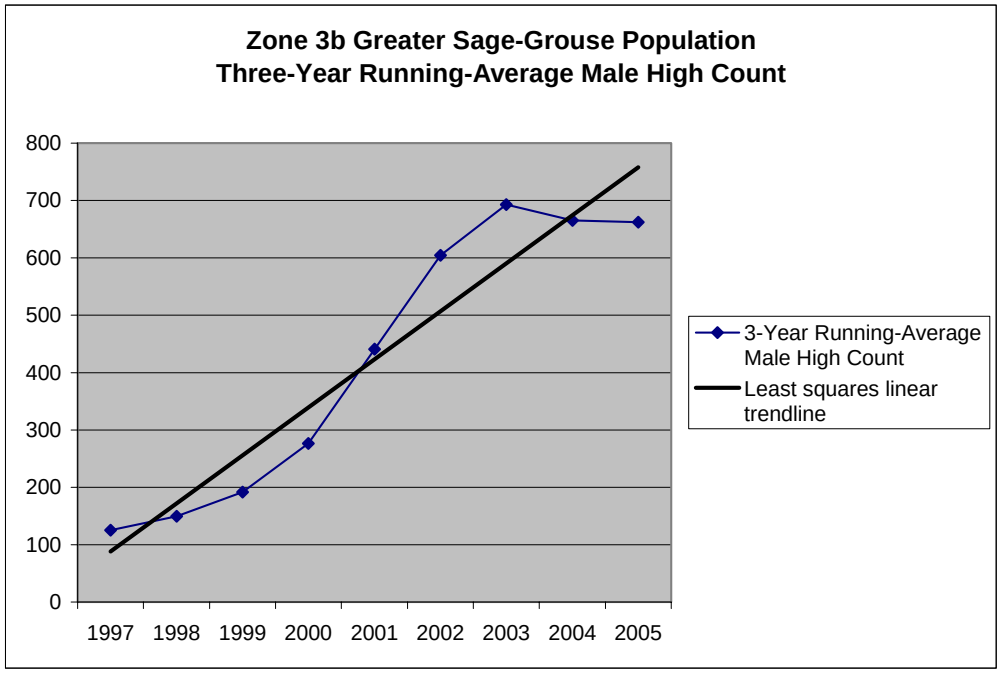


Figure 41. Management Zone 3c lek counts—three year running average

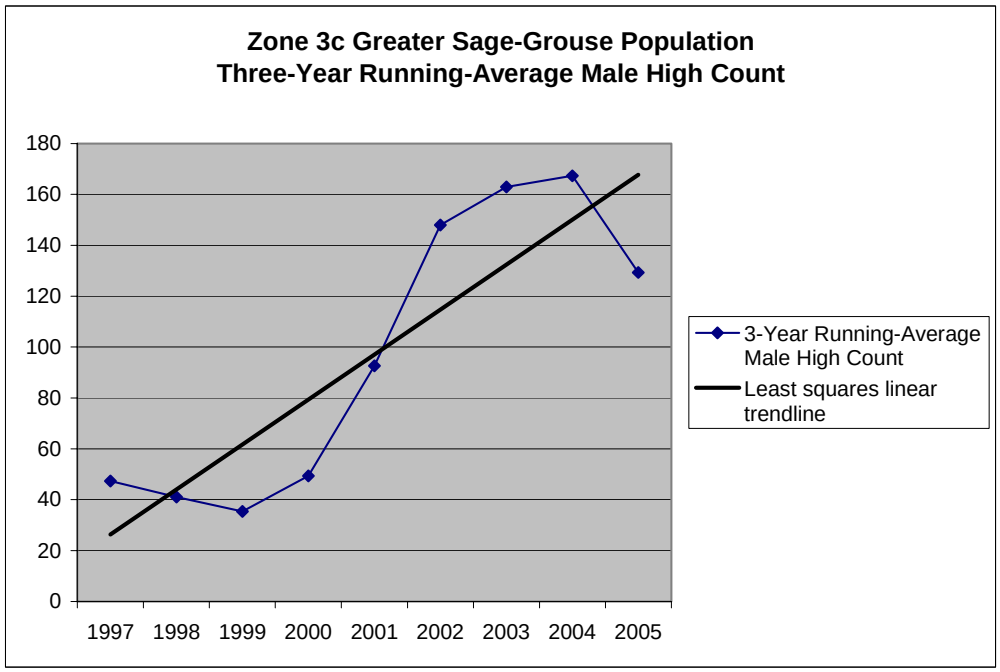


Figure 42. Management Zone 4a lek counts—three year running average

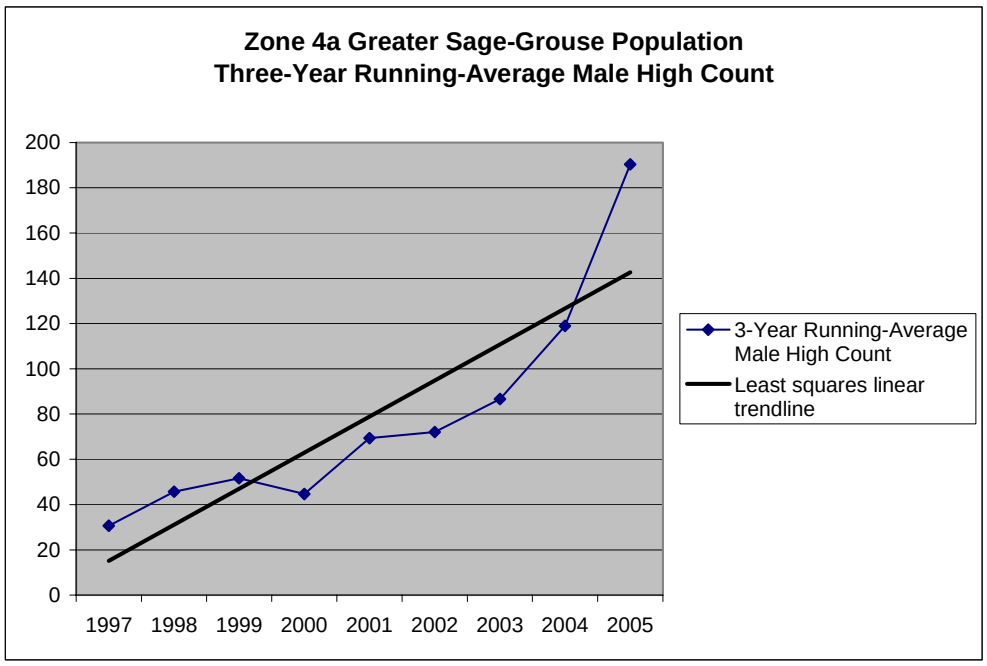


Figure 43. Management Zone 4b lek counts—three year running average

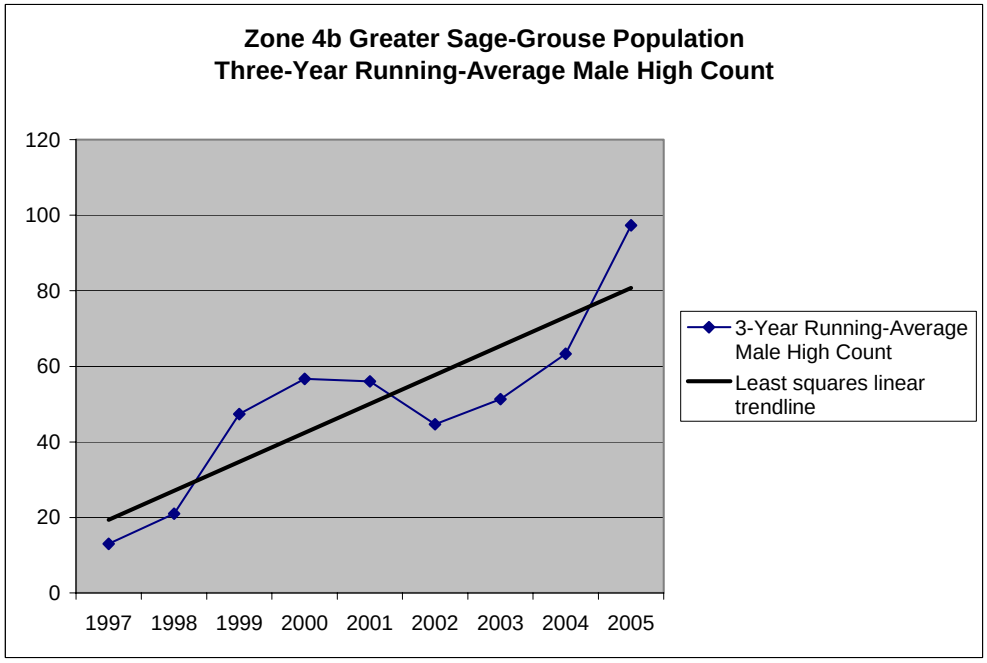


Figure 44. Management Zone 5 lek counts—three year running average

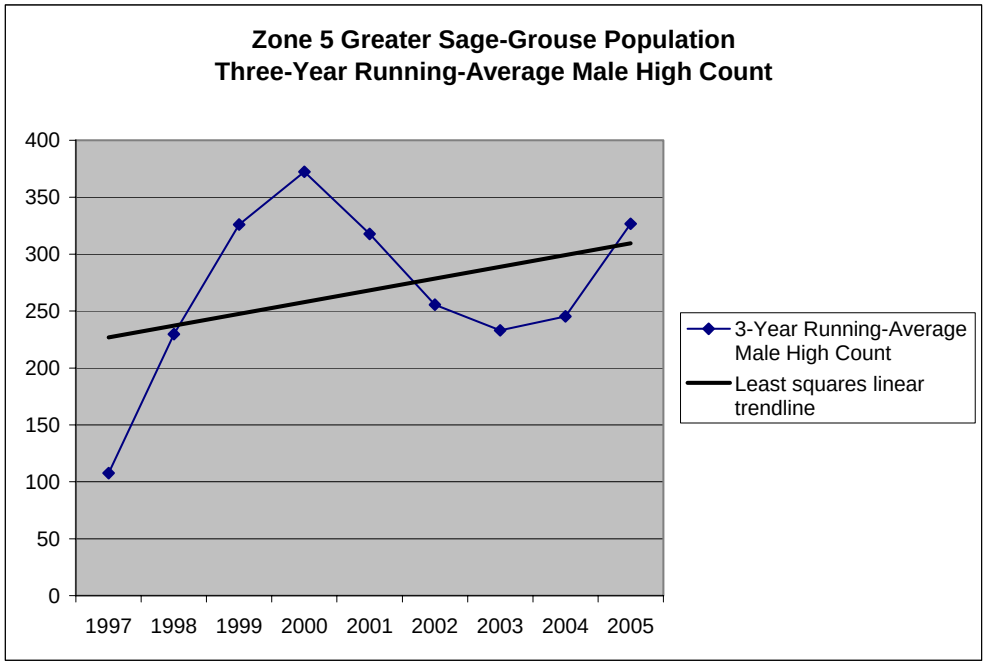


Figure 45. Management Zone 6 lek counts—three year running average

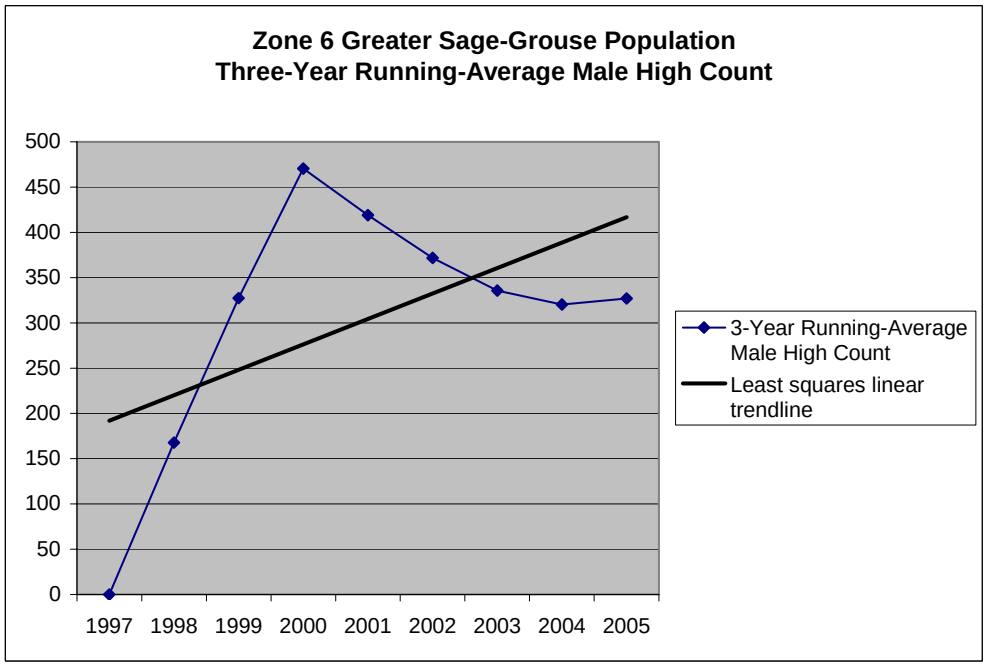
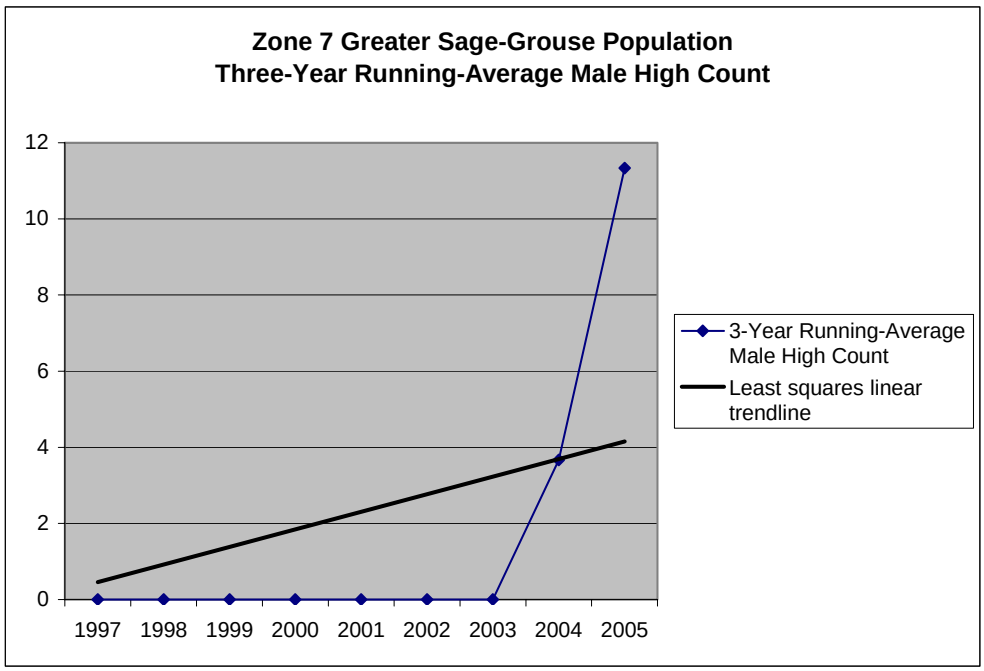


Figure 46. Management Zone 7 lek counts—three year running average



The GSGWG will use spring male counts on leks as the primary inventory technique for determining greater sage-grouse population trend with the number of active leks and the average number of males per lek also considered. Management Zone specific three-year running averages of high male counts will be the primary criterion for measuring progress. Three year running average graphs of the whole Northwest Colorado population and each Management Zone are presented in Figures 36-47.

This Conservation Plan also calls for the development and maintenance of a trend measurement of greater sage-grouse populations in Northwest Colorado consisting of a subset of the leks in each Zone which have a long count history. This measurement of high male counts on a fixed subset of leks will help to evaluate whether changes in lek counts are the result of real changes in the population or whether they result from changes in count effort or efficiency. While the total male count by Management Zone will be the primary measure of progress for the GSGWG, this supplemental trend information will be used, once developed, to evaluate fluctuations in the data caused by varying lek counting effort between years and the discovery and addition of newly discovered leks to the total count over time.

Wing barrel data will provide important supplementary information on production. Brood counts will not be used unless a better technique is developed. Other survey techniques will be

evaluated and incorporated if they show promise for achieving better sage grouse population size and trend information.

Development of Population Targets

Population targets for greater sage-grouse in Northwest Colorado are described in terms of the total number of males counted on leks in the spring for each Management Zone and for the Northwest Colorado population as a whole. Progress toward sage grouse conservation will also be measured by this high male count standard rather than a more complicated and speculative total population estimate. The GSGWG will use a three-year running average of lek counts for each Management Zone and for the whole population for decision making to smooth out annual variations in lek counts. Trend lines showing the number of active leks and the average number of males per lek are secondary measures of how the population is distributed within each Management Zone or the entire population.

The GSGWG believes that the Northwest Colorado greater sage-grouse population is currently stable to increasing. High male counts in individual Management Zones and the population as a whole have increased substantially since 1998. The GSGWG is confident that current populations of greater sage-grouse in Northwest Colorado are sustainable for the foreseeable future, especially in the Management Zones that make up the core of the population (Zones 1, 3a, 3b, 4a, 5, and 6), and in the population as a whole.

Population targets are derived from the average (mean) of high male lek counts in a Management Zone or the entire population from 1998 through 2005 (the eight most complete and most recent years of data). Means, rather than medians, are used in development of population targets in this Plan because they are the most widely used and understood estimate of the central tendency of data sets. As data sets increase in length, the mean and median tend to approximate one another. Lek counting effort was relatively constant during this period, so some of the variability inherent in lek counts is dampened during this period. Populations are expected to fluctuate around this average (population target range). Future greater sage-grouse population data (i.e. lek counts) will be collected consistent with current (2006) standards and practices to maintain consistency in the data set and to avoid confounding estimates as a result of increased or decreased effort to find and count leks.

Management Zone-specific population target ranges are presented in Table 14. These population target ranges are defined to be from 25% below the mean of 1998-2005 high male counts to the mean. This range from 25% below the mean to the mean is also considered an “evaluation zone”. The GRSGWG intends to maintain greater sage-grouse populations at or above these levels. Currently, all Management Zones and the whole population fall within or above the population target ranges, by a substantial margin in some cases.

Management of greater sage-grouse in Northwest Colorado will be on-going as opportunities arise and as appropriate for working group partners. However, when any Management Zone or the whole population is determined to be in the “evaluation zone”, the GSGWG will, within one

year, take steps to determine what has caused the Management Zone or whole population to reach this level and to determine what, if any, strategies and actions currently described in this Plan or otherwise, can be implemented to abate factors causing population declines and to reverse the trend.

These population target ranges are intended to be long-term population goals and are developed to maintain significant populations of greater sage-grouse consistent with habitat capability. They are also intended to be realistic and achievable and to reflect the fluctuating nature of greater sage-grouse populations and are based on the best and most consistent data available. However, the GSGWG acknowledges that it is just beginning to understand annual and periodic variation in this population, including the possible action of population cycles, and the current location of the Northwest Colorado population within its long-term trends, variability and cycles. The GSGWG will use the principles of adaptive management to set future population targets as better, more complete data becomes available and reserves the right to update population targets based on future data.

Table 14. Whole population and Management Zone specific population targets

	Whole Pop.	**Zone 1**	**Zone 2**	**Zone 3a**	**Zone 3b**	**Zone 3c**	**Zone 4a**	**Zone 4b**	**Zone 5**	**Zone 6**	**Zone 7**
Population Target Range	1643 to 2191	125 to 167	29 to 39	195 to 461	398 to 531	82 to 109	85 to 113	53 to 70	238 to 317	289 to 385	3 to 4
2005 Raw High Male Count	3100	202	36	825	731	78	267	153	428	357	23
2003 -2005 3-Yr. Running Average	2482	167	29	541	662	129	190	97	327	327	11
1998 Initial Year of Good Data	1749	177	64	258	195	12	69	49	422	503	0
1998-2005 Average (Mean) High Male Count	2191	167	39	461	531	109	113	70	317	385	4
Mean minus 25%	1643	125	29	195	398	82	85	53	238	289	3

Prioritization of Management Zones

The GSGWG anticipates that one or two Management Zones will receive intensive effort each year. Zone priorities have been established based on the health of sage grouse in the Zone and their ability to respond to management, the capability of the Zone to provide sage grouse habitat, the level of threat facing sage grouse within the Zone, and opportunities for management, including land ownership patterns and other ongoing projects. This assessment of Management Zones and resulting Zone priorities derived from it is included in Table 15. The GSGWG intends to focus first on those Zones which have significant populations and high ability to respond (i.e. to protect the core areas first) rather than Zones where populations are seriously depleted or habitat is incapable of significant response without a major infusion of energy.

As the Conservation Plan amply demonstrates, none of the Management Zones in the Northwest Colorado greater sage-grouse population are insignificant. All have substantial value to greater sage-grouse. Establishing Zone assessments is intended to help the GSGWG focus attention to identify and treat Zone issues comprehensively, and especially to do detailed assessments and prioritizations required to treat sage grouse issues over time, in each Zone. This will be done at least annually. It is also likely that work will be ongoing in many or all of the Zones at the same time.

Table 15. Assessment of Management Zones, (as of March 2007)

Management Zone	Population Trend*	Zone Potential**	Risk (actual and potential)***	Potential for Projects****
1	Moderate Stable	High	Moderate	High
2	Low Stable	Low	High	Low
3a	High Increasing	Moderate	Moderate	High
3b	High Increasing	High	High	High
3c	Moderate Increasing	Low	High	Moderate
4a	High Increasing	High	High	High
4b	Moderate Increasing	Low	High	High
5	Moderate Increasing	Moderate	Moderate	High
6	Moderate Increasing	High	Moderate	High
7	Low Increasing	Moderate	Moderate	Low

*For a detailed description of population trend, please see Section IV
**Capacity of the Zone to Support a Viable population of greater sage-grouse
***Potential for negative impacts—for a detailed description of issues affecting greater sage-grouse, please read the ENTIRE PLAN (Sections II and III)
****Capacity for project implementation, based on Work Group assessment of landowner willingness, land ownership patterns, cost, potential for success

Implementation by Management Zone—Where the Rubber Meets the Road
Due to the varied nature of sage grouse performance, habitat capability and conservation threats between Management Zones, each Zone will be evaluated and managed independently toward reaching and maintaining its own internal population target and the broader area-wide population target. Conservation strategies applied in each Management Zone will focus on meeting the desired condition for greater sage-grouse habitat and population performance on a sufficient portion of the Zone to meet population goals. Conservation activities may proceed at different rates and in different directions in each Management Zone based on the needs of the Zone, its priority in meeting overall goals and the availability of resources. To be successful, greater sage-grouse conservation in each Zone will require a mix of landscape level analysis and application of conservation strategies on a site-specific basis.

Implementing this Conservation Plan in each Zone will require a sub-committee of people with knowledge of conditions in that Zone. Each sub-committee should include a mix of agency personnel, landowners, permittees, and interested parties familiar with the area. These sub-committees will determine the importance of limiting factors, which lek complexes or winter ranges most need management attention within each Zone, and determine the capability of the Zone or site to provide greater sage-grouse habitat needs. Sagebrush species/subspecies mapping, stand character including age, and an overall detailed assessment of sage grouse habitat conditions will be conducted during this stage. These sub-committees will also determine the desired condition for each area, develop specific habitat structure parameters appropriate for the area, select the most effective and acceptable conservation actions for the sites, and implement these actions or recommend action to the appropriate agency. Cooperators will be enlisted to complete these actions.

Specific sites will have different capabilities and will respond to conservation actions in differing ways. Management objectives for any given site may be influenced by mixed land ownership, land uses, wildlife species present and a variety of other biotic and abiotic factors. Zone sub-committees should evaluate all possible solutions to each problem before making recommendations. Sub-committees should focus on solutions that achieve the desired effect with the lowest possible impact on existing uses. The GSGWG anticipates that several Zone sub-committees will be active simultaneously.

Monitoring and Evaluation of Plan
The conservation actions and implementation process will take effect as soon as the Plan is accepted and signed by the members and representatives of all interested parties. This Conservation Plan is intended to be an adaptive document, guiding greater sage-grouse management in Northwest Colorado for the long-term. The GSGWG defines adaptive management as:

> *Adaptive management [is a decision process that] promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an*

iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a 'trial and error' process, but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social, and economic goals, increases scientific knowledge, and reduces tensions among stakeholders.

Several important terms are frequently used in any adaptive management strategy: outcome, indicator, and trigger point. An outcome, which is also referred to as a desired outcome, can be thought of as a resource objective. Outcomes should be specific, measurable, achievable, realistic, and time-sensitive. An indicator is used to measure whether an outcome or resource objective is being reached. Indicators should be able to measure long-term as well as short-term changes. A trigger point is a predetermined value of an indicator that "triggers" thought or action. For example, a trigger point could be the "evaluation zones" of the population targets (25% below the mean).

Monitoring and evaluation of this Plan will consist of periodically answering the following questions:

- What is the status and trend of greater-sage grouse populations?
- What is the status and trend of greater-sage grouse habitats?
- What conservation strategies has the GSGWG applied, where and in what amounts?
- How did greater sage-grouse habitat respond to the conservation strategies?
- How did greater sage-grouse populations respond to the conservation strategies?

The U.S. Fish and Wildlife Service evaluates local conservation efforts when reviewing ESA listing petitions under the provisions of their Policy for the Evaluation of Conservation Efforts (PECE Policy) (USDI-USFWS 2003). The GSGWG intends this Plan to comply with PECE to the extent possible. PECE evaluates conservation efforts in two categories: certainty of implementation and certainty of effectiveness. The criteria are as follows:

Criteria for evaluating whether there is sufficient certainty of implementation:

1. The conservation effort, the party(ies) to the agreement or plan, and the staffing, funding level, funding source and other resources necessary to implement the effort are identified.
2. The legal authority of the party(ies) to implement the effort and the commitment to proceed with it are described.
3. Legal procedural requirements (e.g. environmental review) necessary to implement the effort are described, and information is provided indicating that fulfillment of these requirements does not preclude commitment to the effort.
4. Authorizations necessary to implement the effort are identified (e.g. permits, landowner permission), and a high level of certainty is provided that the authorizations will be obtained.

5. The type and level of voluntary participation necessary for implementation is identified (e.g. the number of participants agreeing to alter management practices and the acres involved), and a high level of certainty is provided that this level of voluntary participation will be obtained.
6. Regulatory mechanisms necessary to implement the effort are in place (e.g. laws, regulations).
7. A high level of certainty is provided that the necessary funding to implement the conservation effort will be obtained.
8. An implementation schedule, including incremental completion dates, is provided.
9. The conservation agreement or plan is signed/approved by all responsible parties.

Criteria for evaluating whether there is sufficient certainty of effectiveness:

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

Dependable measurement of progress will be required to evaluate the progress and success of this Plan and to guide its future adaptation. Monitoring efforts will focus on population performance measures, habitat conditions, and steps taken toward implementation of this Conservation Plan. Monitoring schedules, protocols, etc. will be detailed in annual implementation plans developed by the GSGWG and Management Zone subcommittees. Monitoring of several key factors will be required, including:

-greater sage-grouse population trend monitoring
-condition and trend of greater sage-grouse habitat
-natural and human caused treatments and developments in greater sage-grouse habitat
-cumulative impacts relating to treatment and development location, design and size
-tracking of any other conservation action applied in greater sage-grouse habitat
-continue to conduct scientific research to answer questions raised during the development and implementation of this Conservation Plan.

The primary measurement of progress toward management goals and ultimate success of this Conservation Plan will be annual total male counts on leks and the number of active leks each spring by Management Zone. Progress and management decisions will be made from analysis of three year running averages, updated annually, of total male and number of lek counts. Three year running averages will allow a more consistent view of trend by dampening annual fluctuations. The GSGWG will still remain alert to dramatic one-year population drops and take

appropriate action. This three year average will be correlated with counts from a subset of leks with a long continuous count history which will shed light on the effects of new lek discoveries, increased inventory intensity and other factors on total male counts. Greater sage-grouse population performance will be measured annually for as long as necessary. The CDOW will continue to conduct annual lek surveys to monitor population trends of greater sage-grouse in Northwest Colorado using current methods. As better population estimators become available, these will also be applied in Northwest Colorado in addition to lek counts. The Colorado Division of Wildlife, in cooperation with the GSGWG, will establish and maintain an up-to-date population database for greater sage-grouse in each Management Zone. The CDOW will also continue to record annual harvest and hunter effort using a combination of wing barrel stations, surveys, and questionnaires in all areas of Northwest Colorado where greater sage-grouse hunting occurs.

All greater sage-grouse habitat, including seasonal ranges where possible, and related information will be identified and mapped by Zone. The collection of adequate data for greater sage-grouse populations and habitat conditions will be coordinated between the BLM, CDOW, and GSGWG. The BLM, CDOW, and/or NRCS will establish monitoring transects and photo plots to record changes in plant structure and composition in active greater sage-grouse areas within greater sage-grouse Management Zones. These vegetation measurements will generally follow the protocols developed in Connelly et al. (2003) and Sather-Blair et al. (2000). This information will be compared with the information in Table 13. Assessment of the vegetation data will recognize the high variability of site potential across management zones in Northwest Colorado. Characteristics of sagebrush rangeland needed for productive greater sage-grouse habitat. CDOW, BLM and/or NRCS will also prepare detailed vegetation cover types, baseline ecological conditions, and ownership maps of occupied habitat. Information and maps of habitats will be entered into a Geographic Information System (GIS) database. The CDOW will monitor the response of greater sage-grouse populations to habitat manipulation practices within occupied habitats. An evaluation will be conducted periodically to determine if management goals are being met.

CDOW, BLM, NRCS and other GSGWG members will compile information on past, present and future treatments and developments in greater sage-grouse habitat and develop an annually updated master GIS database containing this information for use in tracking and evaluating projects and impacts on greater sage-grouse habitats.

Annual estimates of current and cumulative treatment and development acreages, locations and design will be maintained by the GSGWG to measure progress in implementing this Conservation Plan as well as cumulative impacts to greater sage-grouse habitats and to determine the effectiveness and appropriateness of planned and proposed projects and the need for additional treatments.

Research projects recommended in the conservation strategies and the necessary funding for those projects will be actively pursued by the GSGWG and other sources. Research efforts

addressing questions on the impact of predation on greater sage-grouse, the species of predators that are having the most detrimental effect on greater sage-grouse survival and reproduction, and predator/prey relationships as they pertain to Northwest Colorado and surrounding areas will be pursued as funding becomes available.

Research is needed to improve management of greater sage-grouse habitat and to establish an adequate sampling program to determine if habitat manipulation practices are accomplishing management goals. Research projects are also needed to evaluate habitat conversion & fragmentation, grazing intensity & duration, and herbicide & pesticide use in Northwest Colorado.