

1 **9.0 MONITORING AND ADAPTIVE MANAGEMENT** {The following is an rough draft intended to  
2 **guide discussion at the June 24, 2014 SEC Committee on Monitoring Meeting}**

3 Monitoring and adaptive management are key components of successful resource management plans in  
4 order to derive the greatest benefit for sage-grouse given limited agency resources. Incorporation of  
5 these strategies in the planning process will help ensure management actions identified in this State  
6 Plan are implemented and effective at achieving the intended goals and objectives. Adaptive  
7 management allows for information learned through monitoring to be integrated into iterative decision  
8 making that can be adjusted as outcomes from management actions become better understood  
9 (Williams et al. 2009). Management that does not achieve intended goals and objectives can be  
10 modified and contribute to the emerging understanding of management action response, sage-grouse  
11 habitat requirements, sage-grouse behavior, and sagebrush ecosystem processes.

12 **Monitoring**

13 Monitoring plans must be developed for all management actions that occur under direction of the State  
14 Plan, including those intended to ameliorate threats outlined in Section 7.0. Monitoring associated with  
15 the Conservation Credit System (see Section 8.0) is detailed {currently under development} in the  
16 Habitat Quantification Tool Scientific Methods Document<sup>1</sup>. These plans will include monitoring for  
17 implementation and monitoring for effectiveness.

18 *Implementation monitoring* includes: 1) a brief description of the project and the work completed, 2)  
19 pre- and post-project photographs, 3) lessons learned during implementation, 4) recommendations on  
20 the implementation of future projects, 5) maintenance performed, and 6) accounting of expenditures.

21 *Effectiveness monitoring* can play a key role in demonstrating the accountability, success, and value of  
22 management investments. Effectiveness monitoring is designed to determine if the project is effective  
23 at meeting its biological and ecological goals and objectives. Project-scale effectiveness monitoring  
24 measures environmental parameters to ascertain whether management actions were effective in  
25 creating the desired change(s) in habitat conditions and species response. There are at least three  
26 important reasons to conduct project-scale effectiveness monitoring on a management action or a  
27 change in management: 1) to determine the biotic and abiotic changes resulting on, and adjacent to, the  
28 treatment area; 2) to determine if treatment and management actions were effective in meeting the  
29 objective(s); and 3) to learn from the management actions and to incorporate new knowledge in future  
30 treatment design.

31 The following concepts should be addressed in all monitoring plans:

- 32
- 33 • Identify the site conditions and the reasons for implementing management action(s) at the site.
  - 34 • Set monitoring objectives and indicators – these should quantitatively or qualitatively evaluate  
35 the project objectives that will be used to evaluate project implementation and effectiveness in  
36 meeting objectives. Effectiveness in meeting objectives should consider both habitat changes  
and species response.

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<sup>1</sup> For more information please refer to The Habitat Quantification Tool Scientific Methods Document on the Sagebrush Ecosystem Program's Website: <http://sagebrushco.nv.gov/CCS/ConservationCreditSystem/>

- 1 • Identify anticipated site attribute changes in response to the management action, target values,  
2 and time frame under which changes are anticipated.
- 3 • Select monitoring sites and determine methods. Include control or reference sites in method  
4 design.

5 *Cooperative monitoring* {Consider inclusion of BLM's Cooperative Monitoring Agreement?}

## 6 **Adaptive Management**

7 Adaptive management as it relates to sage-grouse and their habitat is a structured, iterative process of  
8 robust decision making in the face of uncertainty, with an aim to reduce uncertainty over time through  
9 continued monitoring. Because adaptive management is based on a learning system, it improves long  
10 term management outcomes. The challenge in using the adaptive management approach lies in finding  
11 the correct balance between gaining knowledge to improve management in the future and achieving  
12 the best short-term outcomes based on current knowledge (Allan and Stankey 2009).

13 “An adaptive management approach involves exploring alternatives ways to meet  
14 management objectives, predicting the outcomes of alternatives based on the current  
15 state of knowledge, implementing one or more of these alternatives, monitoring to  
16 learn about the impacts of management actions, and then using the results to update  
17 knowledge and adjust management actions” (Williams et al. 2009).

18 Adaptive management takes monitoring to the next level by establishing, prior to implementation, a  
19 framework from which an iterative implementation and learning process can be instituted. Adaptive  
20 management implements “learning by doing” and provides flexibility to act in the face of uncertainty.

21 The following are additional steps to monitoring that need to be addressed to successfully implement  
22 adaptive management (Adapted from Williams et al. 2009):

- 23 • Identify and record potential drivers of change in the system, threats to the system, and  
24 opportunities for beneficial actions. These should be incorporated in the model of response for  
25 each management action.
- 26 • Development of “models” or hypotheses of the expected response and rationale.
- 27 • Development of how management actions should be adjusted following results from  
28 monitoring.
- 29 • Implementation of iterative adjustments to management actions following implementation of  
30 actions and results of monitoring, following process outlined in previous bullet.
- 31 • Project and management plans have to incorporate the ability to change methods when  
32 monitoring of the projects or management actions provides indication or when new science  
33 from research or other monitoring project emerges.

34 Consideration of when adaptive management is appropriate:

- 35 • Decision making must be able to be made in an iterative process

- 1 • Monitoring data must be available to decision makers
- 2 • It is not appropriate when risks associated with learning based-decision making are too high
- 3 (i.e., if risk of management action is unknown and worst case scenario has irreversible
- 4 consequences)

### 5 **Incorporation of Monitoring and Adaptive Management into the State Plan**

6 A multi-scale monitoring approach is necessary as sage-grouse are a landscape species and conservation  
7 is scale dependent to the extent that management actions are implemented with seasonal habitats to  
8 benefit populations. As part of the Greater Sage-grouse Northern California and Nevada Sub-regional  
9 EIS/LUPA, the BLM/FS have developed a Monitoring Framework (Appendix E of that document) that  
10 outlines monitoring for habitat loss, habitat degradation, and population trend at the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup>  
11 order scale (Stiver et al. 2010). The State will work to ensure implementation, and engage in  
12 refinements over time of this monitoring framework.

13 In addition to engagement in the above process, all management actions overseen by the SEP will  
14 develop monitoring plans following guidance provided in this section. If participating in projects  
15 developed by BLM/FS, NDOW, NDA, NDF, or other agencies, projects should include similar aspects to  
16 those outlined here, if not all. As well, all management actions should be reviewed and those  
17 appropriate for the adaptive management process should additionally develop an adaptive  
18 management plan in coordination with the monitoring plan.

19 Monitoring data from sage-grouse management actions should be submitted to a database. {The 2012  
20 State Plan had indicated that all monitoring data from all agencies will be compiled into a sage-grouse  
21 database managed by the SETT. The BLM has already developed such a database to meet their needs  
22 (DIMA - <http://jornada.nmsu.edu/monit-assess/dima>). SETT recommends the Committee look to  
23 conduct a review of that process and see if it meets the State's needs and if the State can contribute to  
24 their on-going process. It is several years in development and has been through development/review by  
25 some of the top experts in the field.}

26 The state of Nevada will develop a methods document for monitoring plans and adaptive management  
27 plans that provide protocols and methods that are consistent with other land jurisdictions and agencies,  
28 include BLM, FS, NDOW, and the Habitat Assessment Framework (Stiver et al. 2010). These methods  
29 outlined will be consistent with those developed for the HQT and for the EIS.

30 Annual monitoring reports will be compiled to provide assessment of management actions for sage-  
31 grouse in Nevada.

### 32 ***Existing monitoring and adaptive management plans and methods***

33 There are several key plans and methods that have been developed for use in Nevada and across the  
34 range of the sage-grouse. The following are recommended for consideration in the State Plan:

#### 35 Monitoring

36 Swanson, S, Ben, B, Rex, C, Bill, D, Gary, B, Gene, F, James, L, Gary, M, Valerie, M, Barry, P, Paul, T,  
37 Diane, W and Duane, W, (2006). Nevada rangeland monitoring handbook. Second Edition.

1 University of Nevada Cooperative Extension, Natural Resources Conservation Service, Bureau of  
2 Land Management, U.S. Forest Service. USA.

3 Stiver, S.J., E.T. Rinkes, and D.E. Naugle. 2010. Sage-grouse Habitat Assessment Framework. U.S. Bureau  
4 of Land Management. Unpublished Report. U.S. Bureau of Land Management, Idaho State  
5 Office, Boise, Idaho.

6 *BLM AIM Strategy*

7 Toevs, G.R., J.W. Karl, J.J. Taylor, C.S. Spurrier, M. Karl, M.R. Bobo, and J.E. Herrick. 2011.  
8 Consistent Indicators and Methods and a Scalable Sample Design to Meet Assessment,  
9 Inventory, and Monitoring Information Needs Across Scales. Rangelands: 14-20.

10 Toevs, G.R., J.J. Taylor, C.S. Spurrier, W.C. MacKinnon, and M.R. Bobo. 2011. Bureau of Land  
11 Management Assessment, Inventory, and Monitoring Strategy: For Integrated  
12 Renewable Resources Management. Department of the Interior, Bureau of Land  
13 Management, National Operations Center, Denver, CO.

14 *BLM AIM Monitoring Methods*

15 Herrick, J.E., J.W. Van Zee, K.M. Havstad, L.M. Burkett, and W.G. Whitford. 2009. Monitoring  
16 Manual for Grassland, Shrubland and Savanna Ecosystems. Volume I: Quick Start.  
17 Department of Agriculture, Agricultural Research Service, Jornada Experimental Range,  
18 Las Cruces, NM.

19 Herrick, J.E., J.W. Van Zee, K.M. Havstad, L.M. Burkett, and W.G. Whitford. 2009. Monitoring  
20 Manual for Grassland, Shrubland and Savanna Ecosystems. Volume II: Design,  
21 Supplementary Methods and Interpretation. Department of Agriculture, Agricultural  
22 Research Service, Jornada Experimental Range, Las Cruces, NM.

23 Adaptive Management

24 Williams, B. K., R. C. Szaro, and C. D. Shapiro. 2009. Adaptive Management: The U.S. Department of the  
25 Interior Technical Guide. Adaptive Management Working Group, U.S. Department of the  
26 Interior, Washington, DC.

27

28 {Other plans and strategies??}

29 **Citations**

30 Williams, B. K., R. C. Szaro, and C. D. Shapiro. 2009. Adaptive Management: The U.S. Department of the  
31 Interior Technical Guide. Adaptive Management Working Group, U.S. Department of the Interior,  
32 Washington, DC.