

1 9.0 MONITORING AND ADAPTIVE MANAGEMENT

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

13 Monitoring

14 Two main categories of monitoring will occur for the State Plan: 1) inventory monitoring and 2)
15 management action monitoring. These are described below. Within each of these categories,
16 additional concepts will need to be considered: short and long-term monitoring, monitoring at
17 multiple scales (e.g., site, landscape), and, for management action monitoring, monitoring for
18 implementation and for effectiveness.

19 Inventory monitoring assesses the status/extent/condition of sage-grouse populations (e.g.,
20 sage-grouse population trends over time), sage-grouse habitat (e.g., gain/loss of sage-grouse
21 habitat over time), and of the threats to sage-grouse (as identified in the State Plan, e.g., how
22 many acres of PJ encroachment are occurring each year). Inventory monitoring provides a
23 quantified understanding of changes in condition and extent of sage-grouse populations,
24 habitat, and threats over time and space, can help prioritize efforts, and can help evaluate
25 success in meeting short and long-term goals and objectives. Many of the state and federal
26 agencies already provide a level of inventory monitoring appropriate for the needs of the state
27 plan and [this](#) will be incorporated into the state's monitoring plan- more detail is provided
28 below.

29 This State Plan identified many management actions to address ~~the~~ specific threats. Monitoring
30 of management actions is necessary to ensure that individual actions are accomplishing what
31 they are intended to do. The state will require that monitoring plans be developed for all
32 management actions that occur under direction of the State Plan, including those intended to
33 ameliorate threats outlined in Section 7.0. These plans will include monitoring for
34 implementation and monitoring for effectiveness. Monitoring associated with the Conservation
35 Credit System (see Section 8.0) is detailed ~~{currently under development}~~ in the Habitat
36 Quantification Tool Scientific Methods Document¹. ~~{currently under development}~~. ~~These~~
37 ~~plans will include monitoring for implementation and monitoring for effectiveness.~~

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

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

5 Management Action monitoring for effectiveness can play a key role in demonstrating the
6 accountability, success, and value of management investments. Effectiveness monitoring is
7 designed to determine if the project is effective at meeting its biological and ecological goals
8 and objectives. Project-scale effectiveness monitoring measures environmental parameters to
9 ascertain whether management actions were effective in creating the desired change(s) in
10 habitat conditions *and* species response. There are at least three important reasons to conduct
11 project-scale effectiveness monitoring on a management action or a change in management: 1)
12 to determine the biotic and abiotic changes resulting on, and adjacent to, the treatment area;
13 2) to determine if treatment and management actions were effective in meeting the
14 objective(s); and 3) to learn from the management actions and to incorporate new knowledge
15 in future treatment design.

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

- 17 • Identify the site conditions and the reasons for implementing management action(s) at
18 the site.
- 19 • Set monitoring objectives and indicators – these should quantitatively or qualitatively
20 evaluate the project objectives that will be used to evaluate project implementation and
21 effectiveness in meeting objectives. Effectiveness in meeting objectives will need to be
22 evaluated for both habitat changes and when appropriate and feasible, sage-grouse
23 response.
- 24 • Identify anticipated site attribute changes in response to the management action, target
25 values, and time frame under which changes are anticipated.
- 26 • Select monitoring sites and determine appropriate, effective methods. Include control
27 or reference sites in method design. Baseline data on these will allow before, after, with,
28 and without comparisons.
- 29 • Monitoring will be conducted for a minimum of three years or until management
30 objects are met. If, as part of the treatment, grazing was restricted for a time period,
31 post-treatment, monitoring should be conducted for three year following resumption of
32 grazing practices. In addition, monitoring will be conducted at 10 years post-treatment
33 as a follow-up for long-term monitoring.

Comment [LN1]: 8/4: If we include this qualifier, then we need to set guidelines as to when it is appropriate and what constitutes feasible. If most of these actions are occurring to benefit sage-grouse, until we really understand the response, we cannot say if they are truly, effectively, benefiting sage-grouse.

34 See resources listed at end of this section for development on monitoring plans.

35 **Adaptive Management**

36 Adaptive management as it relates to sage-grouse and their habitat is a structured, iterative
37 process of robust decision making in the face of uncertainty, with an aim to reduce uncertainty
38 over time through continued monitoring. Because adaptive management is based on a learning
39 system, it improves long term management outcomes. The challenge in using the adaptive
40 management approach lies in finding the correct balance between gaining knowledge to

1 improve management in the future and achieving the best short-term outcomes based on
2 current knowledge (Allan and Stankey 2009).

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

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

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

- 15 • Identify and record potential drivers of change in the system, threats to the system, and
16 opportunities for beneficial actions. These should be incorporated in the model of
17 response for each management action.
- 18 • Development of “models” or hypotheses of the expected response and rationale.
- 19 • Development of how management actions should be adjusted following results from
20 monitoring (this should include a set of triggers that identify what monitoring results
21 will trigger what management actions).
- 22 • Implementation of iterative adjustments to management actions following
23 implementation of actions and results of monitoring, following [the](#) process outlined in
24 previous bullet.
- 25 • Project and management plans have to incorporate the ability to change methods when
26 monitoring of the projects or management actions provides indication or when new
27 science from research or other monitoring project emerges.

28 Consideration of when adaptive management is appropriate:

- 29 • Decision making must be able to be made in an iterative process
- 30 • Monitoring data must be available to decision makers
- 31 • It is not appropriate when risks associated with learning based-decision making are too
32 high (i.e., if risk of management action is unknown and worst case scenario has
33 irreversible consequences) [in comparison to the risks of not doing so \(i.e., the
34 consequences of doing nothing\).](#)

35 See resources listed at end of this section for development on adaptive management plans.

36 **Incorporation of Monitoring and Adaptive Management into the State Plan**

37 A multi-scale monitoring approach is necessary as sage-grouse are a landscape species and

1 conservation is scale dependent to the extent that management actions are implemented
2 ~~with~~within or across seasonal habitats to benefit populations. The state needs to track the
3 extent of threats to sage-grouse (e.g., fire, pinyon-juniper encroachment, etc.), through
4 inventory monitoring, as well as the efforts to manage the threats (e.g., number of acres of
5 pinyon-juniper treated), through management action monitoring, to be able to effectively
6 manage for the species and understand progress in goals and objectives outlined in this plan.
7 Many of the components of inventory monitoring are already being monitored by state and
8 federal agencies. The SETT will work to compile annual monitoring reports that provide a
9 synopsis of these monitoring efforts and metrics relevant to the state plans goals and
10 objectives. The state will engage with stakeholders responsible for these components to
11 facilitate when possible and ensure monitoring occurs. For components that are not currently
12 under purview of agencies, the SETT will work to engage relevant stakeholders to develop a
13 monitoring program. The SETT will develop a comprehensive database to store all monitoring
14 information which will be accessible to the public.

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

21 Table ~~xx~~ presents the components (sage-grouse threats, habitat, and populations) that will be
22 monitored to be able to better understand the level of threat to sage-grouse and sagebrush
23 ecosystems and what can be done to respond to the threat for sage-grouse. Elements for
24 inventory monitoring and management action monitoring are outlined as well as the relevant
25 agencies from which monitoring information will be gathered. Monitoring information will be
26 collected across the extent of SGMA and provided at the site, landscape, PMU and state levels
27 and by core, priority, and general management areas. In addition, known changes in extent
28 between years will be documented and total extent of treatments will be summarized.

29 In addition to the annual monitoring report and database, the state of Nevada will develop a
30 methods document for monitoring plans and adaptive management plans that provide
31 protocols and methods that are consistent with other land jurisdictions and agencies, ~~include~~
32 including BLM, FS, NDOW, and the Habitat Assessment Framework¹ (Stiver et al. 2010). These
33 methods outlined will be consistent with those developed for the HQT and for the EIS.

34

Comment [UGU2]: This reference has methods and implied and operational numerical objectives that will not always be relevant to specific areas and objectives being monitored.

Comment [LN3]: 8/4: Sherm, see added footnote to see if this addresses your concern.

¹ The Habitat Assessment Framework will be referenced for methods. Habitat objectives should be based on Table ~~xx~~ in Section 4.0 of this document.

1 Table XX. Inventory and management action monitoring for the State Plan

Monitoring Component	Agency	Inventory Monitoring Elements	Management Action Monitoring Elements ¹
Sage-grouse Parameters			
Sage-grouse habitat	NDOW , BLM, FS, SETT CCS	<ul style="list-style-type: none"> Land Health Assessments (BLM) (site, landscape, and state scale) Resource Implementation Protocol for Rapid Assessment Matrices (USFS) Sagebrush landscape cover (BLM EIS)² (landscape scale) CCS- functional acres lost due to debit projects, functional acres gained due to credit projects (concept of no net unmitigated loss) 	<ul style="list-style-type: none"> Treatment conducted and effectiveness of treatments (these would be treatments not included in subsequent components, e.g., mead
Sage-grouse populations	NDOW, BLM, USGS	<ul style="list-style-type: none"> Lek, lek cluster, PMU counts, populations and trends¹ (all scales) Telemetry data collection (site to landscape scale- project dependent) 	<ul style="list-style-type: none"> At this point, the state plan does not outline management actions directly influencing sage-grouse numbers. Management actions outlined directly affect habitat and indirectly affect populations.
Threat			
Fire	BLM, FS, NDF, NDOW ³	<ul style="list-style-type: none"> Number of fire starts per year Number of fires “successfully” suppressed (<1,000 acres) Number of fires in each vegetation community, and resistance and resilience classes (per Chambers et al 2014 low, medium, high) 	<ul style="list-style-type: none"> Fuels management treatments (conducted and effectiveness of treatments) Rehabilitation efforts for each fire (implementation and effectiveness of treatments) Document coordination efforts that aid in

Comment [LN4]: 8/4: I thought this was the program that Cheri Howell was discussing during the last meeting. Let's discuss.

Comment [UGU5]: Is this being used by the FS?

¹ Scale of Management Action Monitoring is dependent on management action details specified in Section 7.0

² As part of the Greater Sage-grouse Northern California and Nevada Sub-regional EIS/LUPA, the BLM/FS have developed a Monitoring Framework (Appendix E of that document) that outlines monitoring for habitat loss, habitat degradation, and population trend (in coordination with NDOW) at the 1st, 2nd, and 3rd order scale (Stiver et al. 2010).

³ [NDOW is engaged with BLM on post-fire treatment monitoring and provides monitoring on behalf of these agencies post ES&R efforts.](#)

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Monitoring Component	Agency	Inventory Monitoring Elements	Management Action Monitoring Elements ¹
			efficient and effective fire pre-suppress and suppression management
Cheatgrass	SETT will coordinate with researchers to determine extent BLM, FS, NDOW , Nevada Cheatgrass Action Team	<ul style="list-style-type: none"> Extent (spatial distribution, acres, and density of invasion) 	<ul style="list-style-type: none"> Treatments conducted and effectiveness of treatments (includes restoration efforts or efforts to improve resilience/resistance); Cheatgrass Action Team work
<u>Noxious weeds¹</u> Medusahead (<i>Taeniatherum caput-medusae</i>) Hoary cress (<i>Cardaria draba</i>) Russian knapweed (<i>Acroptilon repens</i>) Leafy spurge (<i>Euphorbia esula</i>) <u>Other weeds</u> Red Brome (<i>Bromus rubens</i>) Rattlesnake chess (<i>Bromus briziformis</i>) Halogeton (<i>Halogeton gomeratus</i>) Purple mustard (<i>Chorispora tenella</i>)	NDA (Noxious weeds), NDOW , and SETT SETT will coordinate with NDA and researchers to determine extent (Other weeds)	<ul style="list-style-type: none"> Extent (spatial distribution, acres, and density of invasion) 	<ul style="list-style-type: none"> Treatments conducted and effectiveness of treatments
Pinyon juniper encroachment	BLM, FS, NDF, NDOW , SETT, all stakeholders (including researchers at University of Nevada ,	<ul style="list-style-type: none"> Extent (spatial distribution, acres, and density of invasion) 	<ul style="list-style-type: none"> Treatments conducted and effectiveness of treatments

Comment [LN6]: 8/4: Sherm, I am unclear what the question is that you listed in the footnote.

¹ Weed species in Nevada identified as having, generally, greatest impact to sage-grouse habitats (S. Espinosa, personal communication). [Robert Little, Brad Schultz, and Kent McAdoo also have use information about this question](#)

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Monitoring Component	Agency	Inventory Monitoring Elements	Management Action Monitoring Elements ¹
	Reno, and USGS		
Predation	NDOW, SETT,	<ul style="list-style-type: none"> • Baseline data collected prior to treatments- data will likely be site specific, not SGMA wide (road kill inventories, raven counts, habitat parameters, etc.) 	<ul style="list-style-type: none"> • Treatments conducted and effectiveness of treatments • Documentation of coordination efforts with city counties, landfills waste managers, livestock owners, research on perching and nest deterrent technology
WHB populations	BLM, FS	<ul style="list-style-type: none"> • HMA/WHBT populations • Extent of resources damaged by WHB • Understand their timing of use on wetland resources • Trend monitoring regarding maintenance of a thriving natural ecological balance for adjusting AML (BLM 2010) 	<ul style="list-style-type: none"> • Gathers conducted • TreatmentTreatments or management actions conducted and effectiveness of treatments
Livestock grazing	BLM, FS,	<ul style="list-style-type: none"> • Allotment standards • Dates of use and/or intensity of use by allotment • Monitoring of attainment of management objectives (Swanson et al. 2006) 	<ul style="list-style-type: none"> • Documentation of changes in management prescriptions to improve management, when appropriate
Anthropogenic disturbances	SETT, BLM, FS, other federal agencies, all stakeholders	<ul style="list-style-type: none"> • CCS- functional acres lost due to debit projects, functional acres gained due to credit projects (concept of no net unmitigated loss) • Surface acres impacted • Indirect acres impacted • Identification of existing infrastructure that could be retrofitted, as appropriate (inclusion on the list does not require retrofitting, simply identifying the opportunity) 	<ul style="list-style-type: none"> • Management actions to mitigation for anthropogenic disturbances will be accounted for under the appropriate threat or under habitat and in reporting will be noted as credit projects.
Recreation and OHVs	SETT, BLM, FS, Commission on Off-Highway Vehicles	<ul style="list-style-type: none"> • Permitted activities • Extent of authorized and unauthorized 	<ul style="list-style-type: none"> • Treatments conducted to restore areas impacted by recreational activities and

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Monitoring Component	Agency	Inventory Monitoring Elements	Management Action Monitoring Elements ¹
	and other stake holders	recreational trails and facilities • Extent of open access in sagebrush ecosystems	effectiveness of treatments • Documentation of coordination with recreational groups
Drought		• Unclear on what parameters would be monitored	•

Comment [LN7]: 8/4: Sherm, what do you mean by "open access"?

Comment [UG8]: Delete, covered by the above.

DRAFT

- 1 Sage-grouse habitat
- 2 Sage-grouse populations
- 3 Fire
- 4 Cheatgrass
- 5 Noxious weeds
- 6 Pinyon juniper
- 7 Predation
- 8 WHB populations
- 9 Grazing standards
- 10 Anthropogenic disturbances
- 11 Recreation and OHVs
- 12 Drought

Comment [LN9]: Do we want more depth on what exactly we'll report and where the information will come from? Or is the above table adequate?

14 ***Existing monitoring and adaptive management plans and methods***

15 There are several key plans and methods that have been developed for use in Nevada and
16 across the range of the sage-grouse. These should be referenced in the development of
17 resource objectives, management action monitoring plans, and adaptive management plans.
18 The following are recommended for consideration in the State Plan:

19 **Monitoring**

20 Swanson, S, Ben, B, Rex, C, Bill, D, Gary, B, Gene, F, James, L, Gary, M, Valerie, M, Barry, P, Paul,
21 T, Diane, W and Duane, W. (2006). Nevada rangeland monitoring handbook. Second
22 Edition. [Educational Bulletin 06-03](#). University of Nevada Cooperative Extension, Natural
23 Resources Conservation Service, Bureau of Land Management, U.S. Forest Service. USA.
24 [84 pp. Available at: https://www.unce.unr.edu/publications/files/ag/2006/eb0603.pdf](https://www.unce.unr.edu/publications/files/ag/2006/eb0603.pdf)

25 Stiver, S.J., E.T. Rinkes, and D.E. Naugle. 2010. Sage-grouse Habitat Assessment Framework. U.S.
26 Bureau of Land Management. Unpublished Report. U.S. Bureau of Land Management,
27 Idaho State Office, Boise, Idaho. [Available at:](#)
28 <http://sagemap.wr.usgs.gov/docs/rs/SG%20HABITAT%20ASSESSMENT%202010.pdf>

29 [Bureau of Land Management. 2010 Wild Horses and Burros Management Handbook. H-4700-](#)
30 [1. Available at:](#)
31 http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.11148.File.dat/H-4700-1.pdf
32

1 *BLM AIM Strategy*

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

5 Toevs, G.R., J.J. Taylor, C.S. Spurrier, W.C. MacKinnon, and M.R. Bobo. 2011. Bureau of Land
6 Management Assessment, Inventory, and Monitoring Strategy: For Integrated
7 Renewable Resources Management. Department of the Interior, Bureau of Land
8 Management, National Operations Center, Denver, CO. Available at:
9 http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/ib_attachments/2012.Par.53766.File.dat/IB2012-080_att1.pdf
10

11 *BLM AIM Monitoring Methods*

12 Herrick, J.E., J.W. Van Zee, K.M. Havstad, L.M. Burkett, and W.G. Whitford. 2009. Monitoring
13 Manual for Grassland, Shrubland and Savanna Ecosystems. Volume I: Quick Start.
14 Department of Agriculture, Agricultural Research Service, Jornada Experimental Range,
15 Las Cruces, NM. Available at:
16 [http://www.ntc.blm.gov/krc/uploads/281/Monitoring%20Manual%20for%20Grassland,
17 %20Shrubland%20and%20Savanna%20Ecosystems%20Vol.%20I_Quick%20Start.pdf](http://www.ntc.blm.gov/krc/uploads/281/Monitoring%20Manual%20for%20Grassland,%20Shrubland%20and%20Savanna%20Ecosystems%20Vol.%20I_Quick%20Start.pdf)

18 Herrick, J.E., J.W. Van Zee, K.M. Havstad, L.M. Burkett, and W.G. Whitford. 2009. Monitoring
19 Manual for Grassland, Shrubland and Savanna Ecosystems. Volume II: Design,
20 Supplementary Methods and Interpretation. Department of Agriculture, Agricultural
21 Research Service, Jornada Experimental Range, Las Cruces, NM. Available at:
22 [http://www.ntc.blm.gov/krc/uploads/281/Monitoring%20Manual%20for%20Grassland,
23 %20Shrubland%20and%20Savanna%20Ecosystems%20Vol.%20II.pdf](http://www.ntc.blm.gov/krc/uploads/281/Monitoring%20Manual%20for%20Grassland,%20Shrubland%20and%20Savanna%20Ecosystems%20Vol.%20II.pdf)

24 Adaptive Management

25 Williams, B. K., R. C. Szaro, and C. D. Shapiro. 2009. Adaptive Management: The U.S.
26 Department of the Interior Technical Guide. Adaptive Management Working Group, U.S.
27 Department of the Interior, Washington, DC. Available at:
28 <http://www.doi.gov/initiatives/AdaptiveManagement/TechGuide.pdf>

29 *Cooperative monitoring*

30 The state of Nevada recognizes the value of monitoring as well as the time and effort required
31 to do so. Given limiting staffing and resources of agencies, the SETT will encourage and
32 facilitate cooperative monitoring by interested stakeholders. The BLM has established a
33 cooperative monitoring agreement for grazing allotment permittees to help conduct rangeland
34 health assessments on their permitted allotments (See Attachment XXX). In compilation of the
35 first annual monitoring report and through discussions with stakeholders, the SETT will work to
36 develop similar cooperative monitoring agreements for additional resources with additional
37 agencies and will facilitate development of such to meet the needs for training and quality
38 control.

Comment [UGU10]: I think there is some ongoing discussion about this agreement wording.

- 1 See resources below for monitoring guides for ranchers and other stakeholders.
- 2 Oregon Cattlemen’s Association (2014). Oregon Resources Monitoring Guide: The Rancher’s
3 Guide to Improved Grazing.
- 4 [Peterson, Eric. 2010. Implementing a Cooperative Permittee Monitoring Program. Sublette
5 County Extension. University of Wyoming Cooperative Extension Service. B-1169. 28 pp.
6 Available at: <http://www.wyoextension.org/agpubs/pubs/B1169.pdf>](#)
- 7 Swanson, S, Ben, B, Rex, C, Bill, D, Gary, B, Gene, F, James, L, Gary, M, Valerie, M, Barry, P, Paul,
8 T, Diane, W and Duane, W.2006. Nevada rangeland monitoring handbook. Second
9 Edition. Educational Bulletin 06-03. University of Nevada Cooperative Extension, Natural
10 Resources Conservation Service, Bureau of Land Management, U.S. Forest Service. USA.
11 84 pp. Available at: <https://www.unce.unr.edu/publications/files/ag/2006/eb0603.pdf>

12

13 **Literature Cited**

- 14 [Allan C. and G. H. Stankey. 2009. Adaptive Environment Management: a practitioner’s guide.
15 Dordrecht Publisher, Netherlands. ISBN 978-90-2710-8.](#)
- 16 [Bureau of Land Management. 2010 Wild Horses and Burros Management Handbook. H-4700-1.
17 Available at:
18 \[http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information Resources Manage
19 nt/policy/blm_handbook.Par.11148.File.dat/H-4700-1.pdf\]\(http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information%20Resources%20Management/policy/blm_handbook.Par.11148.File.dat/H-4700-1.pdf\)](#)
- 20 [Chambers, J. C.; Pyke, D. A.; Maestis, J. D.; Pellant, M.; Boyd, C. S.; Campbell, S. B.; Espinosa, S.; Havlina,
21 D. W.; Mayer, K. E.; Wuenschel, A. 2014. Using resistance and resilience concepts to reduce
22 impacts of invasive annual grasses and altered fire regimes on the sagebrush ecosystem and
23 greater sage-grouse – A strategic multi-scale approach. Gen. Tech. Rep. RMRS-GTR-XXX. Fort
24 Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. *in
25 press.*](#)
- 26 [Swanson, S, Ben, B, Rex, C, Bill, D, Gary, B, Gene, F, James, L, Gary, M, Valerie, M, Barry, P, Paul,
27 T, Diane, W and Duane, W.2006. Nevada rangeland monitoring handbook. Second
28 Edition. Educational Bulletin 06-03. University of Nevada Cooperative Extension, Natural
29 Resources Conservation Service, Bureau of Land Management, U.S. Forest Service. USA.
30 84 pp. Available at: <https://www.unce.unr.edu/publications/files/ag/2006/eb0603.pdf>](#)
- 31 Williams, B. K., R. C. Szaro, and C. D. Shapiro. 2009. Adaptive Management: The U.S.
32 Department of the Interior Technical Guide. Adaptive Management Working Group, U.S.
33 Department of the Interior, Washington, DC.