

BLM Rangeland Health Standards (LHS) Evaluation Data Compilation, Reconciliation, & Analysis (June 2021)

Background

Broad-scale data characterizing the influence of livestock grazing on rangeland ecosystems is critically needed to aid in landscape-scale public land multi-resource management for conservation, maintenance and restoration of ecosystem services and resource use. The Bureau of Land Management manages more than 21,000 grazing allotments totaling more than 150,000,000 acres of public lands.

The Land Health Standards Data

Beginning in 1997, BLM has been required under 43 CFR 4180.2 to conduct land health standards evaluations of all allotments to determine whether livestock grazing practices are degrading rangeland health, and if so, are required to take corrective action. Under these regulations, states are required to evaluate whether allotments meet fundamental land health standards reflecting:

- (1) watershed function,
- (2) nutrient cycling and energy flow,
- (3) water quality,
- (4) habitat for endangered, threatened, proposed, candidate, and other special status species, and
- (5) habitat quality for native plant and animal populations and communities

Each state built upon and adapted these fundamental standards to reflect regional differences in relevant conditions, but the resulting state standards fall into these broader categories.

The records of these evaluations are maintained at field offices, and summaries of allotment status are reported to the state and compiled annually to report the condition of all allotments managed by the agency. Unfortunately, these data have never been standardized, compiled, and maintained in an agency-wide digital database. In addition, all allotment land health standards evaluation datasets have been compiled largely from scratch over the years in response to separate Freedom of Information Act requests by private organizations.

The first of these datasets was compiled by the agency in 2008 and was later evaluated by both the agency (BLM, 2012) and by USGS (Veblen et al. 2014). A second was compiled and obtained containing updated records through 2012. The most recent dataset was compiled and obtained from the agency in 2020, containing all allotment records reflecting the most recent land health evaluation records through 2018. Each of the datasets were expected to contain the date of most recent LHS determination, standards not met, and significant causal factor(s) responsible for failure to meet

standards. There proved to be many inconsistencies for the same records between the datasets.

A considerable and concerted effort was made to reconcile as many errors, omissions, and inconsistencies between datasets as possible, but allotment-level data quality issues remain. In addition, all allotments should have been evaluated at least once by 2018, but many allotments remain to be evaluated. Despite these issues, these data now reflect the most complete recorded picture of the relative significance of livestock grazing as a significant cause of failure to meet land health standards on public rangelands across the West.

Data Cleanup and Reconciliation Methods

The objective of the data cleanup and reconciliation process was to produce a single, current, one-to-one relationship between an allotment and its most recently determined Land Health Standards status.

The raw allotment land health standards evaluation data was provided by BLM in spreadsheet format in each instance. Within the first dataset, there were often multiple records, reflecting separate roughly concurrent LHS evaluations within an allotment that contained conflicting LHS status. In addition, to complicate matters, the second and third datasets contained records reflecting both the records from the prior dataset as well as new or repeat LHS evaluations conducted in the interim. These too often contained conflicting dates, evaluation status, and causal factor details when allotments failed to achieve standards.

We deferred to the land health status recorded in the most recent dataset unless there was evidence to the contrary within the same record or between datasets. For example, if no cause of failure was identified in the current dataset for an allotment failing to achieve standards, but was identified in an earlier dataset, then the status of the allotment was based on the prior dataset. The same approach was applied to records such as where the most recent status was improbable, based on prior records, such as the complete recovery from multiple significant causal factors such as historic grazing *and* major mining damage within just a few years.

We classified allotments as to whether they met all failed one or more fundamentals of rangeland health as described in 43 CFR 4180.1 (Attachment 1) following the general approach taken by USGS (Veblen et al. 2014), and BLM (2012). Again, following USGS and BLM, we broke out allotments failing one or more standard into those where livestock grazing was identified as a significant cause, and those where causes other than livestock grazing were identified as the reason for failure.

Unlike USGS, we did not further identify which of the general standards failed in cases where livestock was identified as a cause of failure. In addition, we defined failures due to livestock grazing to include both current grazing *and* historic grazing, as was done by

BLM for the Greater Sage-grouse National Planning Effort from the 2008 BLM Land Health spreadsheet (BLM, 2012).

The reconciliation process conducted by USGS and BLM was based on a single dataset. Reconciliation to prepare the current dataset has been more challenging in that it required reconciliation of three sets of allotment records reflecting LHS status circa 2008, 2012, and 2018, totaling more than 75,000 records. Many records of the same evaluation that were reported in all three contained errors, omissions, and at times, contradictory information, significantly complicating matters. Not all allotments identified as failing rangeland health standards identified a cause of failure.

Although the protocol we used for reconciliation of errors, omissions, and contradictory information was developed independently, our protocol was largely consistent with those used by both USGS (Veblen et al., 2014) and by BLM (2012), although required more decision rules because of inconsistencies between records of three as opposed to one dataset.

We broke down land health standards status into the following categories:

- *All Standards Met* (All applicable standards were met)
- *Not Met – Livestock* (One or more applicable standard was not met and livestock grazing was identified as a significant cause)
- *Not Met – Not Livestock* (One or more applicable standard was not met and livestock was not identified as a significant cause)
- *Not Met – Cause Not Identified* (One or more applicable standard was not achieved, but no causal factor was recorded)
- *Determination Not Complete* (No record of an evaluation was identified in any of the three datasets or where an evaluation had been completed and a determination of causal factors had yet to be recorded)
- *Other* (For example: allotments that were closed)

Land Health Standards Evaluation Status Classification Protocol:

- (1) For any allotment, when there was more than one authorization, or more than one record of the same evaluation between datasets, missing records were ignored,
- (2) When more than one LHS status was recorded for an allotment when there was more than one authorization, or where there was a different LHS status recorded for the same evaluation between datasets, a straight forward “worst status” protocol was applied:
 - a. If “All Standards Met” and “Not Met”, then “Not Met”,
 - b. If “Not Met – Not Livestock” or “Not Met – Cause Not Identified” and “Not Met – Livestock”, then “Not Met – Livestock”,

- c. If “All Standards Met” and “Not Met – Cause Not Identified”, then “Not Met – Cause Not Identified”,
- d. If a causal description identified livestock grazing as a significant factor contributing to failure but the LHS status was classified as “All Standards Met”, “Not Met – Not Livestock”, CATEGORY A, CATEGORY D, then “Not Met – Livestock”.
- e. If a causal description was absent, or no reference to livestock was included, but the LHS status was recorded as “Not Met – Livestock”, CATEGORY B, or CATEGORY C, we deferred to the recorded LHS status,
- f. If a causal description was absent, and the LHS status was recorded as “ALL STANDARDS MET”, we deferred to the recorded ‘ALL STANDARDS MET’, or CATEGORY A,
- g. If a causal description identified historic livestock grazing as a causal factor of failure, but the LHS status was recorded as “NOT MET – NOT LIVESTOCK”, or CATEGORY D, it was classified as “NOT MET – LIVESTOCK”,
- h. If a record in one dataset identified a cause of failure, and the other listed either just standards not met, or just indicators, then it was classified based on the record identifying a cause,
- i. If an evaluation had been made and a date of determination of causal factors was recorded, indicating the allotment failed to meet one or more standard, but the cause of failure was still being determined, then it was recorded as “DETERMINATION NOT COMPLETE”, less the record identified an LHS status, in which case we deferred to the recorded LHS status,
- j. If the 2020 dataset reported as most current a record that predated that reported in the 2012 dataset, the most current record was used in the 2020 dataset.

Citations:

(Veblen, Kari E., David A. Pyke, Cameron L. Aldridge, Michael L. Casazza, Timothy J. Assal, and Melissa A. Farinha (2014). **Monitoring of Livestock Grazing Effects on Bureau of Land Management Land.** *Rangeland Ecol Manage* 67:68–77 | January 2014 | DOI: 10.2111/REM-D-12-00178.1)

Karl, Mike “Sherm”. June 28, 2012. Metadata for the spreadsheet dataset created for the GRSG National Planning Effort from the 2008 BLM Land Health spreadsheet. Available online at: <https://landscape.blm.gov/geoportal/rest/document?id=%7B7169BF13-E825-494E-A77C-C7172F88DF70%7D>

(Attachment 1)

43 CFR § 4180.1 - Fundamentals of rangeland health.

§ 4180.1 Fundamentals of rangeland health.

Standards and guidelines developed or revised by a Bureau of Land Management [State Director](#) under [§ 4180.2\(b\)](#) must be consistent with the following fundamentals of rangeland health:

- (a)** Watersheds are in, or are making significant progress toward, properly functioning physical condition, including their upland, riparian-wetland, and aquatic components; soil and plant conditions support infiltration, soil moisture storage, and the release of water that are in balance with climate and landform and maintain or improve water quality, water quantity, and timing and duration of flow.
- (b)** Ecological processes, including the hydrologic cycle, nutrient cycle, and energy flow, are maintained, or there is significant progress toward their attainment, in order to support healthy biotic populations and communities.
- (c)** Water quality complies with State water quality standards and achieves, or is making significant progress toward achieving, established BLM management objectives such as meeting wildlife needs.
- (d)** Habitats are, or are making significant progress toward being, restored or maintained for Federal threatened and endangered species, Federal proposed or candidate threatened and endangered species, and other special status species.

[[60 FR 9969](#), Feb. 22, 1995, as amended at [71 FR 39508](#), July 12, 2006]

43 CFR § 4180.2 - Standards and guidelines for grazing administration.

§ 4180.2 Standards and guidelines for grazing administration.

- (a)** The Bureau of Land Management [State Director](#), in consultation with the affected resource advisory councils where they exist, will identify the geographical area for which standards and guidelines are developed. Standards and guidelines will be developed for an entire state, or an area encompassing portions of more than 1 state, unless the Bureau of Land Management [State Director](#), in consultation with the resource advisory councils, determines that the characteristics of an area are unique, and the rangelands within the area could not be adequately protected using standards and guidelines developed on a broader geographical scale.
- (b)** The Bureau of Land Management [State Director](#), in consultation with affected Bureau of Land Management resource advisory councils, shall develop and

amend State or regional standards and guidelines. The Bureau of Land Management [State Director](#) will also coordinate with Indian tribes, other State and Federal land management agencies responsible for the management of lands and resources within the region or area under consideration, and the public in the development of State or regional standards and guidelines. State or regional standards or guidelines developed by the Bureau of Land Management [State Director](#) may not be implemented prior to their approval by the [Secretary](#). Standards and guidelines made effective under [paragraph \(f\)](#) of this section may be modified by the Bureau of Land Management [State Director](#), with approval of the [Secretary](#), to address local ecosystems and management practices.

(c)

(1) If a standards assessment indicates to the [authorized officer](#) that the rangeland is failing to achieve standards or that management practices do not conform to the guidelines, then the [authorized officer](#) will use [monitoring](#) data to identify the significant factors that contribute to failing to achieve the standards or to conform with the guidelines. If the [authorized officer](#) determines through standards assessment and [monitoring](#) that existing grazing management practices or levels of grazing use on [public lands](#) are significant factors in failing to achieve the standards and conform with the guidelines that are made effective under this section, the [authorized officer](#) will, in compliance with applicable laws and with the consultation requirements of this part, formulate, propose, and analyze appropriate action to address the failure to meet standards or to conform to the guidelines.

(i) Parties will execute a documented agreement and/or the [authorized officer](#) will issue a final decision on the appropriate action under [§ 4160.3](#) as soon as practicable, but not later than 24 months after a determination.

(ii) BLM may extend the deadline for meeting the requirements established in [paragraph \(c\)\(1\)\(i\)](#) of this section when legally required processes that are the responsibility of another agency prevent completion of all legal obligations within the 24-month time frame. BLM will make a decision as soon as practicable after the legal requirements are met.

(2) Upon executing the agreement and/or in the absence of a stay of the final decision, the [authorized officer](#) will implement the appropriate action as soon as practicable, but not later than the start of the next grazing year.

(3) The [authorized officer](#) will take appropriate action as defined in this paragraph by the deadlines established in paragraphs (c)(1) and (c)(2) of this section. Appropriate action means implementing actions pursuant to subparts 4110, 4120, 4130, and 4160 of this part that will result in significant progress toward fulfillment of the standards and significant progress toward conformance with the guidelines. Practices and activities subject to standards and guidelines include the development of grazing-related portions of activity plans, establishment of terms and conditions of permits, leases, and other grazing authorizations, and [range improvement](#) activities such as vegetation manipulation, fence construction, and development of water.

(d) At a minimum, state and regional standards developed or revised under paragraphs (a) and (b) of this section must address the following:

- (1)** Watershed function;
- (2)** Nutrient cycling and energy flow;
- (3)** Water quality;
- (4)** Habitat for endangered, threatened, proposed, candidate, and other special status species; and
- (5)** Habitat quality for native plant and animal populations and communities.

(e) At a minimum, State or regional guidelines developed under paragraphs (a) and (b) of this section must address the following:

- (1)** Maintaining or promoting adequate amounts of vegetative ground cover, including standing plant material and litter, to support infiltration, maintain soil moisture storage, and stabilize soils;
- (2)** Maintaining or promoting subsurface soil conditions that support permeability rates appropriate to climate and soils;
- (3)** Maintaining, improving or restoring riparian-wetland functions including energy dissipation, sediment capture, groundwater recharge, and stream bank stability;
- (4)** Maintaining or promoting stream channel morphology (e.g., gradient, width/depth ratio, channel roughness and sinuosity) and functions appropriate to climate and landform;
- (5)** Maintaining or promoting the appropriate kinds and amounts of soil organisms, plants and animals to support the hydrologic cycle, nutrient cycle, and energy flow;
- (6)** Promoting the opportunity for seedling establishment of appropriate plant species when climatic conditions and space allow;
- (7)** Maintaining, restoring or enhancing water quality to meet management objectives, such as meeting wildlife needs;
- (8)** Restoring, maintaining or enhancing habitats to assist in the recovery of Federal threatened and endangered species;
- (9)** Restoring, maintaining or enhancing habitats of Federal proposed, Federal candidate, and other special status species to promote their conservation;
- (10)** Maintaining or promoting the physical and biological conditions to sustain native populations and communities;
- (11)** Emphasizing native species in the support of ecological function; and

(12) Incorporating the use of non-native plant species only in those situations in which native species are not available in sufficient quantities or are incapable of maintaining or achieving properly functioning conditions and biological health.

(f) Until such time as state or regional standards and guidelines are developed and in effect, the following standards provided in [paragraph \(f\)\(1\)](#) of this section and guidelines provided in [paragraph \(f\)\(2\)](#) of this section will apply and will be implemented in accordance with [paragraph \(c\)](#) of this section.

(1) *Fallback standards.*

(i) Upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate and landform.

(ii) Riparian-wetland areas are in properly functioning condition.

(iii) Stream channel morphology (including but not limited to gradient, width/depth ratio, channel roughness and sinuosity) and functions are appropriate for the climate and landform.

(iv) Healthy, productive and diverse populations of native species exist and are maintained.

(2) *Fallback guidelines.*

(i) Management practices maintain or promote adequate amounts of ground cover to support infiltration, maintain soil moisture storage, and stabilize soils;

(ii) Management practices maintain or promote soil conditions that support permeability rates that are appropriate to climate and soils;

(iii) Management practices maintain or promote sufficient residual vegetation to maintain, improve or restore riparian-wetland functions of energy dissipation, sediment capture, groundwater recharge and stream bank stability;

(iv) Management practices maintain or promote stream channel morphology (e.g., gradient, width/depth ratio, channel roughness and sinuosity) and functions that are appropriate to climate and landform;

(v) Management practices maintain or promote the appropriate kinds and amounts of soil organisms, plants and animals to support the hydrologic cycle, nutrient cycle, and energy flow;

(vi) Management practices maintain or promote the physical and biological conditions necessary to sustain native populations and communities;

(vii) Desired species are being allowed to complete seed dissemination in 1 out of every 3 years (Management actions will promote the opportunity for seedling establishment when climatic conditions and space allow.);

(viii) Conservation of Federal threatened or endangered, proposed, candidate, and other special status species is promoted by the restoration and maintenance of their habitats;

(ix) Native species are emphasized in the support of ecological function;

(x) Non-native plant species are used only in those situations in which native species are not readily available in sufficient quantities or are incapable of maintaining or achieving properly functioning conditions and biological health;

(xi) Periods of rest from disturbance or [livestock](#) use during times of critical plant growth or regrowth are provided when needed to achieve healthy, properly functioning conditions (The timing and duration of use periods shall be determined by the [authorized officer](#).);

(xii) Continuous, season-long [livestock](#) use is allowed to occur only when it has been demonstrated to be consistent with achieving healthy, properly functioning ecosystems;

(xiii) Facilities are located away from riparian-wetland areas wherever they conflict with achieving or maintaining riparian-wetland function;

(xiv) The development of springs and seeps or other projects affecting water and associated resources shall be designed to protect the ecological functions and processes of those sites; and

(xv) Grazing on designated ephemeral (annual and perennial) rangeland is allowed to occur only if reliable estimates of production have been made, an identified level of annual growth or residue to remain on site at the end of the grazing season has been established, and adverse effects on perennial species are avoided.

[[60 FR 9969](#), Feb. 22, 1995, as amended at [61 FR 59835](#), Nov. 25, 1996; [71 FR 39508](#), July 12, 2006]