

Land Health Standards and AIM Core Indicators Crosswalk

The BLM has managed lands under a multiple-use mandate since 1976, following the passage of the Federal Land Policy and Management Act. In accordance with 43 CFR 4180.1, which became effective in 1995, individual states and regions are required to develop and amend land health standards for each of four fundamentals of rangeland health (hereafter referred to as fundamentals) determined to be critical to sustaining functioning rangeland ecosystems. In 2005, with the release of BLM Handbook H-1601-1, “Land Use Planning Handbook,” BLM policy determined land health standards as applicable to all ecosystems and management actions (BLM 2005). This handbook provides a process designed to facilitate adaptive management. Thus, the BLM’s fundamentals of rangeland health and related standards provide a common set of interdisciplinary questions that the BLM seeks to answer from the scale of individual grazing allotments to national-level reporting to ensure the sustainable management of functioning ecosystems

The AIM strategy provides a consistent approach to addressing the question of whether land health fundamentals and standards are being achieved, thus informing adaptive management at multiple scales across BLM. The AIM core terrestrial and aquatic indicators relate to each fundamental (Table 1) and standard (Table 2) and can be used to evaluate a majority of the standards. These indicators were identified through an interdisciplinary process, crossing multiple BLM programs, and can be used at multiple scales.

The purpose of this document is to provide an overview of the relationships among land health fundamentals, land health standards, and AIM indicators. It also highlights areas in which additional supplemental information would be beneficial for informing particular standards.

Land Health Fundamentals and AIM Core Indicators

43 CFR 4180.1 identifies the following four fundamentals that all BLM lands should be managed to achieve:

- 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.

The core and contingent terrestrial and aquatic indicators identified through the AIM strategy inform whether the BLM fundamentals of land health are being attained (Table 1). Additional information used to characterize each terrestrial and aquatic monitoring location and to explain variability across the landscape is also listed.

Table 1.

Land Health Fundamental	Terrestrial Core and Contingent Indicators (BLM Tech Note 440)	Aquatic Core and Contingent Indicators (BLM Tech Ref 1735-1 – in press)	Field Covariates/Other
Watershed Function	<ul style="list-style-type: none"> • Bare ground • Vegetation composition • Vegetation height • Proportion of site in large, intercanopy gaps • Soil aggregate stability 	<ul style="list-style-type: none"> • Residual pool depth, length, and frequency • Streambed particle sizes • Bank stability and cover • Large woody debris • Floodplain connectivity • Instream habitat complexity • Bank angle • Thalweg depth profile 	<i>Terrestrial</i> <ul style="list-style-type: none"> • Topography (slope, aspect, shape) • Landscape unit/position • Soil profile (texture, rock fragments, etc.) • Photos • Management practices/human impacts
Habitat	<ul style="list-style-type: none"> • Bare ground • Vegetation composition • Non-native invasive species • Plant species of management concern 	<ul style="list-style-type: none"> • Bank stability • Residual pool depth, length, and frequency • Substrate particle sizes • Large woody debris 	<i>Aquatic</i> <ul style="list-style-type: none"> • Gradient

	<ul style="list-style-type: none"> • Vegetation height • Proportion of site in large, intercanopy gaps 	<ul style="list-style-type: none"> • Riparian vegetative composition, structure and cover • Floodplain connectivity • Canopy cover • Instream habitat complexity • Bank angle • Thalweg depth profile • Nitrogen • Phosphorous 	<ul style="list-style-type: none"> • Bankfull width • Geology • Photos • Human impacts
Water Quality		<ul style="list-style-type: none"> • Macroinvertebrates • Acidity • Salinity (conductivity) • Stream temperature • Nitrogen • Phosphorous • Turbidity 	
Ecological Processes	<i>See three previous standards</i>	<i>See three previous standards</i>	

Land Health Standards and AIM Core Indicators

To evaluate achievement of land health fundamentals, each BLM State or Resource Advisory Council (RAC) identified a set of Standards for Land Health. They also identified a set of Indicators related to each Standard. There are 18 sets of Standards for Land Health across BLM corresponding to a State or RAC area, 86 Standards for Land Health within the 18 sets of Standards, and numerous Indicators.

The core and contingent terrestrial and aquatic indicators identified through the AIM strategy correspond to many of the Indicators that were identified by the RAC's to inform each Standard for Land Health (Table 2). Additional Indicators corresponding to each standard can also be collected as supplemental indicators. Many of these other indicators are spatial in nature (e.g., distribution of habitats) and can also be addressed through remote sensing.

The table is color-coded as follows:

- Red-colored indicators are derived from AIM terrestrial indicators and associated protocols (including core, contingent and covariates).
- Blue-colored indicators are derived from AIM aquatic indicators and associated protocols (including core, contingent, and covariates). Note that aquatic indicators are specific to perennial lotic systems.
- Purple-colored indicators are both AIM terrestrial and aquatic indicators, in instances where a standard refers to both ecosystem types.
- **Blue Highlight** Other (supplemental) indicators corresponding to each land health standard that could be addressed through remote sensing

Land Health Standards and associated Indicators are from Mike "Sherm" Karl dated 13 February 2014.

Table 2.

Standard for Land Health	AIM Core and Contingent Indicators (plus Covariates)	Other (Supplemental) Indicators
Alaska		
<p>Watershed Function—Uplands: To ensure that watersheds are in, or are making significant progress toward, a properly functioning physical condition that includes their upland, riparian, wetland, and aquatic areas. The infiltration and permeability rates, moisture storage, and stability of upland soils are appropriate to the watershed's soil, climate, and landform.</p>	<ul style="list-style-type: none"> ▪ Amount and distribution of plant cover (including forest canopy cover) ▪ Amount and distribution of plant litter ▪ Amount and distribution of bare ground ▪ Amount and distribution of rock, stone, and gravel ▪ Plant composition and community structure 	<ul style="list-style-type: none"> ▪ Amount and distribution of permafrost ▪ Soil temperature/depth profile ▪ Soil moisture ▪ Accumulation/incorporation of organic matter ▪ Thickness and continuity of the first layer of soil containing organic matter ▪ Character of micro-relief ▪ Presence and integrity of biotic crusts ▪ Root occupancy of the soil profile ▪ Biological activity (plant, animal, and insect) ▪ Absence of accelerated erosion and overland flow ▪ Snow depth/moisture content

Standard for Land Health	AIM Core and Contingent Indicators (plus Covariates)	Other (Supplemental) Indicators
<p>Watershed Function—Riparian, wetland, aquatic areas: To ensure that watersheds are in, or are making significant progress toward, a properly functioning physical condition that applies to upland, riparian, wetland, and aquatic areas. The riparian, wetland, and aquatic areas are functioning properly at levels appropriate to the watershed’s soil, climate, and landform</p>	<ul style="list-style-type: none"> ▪ Hydrograph time/temperature graph ▪ Plant composition, age class distribution, and community structure ▪ Streambank/shoreline stability ▪ Sediment deposition ▪ Coarse/large woody debris ▪ Channel width/depth ratio ▪ Entrenchment ▪ Benthic communities ▪ Channel sinuosity ▪ Gradient ▪ Rocks and coarse and/or large woody debris ▪ Overhanging banks ▪ Pool/riffle ratio ▪ Pool size and frequency ▪ Stream embeddedness ▪ Frequency of floodplain/wetland inundation 	<ul style="list-style-type: none"> ▪ Amount and distribution of aufeis ▪ Amount and distribution of permafrost ▪ Active/stable beaver dams ▪ Root mass ▪ Point bars revegetating ▪ Riparian area width ▪ Watershed conditions of adjacent uplands ▪ Frequency/duration of soil saturation ▪ Water table fluctuation
<p>Ecological Processes: To ensure that water and nutrient cycling and energy flow support healthy, productive, and diverse natural communities. Water and nutrient cycling and energy flow occur effectively to support healthy, productive, diverse communities at levels appropriate to the potential/capability of the site.</p>	<ul style="list-style-type: none"> ▪ Plant composition and community structure ▪ Animal community structure and composition (aquatic macroinvertebrates) 	<ul style="list-style-type: none"> ▪ Fire history mapping ▪ Fire return rate ▪ Fire severity distribution ▪ Animal migrations and other behavior patterns ▪ Groundwater flow interruptions ▪ Accumulation, distribution, incorporation of plant litter and organic matter into the soil ▪ Root occupancy in the soil profile ▪ Biological activity including plant growth, herbivory, and rodent, insect, and microbial activity

Standard for Land Health	AIM Core and Contingent Indicators (plus Covariates)	Other (Supplemental) Indicators
<p>Water Quality and Yield: To ensure that surface water and groundwater quality (to the extent that BLM actions can influence water quality in the area) complies with state water quality standards.</p> <p>[The Watershed Function-Uplands Standard, and the Watershed Function-Riparian, Wetland, and Aquatic Areas Standard, along with their indicators, are also to be assessed to ascertain if the Water Quality and Yield Standard is achieved.]</p>	<ul style="list-style-type: none"> ▪ Water temperature ▪ Turbidity ▪ pH ▪ Populations of aquatic organisms ▪ Specific conductivity ▪ Water chemistry, including nutrients and metals 	<ul style="list-style-type: none"> ▪ Dissolved oxygen ▪ Fecal coliform ▪ Effects on beneficial uses (that is, effects of management activities on beneficial uses as defined under the CWA and state regulations) ▪ Total sediment yield including bed load ▪ Levels of chemicals in bioassays ▪ Change in trophic status
<p>Threatened and Endangered, Native, and Locally Important Species: To ensure that habitats support healthy, productive, and diverse populations and communities of native plants and animals (including special status species and species of local importance, e.g., those used for subsistence)</p>	<ul style="list-style-type: none"> ▪ Plant community composition, age class distribution, and productivity 	<ul style="list-style-type: none"> ▪ Animal community composition and productivity ▪ Habitat elements ▪ Spatial distribution of habitat ▪ Habitat connectivity ▪ Population stability/resilience (within natural population cycles) ▪ Fire history
<p>Arizona</p>		

Standard for Land Health	AIM Core and Contingent Indicators (plus Covariates)	Other (Supplemental) Indicators
Upland Sites: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).	Ground Cover <ul style="list-style-type: none"> • Litter • Live Vegetation, Amount, and Type (e.g. grass, shrubs, trees, etc.) • Rock 	Signs of Erosion <ul style="list-style-type: none"> • Flow Pattern • Gullies • Rills • Plant Pedestaling
Riparian-wetland Sites: Riparian-wetland areas are in properly functioning condition.	<ul style="list-style-type: none"> • Gradient • Width/Depth Ratio • Channel Roughness and Sinuosity of Stream Channel • Bank Stabilization • Captured Sediment 	<ul style="list-style-type: none"> • Reduced Erosion • Ground-water Recharge • Dissipation of Energy by Vegetation
Desired Resource Conditions: Productive and diverse upland and riparian-wetland plant communities of native species exist and are maintained.	<ul style="list-style-type: none"> • Composition • Structure 	<ul style="list-style-type: none"> • Distribution
California (Northwest)		
Soils: Soils exhibit characteristics of infiltration, fertility, permeability rates, and other functional biological and physical characteristics that are appropriate to soil type, climate, desired plant community, and land form.	<ul style="list-style-type: none"> • Ground Cover (vegetation and other types of ground cover such as rock) sufficient to protect sites from accelerated erosion • Litter/residual dry matter evident, accumulating in place, and showing negligible movement by water • A diversity of plant species, including native plants, with a variety of root depths, is present and plants are vigorous during the growing season 	<ul style="list-style-type: none"> • There is minimal evidence of accelerated erosion in the form of rills, gullies, pedestaling of plants or rocks, flow patterns, physical soil crusts/surface sealing, or compaction layers below the soil surface • Biological (microphytic or cryptogamic) soil crusts, if present, are intact

Standard for Land Health	AIM Core and Contingent Indicators (plus Covariates)	Other (Supplemental) Indicators
<p>Species: Viable, healthy, productive, and diverse populations of native and desired plant and animal species, particularly special status species, are maintained and/or being restored.</p>	<ul style="list-style-type: none"> • Wildlife habitats include seral stages, vegetation structure, and patch size to promote diverse and viable wildlife populations • A diversity of plant species with various developmental stages and rooting depths is present to extend the photosynthetic period and increase energy capture • Non-native, noxious, and invasive species are at acceptable levels • Adequate organic matter (litter and standing dead plant material) is present for site protection and decomposition to replenish soil nutrients and support nutrient cycling 	<ul style="list-style-type: none"> • A variety of age classes is present for desired plant species • Plant vigor is adequate to maintain desirable plants and ensure reproduction and recruitment of plants when favorable climatic events occur • The spatial distribution of plant and animal species and their habitats allows for reproduction and recovery from localized catastrophic events • There is evidence of beneficial natural disturbances • Special status species and other local species of concern are healthy and in numbers that appear to ensure stable to increasing populations; habitat areas are large enough to support viable populations or are connected adequately with other similar habitat areas • Where appropriate, biological soil crusts (also called microphytic or cryptogamic soil crusts) are present and not excessively fragmented

Standard for Land Health	AIM Core and Contingent Indicators (plus Covariates)	Other (Supplemental) Indicators
<p>Riparian: Riparian/wetland vegetation, structure and diversity, and stream channels and floodplains are functioning properly, and meeting regional and local management objectives</p>	<ul style="list-style-type: none"> • Naturally occurring vegetation cover will protect banks and dissipate energy during high flows • A diversity of plant species with various developmental stages and rooting depths is present. Root masses are sufficient to stabilize streambanks and shorelines • Age-class and structure of woody/riparian vegetation are diverse and appropriate for the site. Recruitment of preferred species is adequate for sustaining the community • Where appropriate, habitat is sufficient to provide for plant and animal riparian-dependent species. There is diversity and abundance of insects and amphibians • Where appropriate, there is adequate woody debris • Adequate organic matter (litter and standing dead plant material) is present to protect the site and to replenish soil nutrients through decomposition • There is adequate streambank stability, morphology, pool frequency, stream width/depth ratio, and minimal substrate sediments and bare ground • Shallow-rooted, invader plant species are not displacing native species 	<ul style="list-style-type: none"> • Plant species present indicate that soil moisture characteristics are being maintained • Point bars are becoming vegetated over time

Standard for Land Health	AIM Core and Contingent Indicators (plus Covariates)	Other (Supplemental) Indicators
<p>Water Quality: Surface and groundwater complies with objectives of the Clean Water Act and other applicable water quality requirements, including meeting the California State standards</p> <p>[Appears as though the Riparian Standard must be achieved if we are going to say that the Water Quality Standard is being achieved.]</p>	<ul style="list-style-type: none"> • The following do not exceed the applicable requirements: chemical constituents, water temperature, nutrient loads, fecal coliform, turbidity, suspended sediment, and dissolved oxygen • Aquatic organisms and plants (e.g. macroinvertebrates, fish, algae and plants) indicate support for beneficial uses • Monitoring results or other data that show water quality is meeting the standard 	<ul style="list-style-type: none"> • Achievement of the standards for riparian, wetlands, and water bodies
<h3>California (Northeast) and Nevada (Northwest)</h3>		
<p>Upland Soils: Upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate, and landform, and exhibit functional biological, chemical, and physical characteristics</p>	<ul style="list-style-type: none"> • Ground cover (vegetation, litter, and other types of ground cover such as rock fragments) is sufficient to protect sites from accelerated erosion • Vegetation is vigorous, diverse in species composition and age class, and reflects the potential natural vegetation or desired plant community (DPC) for the site 	<ul style="list-style-type: none"> • Evidence of wind and water erosion, such as rills and gullies, pedestaling, scour or sheet erosion, and deposition of dunes is either absent or, if present, does not exceed what is natural for the site

Standard for Land Health	AIM Core and Contingent Indicators (plus Covariates)	Other (Supplemental) Indicators
<p>Streams: Stream channel form and function are characteristic for the soil type, climate, and landform</p>	<ul style="list-style-type: none"> • Gravel bars and other coarse textured stream deposits are successfully colonized and stabilized by woody riparian species • Stream bank vegetation is vigorous and diverse, mostly perennial, and holds and protects banks during high stream flow events • The stream water surface has a high degree of shading, resulting in cooler water in summer and reduced icing in winter 	<ul style="list-style-type: none"> • Portions of the primary floodplain are frequently flooded (inundated every 1-5 years)
<p>Water Quality: Water will have characteristics suitable for existing or potential beneficial uses. Surface and groundwater complies with objectives of the Clean Water Act and other applicable water quality requirements, including meeting the California and Nevada State standards, excepting approved variances</p> <p>[Appears as though the Riparian and Wetland Sites Standard, and the Streams Standard, must be achieved if we are going to say that the Water Quality Standard is being achieved.]</p>	<ul style="list-style-type: none"> • The following do not exceed the applicable requirements for physical, chemical, and biological constituents including but not limited to: temperature, nutrients, fecal coliform, turbidity, sediment, dissolved oxygen, and aquatic organisms and plants (e.g. indicator macroinvertebrates, fish, algae, and plants) • Monitoring results or other data that show water quality is meeting the standard 	<ul style="list-style-type: none"> • Achievement of the standards for riparian, wetlands, and water bodies

Standard for Land Health	AIM Core and Contingent Indicators (plus Covariates)	Other (Supplemental) Indicators
<p>Riparian and Wetland Sites: Riparian and wetland areas are in properly functioning condition and are meeting regional and local management objectives</p>	<ul style="list-style-type: none"> • Riparian vegetation is vigorous and mostly perennial and diverse in species composition, age class, and life form sufficient to stabilize stream banks and shorelines • Riparian vegetation and large woody debris are well anchored and capable of withstanding high stream flow events • Negligible accelerated erosion as a result of human related activities is evident • Age class and structure of woody riparian and wetland vegetation are appropriate for the site 	
<p>Biodiversity: Viable, healthy, productive, and diverse populations of native and desired plant and animal species, including special status species, are maintained</p>	<ul style="list-style-type: none"> • Wildlife habitats include seral stages, vegetation structure, and patch size to promote diverse and viable wildlife populations • Nonnative plant and animal species are present at acceptable levels • Adequate organic matter (litter and standing dead plant material) is present for site protection and decomposition to replenish soil nutrients and maintain soil health • Habitat areas are sufficient to support diverse, viable, and desired populations and are connected adequately with other similar habitat areas 	<ul style="list-style-type: none"> • A variety of age classes is present for most species • Vigor is adequate to maintain desirable levels of plant and animal species to ensure reproduction and recruitment of plants and animals when favorable events occur • Distribution of plant species and their habitats allow for reproduction and recovery from localized catastrophic events • Natural disturbances such as fire are evident but not catastrophic
<p>California (Central)</p>		

Standard for Land Health	AIM Core and Contingent Indicators (plus Covariates)	Other (Supplemental) Indicators
<p>Soils: Soils exhibit functional biological and physical characteristics that are appropriate to soil type, climate, and landform</p>	<ul style="list-style-type: none"> • Ground cover (vegetation and other types of ground cover such as rock) is sufficient to protect sites from accelerated erosion • Litter/residual dry matter is evident, in sufficient amounts to protect the soil surface • A diversity of plant species, with a variety of root depths, is present and plants are vigorous during the growing season 	<ul style="list-style-type: none"> • There is minimal evidence of accelerated erosion in the form of rills, gullies, pedestaling of plants or rocks, flow patterns, physical soil crusts/surface • Biological (microphytic or cryptogamic) soil crusts are in place where appropriate

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Standard for Land Health	AIM Core and Contingent Indicators (plus Covariates)	Other (Supplemental) Indicators
<p>Species: Viable, healthy, productive, and diverse populations of native and desired species, including special status species (Federal T&E, Federal proposed, Federal candidates, BLM sensitive, or Calif. State T&E) are maintained or enhanced where appropriate</p>	<ul style="list-style-type: none"> • Wildlife habitats include seral stages, vegetation structure, and patch size to promote diverse and viable wildlife populations • A diversity of plant species with various phenological stages and rooting depths are present on sites where appropriate • Levels of non-native plants and animals are at acceptable levels • Adequate organic matter (litter and standing dead plant material) is present for site protection and decomposition to replenish soil nutrients • Noxious and invasive species are contained at acceptable levels 	<ul style="list-style-type: none"> • A variety of age classes are present for most perennial plant species • Plant vigor is adequate to maintain desirable plants and ensure reproduction and recruitment of plants when favorable climatic events occur • The spatial distribution and cover of plant species and their habitats allows for reproduction and recovery from localized catastrophic events • Appropriate natural disturbances are evident • Special status species present are healthy and in numbers that appear to ensure stable to increasing populations; habitat areas are large enough to support viable populations or are connected adequately with other similar habitat areas • Where appropriate, biological soil crusts (also called microphytic or cryptogamic soil crusts) are present and not excessively fragmented
California Desert District		
<p>Upland Soils: Upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate, and landform</p>	<p>Not Known</p>	<p>Not Known</p>

Standard for Land Health	AIM Core and Contingent Indicators (plus Covariates)	Other (Supplemental) Indicators
Riparian-wetland Areas: Riparian-wetland areas are in properly functioning condition	Not Known	Not Known
Stream Channel Morphology: 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	Not Known	Not Known
Native Species Populations: Healthy, productive and diverse populations of native species exist and are maintained	Not Known	Not Known
Colorado		
Upland Soils: Upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate, land form, and geologic processes. Adequate soil infiltration and permeability allows for the accumulation of soil moisture necessary for optimal plant growth and vigor, and minimizes surface runoff	<ul style="list-style-type: none"> • Canopy and ground cover are appropriate • There is litter accumulating in place and is not sorted by normal overland water flow • There is appropriate organic matter in soil • There is diversity of plant species with a variety of root depths 	<ul style="list-style-type: none"> • Expression of rills and soil pedestals is minimal • Evidence of actively-eroding gullies (incised channels) is minimal • Upland swales have vegetation cover or density greater than that of adjacent uplands • There are vigorous, desirable plants

Riparian Systems: Riparian systems associated with both running and standing water function properly and have the ability to recover from major disturbance such as fire, severe grazing, or 100-year floods. Riparian vegetation captures sediment, and provides forage, habitat and biodiversity. Water quality is improved or maintained. Stable soils store and release water slowly

- There is vegetation with diverse age class structure, appropriate **vertical structure**, and adequate **composition, cover**, and density
- **Streambank vegetation is present** and is comprised of species and communities that have root systems capable of withstanding high streamflow events
- Stream is in balance with the water and **sediment** being supplied by the watershed (e.g. no headcutting, no excessive erosion or deposition)
- **Vegetation and free water indicate high water tables**
- **An active floodplain** is present
- **Residual floodplain vegetation** is available to capture and retain sediment and dissipate flood energies
- Stream channels have appropriate **size** and **meander patterns** for the stream's position in the landscape, and parent materials
- **Woody debris** contributes to the character of the **stream channel morphology**

- Vegetation is dominated by an appropriate mix of native or desirable introduced species
- Plant species present indicate maintenance of riparian moisture characteristics
- Vigorous, desirable plants are present
- Vegetation colonizes point bars with a range of age classes and successional stages

<p>Healthy, productive plant and animal communities of native and other desirable species are maintained at viable population levels commensurate with the species and habitat's potential. Plants and animals at both the community and population level are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations, and ecological processes</p>	<ul style="list-style-type: none"> • Noxious weeds and undesirable species are minimal in the overall plant community • Diversity and density of plant and animal species are in balance with habitat/landscape potential and exhibit resilience to human activities • Appropriate plant litter accumulates and is evenly distributed across the landscape 	<ul style="list-style-type: none"> • Native plant and animal communities are spatially distributed across the landscape with a density, composition, and frequency of species suitable to ensure reproductive capability and sustainability • Plants and animals are present in mixed age classes sufficient to sustain recruitment and mortality fluctuations • Landscapes exhibit connectivity of habitat or presence of corridors to prevent habitat fragmentation • Photosynthetic activity is evident throughout the growing season
<p>Special status, threatened and endangered species (federal and state), and other plants and animals officially designated by the BLM, and their habitats are maintained or enhanced by sustaining healthy, native plant and animal communities</p>		<ul style="list-style-type: none"> • All the indicators associated with the plant and animal communities standard apply • There are stable and increasing populations of endemic and protected species in suitable habitat • Suitable habitat is available for recovery of endemic and protected species
<p>The water quality of all water bodies, including ground water where applicable, located on or influenced by BLM lands will achieve or exceed the Water Quality Standards established by the State of Colorado. Water Quality Standards for surface and ground waters include the designated beneficial uses, numeric criteria, narrative criteria, and antidegradation requirements set forth under State law as found in (5 CCR 1002-8), as required by Section 303(c) of the Clean Water Act</p>	<ul style="list-style-type: none"> • Appropriate populations of macroinvertebrates, vertebrates, and algae are present • Surface and ground waters only contain substances (e.g. sediment, scum, floating debris, odor, heavy metal precipitates on channel substrate) attributable to humans within the amounts, concentrations, or combinations as directed by the Water Quality Standards established by the State of Colorado (5 CCR 1002-8). Specifically, those include: total dissolved solids, temperature, pH, total nitrogen , total phosphorous , and turbidity 	

Idaho

<p>Watersheds: Watersheds provide for the proper infiltration, retention, and release of water appropriate to soil type, vegetation, climate, and landform to provide for proper nutrient cycling, hydrologic cycling, and energy flow.</p>	<p>Indicators may include but are not limited to:</p> <ul style="list-style-type: none"> • The amount and distribution of ground cover, including litter, for identified ecological site(s) or soil-plant associations are appropriate for site stability 	<ul style="list-style-type: none"> • Evidence of accelerated erosion in the form of rills and/or gullies, erosional pedestals, flow patterns, physical soil crusts/surface sealing, and compaction layers below the soil surface is minimal for soil type and landform
<p>Riparian Areas and Wetlands: Riparian-wetland areas are in properly functioning condition appropriate to soil type, climate, geology, and landform to provide for proper nutrient cycling, hydrologic cycling, and energy flow.</p>	<p>Indicators may include but are not limited to:</p> <ul style="list-style-type: none"> • Age class and structural diversity of riparian/wetland vegetation is appropriate for the site. • Noxious weeds are not increasing • Riparian/wetland vegetation with deep strong binding roots is sufficient to stabilize streambanks and shorelines. Invader and shallow rooted species are a minor component of the floodplain. • The riparian/wetland vegetation is controlling erosion, stabilizing streambanks, shading water areas to reduce water temperature, stabilizing shorelines, filtering sediment, aiding in floodplain development, dissipating energy, delaying flood water, and increasing recharge of groundwater appropriate to site potential 	

Stream Channel/Floodplain: Stream channels and floodplains are properly functioning relative to the geomorphology (e.g. gradient, size, shape, roughness, confinement, and sinuosity) and climate to provide for proper nutrient cycling, hydrologic cycling, and energy flow

Indicators may include but are not limited to:

- Stream channels and floodplains dissipate energy of high water flows and transport sediment. Soils support appropriate riparian-wetland species, allowing water movement, sediment filtration, and water storage. Stream channels are not entrenching
- Stream width/depth ratio, gradient, sinuosity, and pool, riffle and run frequency are appropriate for the valley bottom type, geology, hydrology, and soils
- Noxious weeds are not increasing
- There is little evidence of excessive soil compaction on the floodplain due to human activities
- Streambanks are within an appropriate range of stability according to site potential
- Streams have access to their floodplains and sediment deposition is evident

<p>Native Plant Communities: Healthy, productive, and diverse native animal habitat and populations of native plants are maintained or promoted as appropriate to soil type, climate, and landform to provide for proper nutrient cycling, hydrologic cycling, and energy flow</p>	<p>Indicators may include, but are not limited to:</p> <ul style="list-style-type: none"> • Native plant communities (flora and microbiotic crusts) are maintained or improved to ensure the proper functioning of ecological processes and continued productivity and diversity of native plant species • Diversity of native species is maintained • Plant vigor (total plant production, seed and seedstalk production, cover, etc.) is adequate to enable reproduction and recruitment of plants when favorable climatic events occur • Noxious weeds are not increasing • Adequate litter and standing dead plant material are present for site protection and for decomposition to replenish soil nutrients relative to site potential 	
<p>Seedings: Rangelands seeded with mixtures, including predominately non-native plants, are functioning to maintain life form diversity, production, native animal habitat, nutrient cycling, energy flow, and the hydrologic cycle</p>	<p>Indicators may include, but are not limited to:</p> <ul style="list-style-type: none"> • In established seedings, the diversity of perennial species is not diminishing over time • Plant production, seed production, and cover are adequate to enable recruitment when favorable climatic events occur • Noxious weeds are not increasing • Adequate litter and standing dead plant material are present for site protection and for decomposition to replenish soil nutrients relative to site potential 	

<p>Exotic plant communities, other than seedlings, will meet minimum requirements of soil stability and maintenance of existing native and seeded plants. These communities will be rehabilitated to perennial communities when feasible cost effective methods are developed.</p>	<p>Indicators may include, but are not limited to:</p> <ul style="list-style-type: none"> • Noxious weeds are not increasing • The number of perennial species is not diminishing over time • Plant vigor (production, seed and seedstalk production, cover, etc.) of remnant native or seeded (introduced) plants is maintained to enable reproduction and recruitment when favorable climatic or other environmental events occur • Adequate litter and standing dead plant material is present for site protection and for decomposition to replenish soil nutrients relative to site potential 	
<p>Water Quality: Surface and ground water on public lands comply with the Idaho Water Quality Standards</p>	<p>Indicators may include, but are not limited to:</p> <ul style="list-style-type: none"> • Physical, chemical, and biologic parameters described in the Idaho Water Quality Standards 	

<p>Threatened and Endangered Plants and Animals: Habitats are suitable to maintain viable populations of threatened and endangered, sensitive, and other special status species</p>	<p>Indicators may include, but are not limited to:</p> <ul style="list-style-type: none"> • Parameters described in the Idaho Water Quality Standards • Age class and structural diversity of riparian/wetland vegetation are appropriate for the site • Native plant communities (flora and microbotic crusts) are maintained or improved to ensure the proper functioning of ecological processes and continued productivity and diversity of native plant species • Diversity of native species is maintained • Amount & Distribution of ground cover, including litter, for identified ecological site(s) or soil-plant associations are appropriate for site stability • Noxious weeds are not increasing • Riparian/wetland vegetation with deep strong binding roots is sufficient to stabilize streambanks and shorelines. Invader and shallow rooted species are a minor component of the floodplain 	
<p>Montana (Butte, Dillon, and Missoula Field Offices)</p>		

<p>Uplands are in proper functioning condition</p>	<p>Physical Environment</p> <ul style="list-style-type: none"> • Surface Litter • Cover Amount <p>Biotic Environment</p> <ul style="list-style-type: none"> • Community Diversity • Community Structure • Exotic Plants 	<p>Physical Environment</p> <ul style="list-style-type: none"> • Erosional Flow Patterns • Soil Movement by Water and Wind • Soil Crusting and Surface Sealing • Rills • Gullies • Compaction Layer • Cover Distribution <p>Biotic Environment</p> <ul style="list-style-type: none"> • Photosynthetic Activity • Plant Status • Seed Production • Recruitment • Nutrient Cycle
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<p>Riparian and Wetland Areas: Riparian and wetland areas are in proper functioning condition.</p>	<p>Hydrologic</p> <ul style="list-style-type: none"> • Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e. landform, geology, and bioclimatic region) • floodplain and channel characteristics; i.e. rocks, coarse and/or woody debris adequate to dissipate energy • Portions of the primary floodplain are frequently flooded (inundated every 1-3 years) <p>Erosion Deposition</p> <ul style="list-style-type: none"> • amount of altered streambanks • lateral stream movement is associated with natural sinuosity • system is vertically stable • stream is in balance with water and sediment being supplied by the watershed (i.e. no excessive erosion or deposition) • bare ground <p>Vegetation</p> <ul style="list-style-type: none"> • diverse composition of vegetation • streambank vegetation is comprised of those plants or plant communities that have deep binding root masses capable of withstanding high streamflow events • adequate vegetative cover present to protect banks and dissipate energy during high flows • plant communities in the riparian area are an adequate source of large woody debris • point bars are vegetating 	<p>Hydrologic</p> <ul style="list-style-type: none"> • riparian zone widening • upland watershed not contributing to riparian degradation <p>Erosion Deposition</p> <p>Vegetation</p> <ul style="list-style-type: none"> • reproduction and diverse age structure of vegetation • species present indicate maintenance of riparian soil moisture characteristics • utilization of trees and shrubs • riparian plants exhibit high vigor
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<p>Water Quality: Water quality meets Montana State standards</p>	<ul style="list-style-type: none"> • pH • Turbidity • Temperature • Sediment • Sodium • Nitrates • Phosphorous 	<ul style="list-style-type: none"> • Dissolved Oxygen Concentration • Fecal Coliform • Color • Toxins • Ammonia, Barium, Boron, Chlorides, Chromium, Cyanide, Endosulfan, Lindane, Phenols, Sulfates, etc.
<p>Air Quality: Air quality meets state standards</p>		<ul style="list-style-type: none"> • PM-10 of 50ug/m3 annual average and 150 ug/m3 24-hr average# • Sulfur Dioxide of 0.02 ppm annual average and 0.10 ppm 24-hr average# and 0.50 ppm 1-hr average## • Carbon Monoxide of 23 ppm hourly average# and 9.0 ppm 8-hr average# • Nitrogen Dioxide of 0.05 ppm annual average and 0.30 ppm hourly average# • Ozone of 0.10 ppm hourly average# • Lead of 1.5 ug/m3 90 day average • Foliar Fluoride of 35ug/g grazing season average and 50ug/g monthly average • Settled Particulate Matter (dustfall) of 10 mg/m2 30-day average • Hydrogen Sulfide of 0.05 ppm hourly average# • Visibility–Particle scattering coefficient of 3×10^{-5} per meter annual average### <p># Not to be exceeded more than once per year. ## Not to be exceeded more than 18 times per year. ### Applies to PSD mandatory Class I areas.</p>

<p>Provide habitat as necessary, to maintain a viable and diverse population of native plant and animal species, including special status species</p>	<ul style="list-style-type: none"> • Plants and animals are diverse, vigorous and reproducing satisfactorily; noxious weeds are absent or insignificant in the overall plant community • Diversity of species (including plants, animals, insects and microbes) are represented 	<ul style="list-style-type: none"> • Spatial distribution of species is suitable to ensure reproductive capability and recovery • A variety of age classes are present • Connectivity of habitat or presence of corridors prevents habitat fragmentation • Plant communities in a variety of successional stages are represented across the landscape
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Montana (Lewistown and Malta Field Offices)

<p>Uplands are in proper functioning condition</p>	<p>Physical Environment</p> <ul style="list-style-type: none"> • Surface Litter • Cover Amount • Cover Distribution <p>Biotic Environment</p> <ul style="list-style-type: none"> • Community Richness • Community Structure • Exotic Plants 	<p>Physical Environment</p> <ul style="list-style-type: none"> • Erosional Flow Patterns • Soil Movement by Water and Wind • Soil Crusting and Surface Sealing • Rills • Gullies • Compaction Layer <p>Biotic Environment</p> <ul style="list-style-type: none"> • Plant Status • Seed Production • Recruitment • Nutrient Cycle
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<p>Riparian and Wetland Areas: Riparian and wetland areas are in proper functioning condition.</p>	<p>Hydrologic</p> <ul style="list-style-type: none"> • amount of altered streambanks • sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e. landform, geology, and bioclimatic region) • Portions of the primary floodplain are frequently flooded (inundated every 1-3 years) <p>Erosion Deposition</p> <ul style="list-style-type: none"> • floodplain and channel characteristics; i.e. rocks, coarse and/or woody debris adequate to dissipate energy • stream is in balance with water and sediment being supplied by the watershed (i.e. no excessive erosion or deposition) <p>Vegetation</p> <ul style="list-style-type: none"> • diverse composition of vegetation • species present indicate maintenance of riparian soil moisture characteristics • streambank vegetation is comprised of those plants or plant communities that have deep binding root masses capable of withstanding high streamflow events • adequate vegetative cover present to protect banks and dissipate energy during high flows • where appropriate, plant communities in the riparian area are an adequate source of woody debris 	<ul style="list-style-type: none"> • upland watershed not contributing to riparian degradation <p>Erosion Deposition</p> <ul style="list-style-type: none"> • lateral stream movement is associated with natural sinuosity • system is vertically stable <p>Vegetation</p> <ul style="list-style-type: none"> • reproduction and diverse age class of vegetation • utilization of trees and shrubs • riparian plants exhibit high vigor • point bars are being created and older point bars are being vegetated
<p>Water Quality: Water quality meets Montana State standards</p>	<ul style="list-style-type: none"> • pH • Turbidity • Temperature • Sediment • Sodium • Nitrates • Phosphorous 	<ul style="list-style-type: none"> • Dissolved Oxygen Concentration • Fecal Coliform • Color • Toxins • Ammonia, Barium, Boron, Chlorides, Chromium, Cyanide, Endosulfan, Lindane, Phenols, Sulfates, etc.

<p>Air Quality: Air quality meets Montana State standards</p>		<ul style="list-style-type: none"> • Section 176(c) Clean Air Act which states that activities of all federal agencies must conform to the intent of the appropriate State Air Quality Implementation Plan and not: <ul style="list-style-type: none"> • cause or contribute to any violations of ambient air quality standards • increase the frequency of any existing violations • impede the State’s progress in meeting their air quality goals
<p>Habitats are provided to maintain healthy, productive and diverse populations of native plant and animal species, including special status species (federally threatened, endangered, candidate or Montana species of special concern as defined in BLM Manual 6840, Special Status Species Management)</p>	<ul style="list-style-type: none"> • Plants and animals are diverse, vigorous and reproducing satisfactorily; noxious weeds are absent or insignificant in the overall plant community • Diversity of species (including plants, animals, insects and microbes) are represented 	<ul style="list-style-type: none"> • Spatial distribution of species is suitable to ensure reproductive capability and recovery • A variety of age classes are present • Connectivity of habitat or presence of corridors prevents habitat fragmentation • Plant communities in a variety of successional stages are represented across the landscape
<p>Montana (Miles City and Billings Field Offices)</p>		

<p>Uplands are in proper functioning condition</p>	<p>Physical Environment</p> <ul style="list-style-type: none"> • Surface Litter • Cover Amount <p>Biotic Environment</p> <ul style="list-style-type: none"> • Community Diversity • Community Structure • Exotic Plants 	<p>Physical Environment</p> <ul style="list-style-type: none"> • Erosional Flow Patterns • Soil Movement by Water and Wind • Infiltration • Soil Crusting and Surface Sealing • Compaction Layer • Rills • Gullies <p>Biotic Environment</p> <ul style="list-style-type: none"> • Cover Distribution • Photosynthetic Activity • Plant Status • Seed Production • Recruitment • Nutrient Cycle
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<p>Riparian Areas and Wetlands: Riparian areas and wetlands are in proper functioning condition</p>	<p>Hydrologic</p> <ul style="list-style-type: none"> • sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e. landform, geology, and bioclimatic region) • amount of altered streambanks • floodplain inundated in relatively frequent events <p>Erosion Deposition</p> <ul style="list-style-type: none"> • floodplain and channel characteristics; i.e. rocks, coarse and/or woody debris adequate to dissipate energy • stream is in balance with water and sediment being supplied by the watershed (i.e. no excessive erosion or deposition) • bare ground <p>Vegetation</p> <ul style="list-style-type: none"> • point bars are vegetating • diverse composition of vegetation • streambank vegetation is comprised of those plants or plant communities that have deep binding root masses capable of withstanding high streamflow events • species present indicate maintenance of riparian soil moisture characteristics • healthy riparian plants • adequate vegetative cover present to protect banks and dissipate energy during high flows 	<p>Hydrologic</p> <ul style="list-style-type: none"> • riparian zone width • upland watershed not contributing to riparian degradation <p>Erosion Deposition</p> <ul style="list-style-type: none"> • lateral stream movement is associated with natural sinuosity • system is vertically stable <p>Vegetation</p> <ul style="list-style-type: none"> • reproduction and diverse age structure of vegetation • utilization of trees and shrubs
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<p>Water Quality: Water quality meets Montana State standards</p>	<ul style="list-style-type: none"> • pH • Turbidity • Temperature • Sediment • Sodium • Nitrates • Phosphorous 	<ul style="list-style-type: none"> • Dissolved Oxygen Concentration • Fecal Coliform • Color • Toxins • Ammonia, Barium, Boron, Chlorides, Chromium, Cyanide, Endosulfan, Lindane, Phenols, Sulfates, etc.
<p>Air Quality: Air quality meets Montana State standards</p>		<ul style="list-style-type: none"> • Section 176(c) Clean Air Act which states that activities of all federal agencies must conform to the intent of the appropriate State Air Quality Implementation Plan and not: <ul style="list-style-type: none"> • cause or contribute to any violations of ambient air quality standards • increase the frequency of any existing violations • impede the State’s progress in meeting their air quality goals
<p>Habitats are provided for healthy, productive, and diverse native plant and animal populations and communities. Habitats are improved or maintained for special status species (federally threatened, endangered, candidate or Montana species of special concern)</p>	<ul style="list-style-type: none"> • Plants and animals are diverse, vigorous and reproducing satisfactorily; noxious weeds are absent or insignificant in the overall plant community • Diversity of species (including plants, animals, insects and microbes) are represented 	<ul style="list-style-type: none"> • An effective weed management program is in place • Spatial distribution of species is suitable to ensure reproductive capability and recovery • A variety of age classes are present (at least two age classes) • Connectivity of habitat or presence of corridors prevents habitat fragmentation • Plant communities in a variety of successional stages are represented across the landscape. This will be accomplished by allowing progression of succession in conjunction with livestock grazing

North Dakota and South Dakota

<p>Uplands are in proper functioning condition for site specific conditions of climate, soils and parent material</p>	<p>Physical Environment</p> <ul style="list-style-type: none"> • Surface Litter • Cover Amount <p>Cover Distribution</p> <p>Biotic Environment</p> <ul style="list-style-type: none"> • Community Diversity • Community Structure • Exotic Plants 	<p>Physical Environment</p> <ul style="list-style-type: none"> • Erosional Flow Patterns • Soil Movement by Wind and Water • Infiltration • Soil Crusting and Surface Sealing • Rills • Gullies <p>Biotic Environment</p> <ul style="list-style-type: none"> • Photosynthetic Activity • Plant Status • Seed Production • Recruitment • Nutrient Cycle
<p>Riparian Areas and Wetlands: Riparian areas and wetlands are in proper functioning condition for site specific conditions of climate, soils and parent material</p>	<p>Hydrologic</p> <ul style="list-style-type: none"> • amount of altered streambanks • 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 • floodplain inundated in relatively frequent events <p>Erosion Deposition</p> <ul style="list-style-type: none"> • floodplain and channel characteristics; i.e. rocks, coarse and/or woody debris adequate to dissipate energy • stream is in balance with water and sediment being supplied by the watershed (i.e. no excessive erosion or deposition) • bare ground <p>Vegetation</p> <ul style="list-style-type: none"> • adequate vegetative cover present to protect banks and dissipate energy during high flows • species present indicate maintenance of riparian soil moisture characteristics 	<ul style="list-style-type: none"> • riparian zone width • upland watershed not contributing to riparian degradation <p>Erosion Deposition</p> <ul style="list-style-type: none"> • lateral stream movement is associated with natural sinuosity • system is vertically stable <p>Vegetation</p> <ul style="list-style-type: none"> • healthy, productive and diverse populations of native species are being maintained • condition of trees and shrubs • riparian plants exhibit high vigor • point bars are vegetating

<p>Water Quality: Water quality meets assigned State water quality standards</p>	<ul style="list-style-type: none"> • pH • Turbidity • Temperature • Sediment • Sodium • Nitrates • Phosphorous 	<ul style="list-style-type: none"> • Dissolved Oxygen Concentration • Fecal Coliform • Color • Toxins • Ammonia, Barium, Boron, Chlorides, Chromium, Cyanide, Endosulfan, Lindane, Phenols, Sulfates, etc.
<p>Air Quality: Air quality meets State air quality standards</p>		<ul style="list-style-type: none"> • Section 176(c) Clean Air Act which states that activities of all federal agencies must conform to the intent of the appropriate State Air Quality Implementation Plan and not: <ul style="list-style-type: none"> • cause or contribute to any violations of ambient air quality standards • increase the frequency of any existing violations • impede the State’s progress in meeting their air quality goals
<p>Habitats are maintained and/or restored, where appropriate, for healthy, productive and diverse populations of native plant and animal species</p>	<ul style="list-style-type: none"> • Plants and animals are diverse, vigorous and reproducing satisfactorily; noxious weeds are absent or insignificant in the overall plant community • Species diversity (including plants, animals, insects, and microbes) is present 	<ul style="list-style-type: none"> • Spatial distribution of species is suitable to ensure reproductive capability. These species may include special status species (Federally threatened, endangered, candidate or Montana/North Dakota/South Dakota species of special concern) • Livestock grazing systems are designed to maintain rangeland health and to ensure a variety of plant communities are present • Connectivity of habitat or presence of corridors prevents habitat fragmentation
<p>Nevada (Mojave-Southern Great Basin Area)</p>		

<p>Soils: Watershed soils and stream banks should have adequate stability to resist accelerated erosion, maintain soil productivity, and sustain the hydrologic cycle.</p>	<ul style="list-style-type: none"> • Ground cover (vegetation, litter, rock, bare ground) • Stream bank stability 	<ul style="list-style-type: none"> • Surfaces (e.g., biological crusts, pavement) • Compaction/infiltration
<p>Watersheds should possess the necessary ecological components to achieve State water quality criteria, maintain ecological processes, and sustain appropriate uses. Riparian and wetlands vegetation should have structural and species diversity characteristic of the stage of stream channel succession in order to provide forage and cover, capture sediment, and capture, retain, and safely release water (watershed function).</p>	<p>Upland Indicators</p> <ul style="list-style-type: none"> • Canopy and ground cover, including litter, live vegetation, biological crust, and rock appropriate to the potential of the ecological site <p>Riparian Indicators</p> <ul style="list-style-type: none"> • Stream side riparian areas are functioning properly when adequate vegetation, large woody debris, or rock is present to dissipate stream energy associated with high water flows • Elements indicating proper functioning condition such as avoiding accelerating erosion, capturing sediment, and providing for groundwater recharge and release are determined by the following measurements as appropriate to the site characteristics: <ul style="list-style-type: none"> • Width/Depth Ratio • Channel Roughness • Sinuosity of Stream Channel • Bank Stability • Vegetative Cover (amount, spacing, life form) <ul style="list-style-type: none"> • Other Cover (large woody debris, rock) • Natural springs, seeps, and marsh areas are functioning properly when adequate vegetation is present to facilitate water retention, filtering, and release as indicated by plant species and cover appropriate to the site characteristics <p>Water Quality Indicators</p> <ul style="list-style-type: none"> • Chemical, physical and biological constituents do not exceed the State water quality Standards 	<p>Upland Indicators</p> <ul style="list-style-type: none"> • Ecological processes are adequate for the vegetative communities

Habitat and Biota: Habitats and watersheds should sustain a level of biodiversity appropriate for the area and conducive to appropriate uses. Habitats of special status species should be able to sustain viable populations of those species

- **Vegetation composition** (relative abundance of species)
- **Vegetation structure** (life forms, cover, height, and age classes)
- **Composition**

- **Vegetation distribution** (patchiness, corridors)
- Vegetation productivity
- Vegetation nutritional value
- **Escape terrain**
- Relative abundance
- **Distribution**
- Nutritional value
- Edge-patch snags

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Wild horses and burros within Herd Management Areas should be managed for herd viability and sustainability. Herd Management Areas should be managed to maintain a healthy ecological balance among wild horse and /or burro populations, wildlife, livestock, and vegetation.

Herd health indicators.

General horse and/or burro appearance: Problems are often apparent and can be easily identified by just looking at the herd.

Crippled or injured horses and/or burros: Excessive injuries can indicate problems.

Herd demographics indicators.

Size of bands: A band with one stud or jack, one mare or jenny, and one foal indicates a problem. An oversized band also indicates there is a problem. Band sizes of 5-10 animals with one dominant stud per band is a good indicator.

Size of Bachelor Bands: Large bachelor bands in the immediate vicinity of other bands could indicate potential problems.

Herd viability indicators.

Heavy trailing into water sources may indicate a significant problem with forage availability or water distribution. Animals may be traveling considerable distances to obtain water or forage.

Waiting for water. When available water becomes so scarce that a waiting line develops, horses and burros are in trouble.

Availability of water. Address legal and/or climatic considerations. Situation exist where WH&B are present only because they currently have access to water which they could legally be deprived of under Nevada Water Laws. Situations exist where existing WH&B populations are dependent upon water hauling. If water hauling were to cease these animals would die within a matter of days.

- Depleted forage near all available water sources. Adequate water, and forage adjacent to water sources, are essential.

Nevada (Sierra Front-Northwestern Great Basin Area)

<p>Soils: Soil processes will be appropriate to soil types, climate and land form.</p>	<ul style="list-style-type: none"> • Surface litter is appropriate to the potential of the site • Basal and canopy cover (vegetative) is appropriate for site potential 	<ul style="list-style-type: none"> • Soil crusting formations in shrub interspaces, and soil compaction are minimal or not in evidence, allowing for appropriate infiltration of water • Hydrologic cycle, nutrient cycle and energy flow are adequate for the vegetative communities • Plant communities are diverse and vigorous, and there is evidence of recruitment
<p>Riparian/Wetlands: Riparian/wetland systems are in properly functioning condition.</p>	<ul style="list-style-type: none"> • Sinuosity, width/depth ratio and gradient are adequate to dissipate streamflow without excessive erosion or deposition • Riparian vegetation is adequate to dissipate high flow energy and protect banks from excessive erosion • Plant species diversity is appropriate to riparian-wetland systems 	
<p>Water Quality: Water quality criteria in Nevada or California State Law shall be achieved or maintained</p>	<ul style="list-style-type: none"> • Chemical constituents do not exceed the water quality Standards • Physical constituents do not exceed the water quality Standards • Biological constituents do not exceed the water quality Standards • The water quality of all water bodies, including ground water located on or influenced by BLM lands will meet or exceed the applicable Nevada or California water quality Standards. Water quality Standards for surface and ground waters include the designated beneficial uses, numeric criteria, narrative criteria, and antidegradation requirements set forth under State law, and as found in Section 303(c) of the Clean Water Act 	

<p>Plant and Animal Habitat: Populations and communities of native plant species and habitats for native animal species are healthy, productive and diverse</p>	<ul style="list-style-type: none"> • Good representation of life forms and numbers of species • Good diversity of height, size, and distribution of plants 	<ul style="list-style-type: none"> • Number of wood stalks, seed stalks, and seed production adequate for stand maintenance • Vegetative mosaic, vegetative corridors for wildlife, and minimal habitat fragmentation
<p>Special Status Species Habitat: Habitat conditions meet the life cycle requirements of special status species</p>	<ul style="list-style-type: none"> • Good diversity of height, size, and distribution of plants 	<ul style="list-style-type: none"> • Habitat areas are large enough to support viable populations of special status species • Special status plant and animal numbers and ages appear to ensure stable populations • Number of wood stalks, seed stalks, and seed production adequate for stand maintenance • Vegetative mosaic, vegetative corridors for wildlife, and minimal habitat fragmentation
<h2>Nevada (Northeastern Great Basin Area)</h2>		
<p>Upland Sites: Upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate and land form.</p>	<ul style="list-style-type: none"> • Indicators are canopy and ground cover, including litter, live vegetation and rock, appropriate to the potential of the site 	

<p>Riparian and Wetland Sites: Riparian and wetland areas exhibit a properly functioning condition and achieve State water quality criteria</p>	<p>Stream side riparian areas are functioning properly when adequate vegetation, large woody debris, or rock is present to dissipate stream energy associated with high water flows. Elements indicating proper functioning condition such as avoiding accelerating erosion, capturing sediment, and providing for groundwater recharge and release are determined by the following measurements as appropriate to the site characteristics:</p> <ul style="list-style-type: none"> • Width/depth ratio • Channel roughness • Sinuosity of stream channel • Bank stability • Vegetative cover (amount, spacing, life form) • Other cover (large woody debris, rock) <p>Natural springs, seeps, and marsh areas are functioning properly when adequate vegetation is present to facilitate water retention, filtering, and release as indicated by plant species and cover appropriate to the site characteristics. Chemical, physical and biological water constituents are not exceeding the State water quality Standards.</p>	
<p>Habitat: Habitats exhibit a healthy, productive, and diverse population of native and/or desirable plant species, appropriate to the site characteristics, to provide suitable feed, water, cover and living space for animal species and maintain ecological processes. Habitat conditions meet the life cycle requirements of threatened and endangered species.</p>	<ul style="list-style-type: none"> • Vegetation composition (relative abundance of species) • Vegetation structure (life forms, cover, height, and age classes) 	<ul style="list-style-type: none"> • Vegetation distribution (patchiness, corridors) • Vegetation productivity • Vegetation nutritional value

<p>Land use plans will recognize cultural resources within the context of multiple use</p>	<p>No indicators listed</p>	
<p>Wild horses and burros exhibit characteristics of a healthy, productive, and diverse population. Age structure and sex ratios are appropriate to maintain the long term viability of the population as a distinct group. Herd management areas are able to provide suitable feed, water, cover and living space for wild horses and burros and maintain historic patterns of habitat use.</p>		<p>Healthy rangelands that provide sufficient quantities and quality of forage and water to sustain the appropriate management level on a year long basis within a herd management area.</p> <p>Wild horses and/or burros managed on a year-long basis for a condition class greater than or equal to five to allow them normal chances for survival in the winter (See glossary for equine body conditioning definitions).</p> <p>Highly adoptable wild horses and burros that are readily available from herd management areas.</p> <p>Wild horse and burro herds that exhibit appropriate age structure and sex ratio for short and long term genetic and reproductive health.</p>
<p>New Mexico</p>		

<p>Upland Sites: Upland ecological sites are in a productive and sustainable condition within the capability of the site. Upland soils are stabilized and exhibit infiltration and permeability rates that are appropriate for the soil type, climate, and landform. The kind, amount, and/or pattern of vegetation provides protection on a given site to minimize erosion and assist in meeting State and Tribal water quality standards.</p>	<p>Indicators may include but are not limited to:</p> <ul style="list-style-type: none"> • Consistent with the capability of the ecological site, soils are stabilized by appropriate amounts of standing live vegetation, protective litter and/or rock cover 	<ul style="list-style-type: none"> • Erosion is indicated by flow patterns characteristic of surface litter soil movement, gullies and rills, and plant pedestalling • Satisfactory plant protection is indicated by the amount and distribution of desired species necessary to prevent accelerated erosion
<p>Biotic Communities, Including Native, Threatened, Endangered, and Special Status Species: Ecological processes such as hydrologic cycle, nutrient cycle, and energy flow support productive and diverse native biotic communities, including special status, threatened, and endangered species appropriate to site and species. Desired plant community goals maintain and conserve productive and diverse populations of plants and animals which sustain ecological functions and processes. Restoration should first be achieved with native, and when appropriate non-native plants.</p>	<p>Indicators may include but are not limited to:</p> <p>Commensurate with the capability of the ecological site, plant and animal populations are:</p> <ul style="list-style-type: none"> • productive, resilient, diverse, and sustainable • Landscapes are composed of communities in a variety of successional stages and patterns • Diversity and composition of communities are indicated by the kinds and amount of species 	<p>Indicators may include but are not limited to:</p> <p>Commensurate with the capability of the ecological site, plant and animal populations are:</p> <ul style="list-style-type: none"> • Endangered and special status species are secure and recovering, with the goal of delisting and ensuring that additional species need not be listed within New Mexico

<p>Riparian Sites: Riparian areas are in a productive, properly functioning, and sustainable condition, within the capability of that site. Adequate vegetation of diverse age and composition is present that will withstand high stream flow, capture sediment, provide for groundwater recharge, provide habitat and assist in meeting State and Tribal water quality standards.</p>	<p>Indicators may include but are not limited to:</p> <ul style="list-style-type: none"> • Stream channel morphology and stability as determined by gradient, width/depth ratio, channel roughness, sinuosity. • Streambank stability as determined by degree of shearing and sloughing, vegetative cover on the bank • Appropriate riparian vegetation includes a mix of communities comprised of species with a range of age, density, growth form 	
<h2>Oregon and Washington</h2>		
<p>Watershed Function - Uplands: Upland soils exhibit infiltration and permeability rates, moisture storage and stability that are appropriate to soil, climate and landform</p>	<p>Protection of the soil surface from raindrop impact; detention of overland flow; maintenance of infiltration and permeability, and protection of the soil surface from erosion, consistent with the potential/capability of the site, as evidenced by the:</p> <ul style="list-style-type: none"> • amount and distribution of plant cover (including forest canopy cover) • amount and distribution of plant litter • accumulation/incorporation of organic matter • amount and distribution of bare ground • amount and distribution of rock, stone, and gravel • plant composition and community structure <p>Soil and plant conditions promote moisture storage as evidenced by:</p> <ul style="list-style-type: none"> • amount and distribution of plant cover (including forest canopy cover) • amount and distribution of plant litter • plant composition and community structure 	<p>Protection of the soil surface from raindrop impact; detention of overland flow; maintenance of infiltration and permeability, and protection of the soil surface from erosion, consistent with the potential/capability of the site, as evidenced by the:</p> <ul style="list-style-type: none"> • thickness and continuity of A horizon • character of microrelief • presence and integrity of biotic crusts • root occupancy of the soil profile • biological activity (plant, animal, and insect) • absence of accelerated erosion and overland flow <p>Soil and plant conditions promote moisture storage as evidenced by:</p> <ul style="list-style-type: none"> • accumulation/incorporation of organic matter

<p>Watershed Function - Riparian/Wetland Areas: Riparian-wetland areas are in properly functioning physical condition appropriate to soil, climate, and landform</p>	<p>Hydrologic, vegetative, and erosional/depositional processes interact in supporting physical function, consistent with the potential or capability of the site, as evidenced by:</p> <ul style="list-style-type: none"> • plant composition, age class distribution, and community structure • streambank/shoreline stability • sediment deposition • frequency of floodplain/wetland inundation • coarse/large woody debris <p>Stream channel characteristics are appropriate for landscape position as evidenced by:</p> <ul style="list-style-type: none"> • channel width/depth ratio • channel sinuosity • gradient • rocks and coarse and/or large woody debris • overhanging banks • pool/riffle ratio • pool size and frequency • stream embeddedness 	<p>Hydrologic, vegetative, and erosional/depositional processes interact in supporting physical function, consistent with the potential or capability of the site, as evidenced by:</p> <ul style="list-style-type: none"> • root mass • point bars revegetating • riparian area width • active/stable beaver dams • upland watershed conditions • frequency/duration of soil saturation • water table fluctuation
<p>Ecological Processes: Healthy, productive and diverse plant and animal populations and communities appropriate to soil, climate and landform are supported by ecological processes of nutrient cycling, energy flow and the hydrologic cycle</p>	<p>Photosynthesis is effectively occurring throughout the potential growing season, consistent with the potential/capability of the site, as evidenced by plant composition and community structure</p> <p>Nutrient cycling is occurring effectively, consistent with the potential/capability of the site, as evidenced by:</p> <ul style="list-style-type: none"> Plant composition and community structure Accumulation, distribution, incorporation of plant litter and organic matter into the soil 	<p>Nutrient cycling is occurring effectively, consistent with the potential/capability of the site, as evidenced by:</p> <ul style="list-style-type: none"> • Animal community structure and composition • Root occupancy in the soil profile • Biological activity including plant growth, herbivory, and rodent, insect and microbial activity

<p>Water Quality: Surface water and groundwater quality, influenced by agency actions, complies with State water quality standards</p> <p>[It is also stated that the Upland Watershed Standard, the Riparian Watershed Standard, and the Ecological Processes Standard, all contribute to attaining the Water Quality Standard.]</p>	<ul style="list-style-type: none"> • Water temperature • Turbidity • pH • Populations of aquatic organisms 	<ul style="list-style-type: none"> • Dissolved oxygen • Fecal coliform • Effects on beneficial uses (that is, effects of management activities on beneficial uses as defined under the Clean Water Act and State implementing regulations)
<p>Native, T&E, and Locally Important Species: Habitats support healthy, productive and diverse populations and communities of native plants and animals (including special status species and species of local importance) appropriate to soil, climate and landform</p>	<p>Essential habitat elements for species, populations and communities are present and available, consistent with the potential/capability of the landscape, as evidenced by:</p> <ul style="list-style-type: none"> • plant community composition, age class distribution, productivity 	<p>Essential habitat elements for species, populations and communities are present and available, consistent with the potential/capability of the landscape, as evidenced by:</p> <ul style="list-style-type: none"> • animal community composition, productivity • habitat elements • spatial distribution of habitat • habitat connectivity • population stability/resilience
<h2>Utah</h2>		
<p>Upland Soils: Upland soils exhibit permeability and infiltration rates that sustain or improve site productivity, considering the soil type, climate, and landform.</p>	<ul style="list-style-type: none"> • Sufficient cover and litter to protect the soil surface from excessive water and wind erosion, promote infiltration, detain surface flow, and retard soil moisture loss by evaporation 	<ul style="list-style-type: none"> • The absence of indicators of excessive erosion such as rills, soil pedestals, and actively eroding gullies • The appropriate amount, type, and distribution of vegetation reflecting the presence of (1) the Desired Plant Community (DPC), where identified in a land use plan conforming to these Standards, or (2) where the DPC is not identified, a community that equally sustains the desired level of productivity and properly functioning ecological conditions

Riparian and Wetland Areas: Riparian and wetland areas are in properly functioning condition. Stream channel morphology and functions are appropriate to soil type, climate and landform

- Streambank vegetation consisting of, or showing a trend toward, species with root masses capable of withstanding high streamflow events. **Vegetative cover** adequate to protect stream banks and dissipate streamflow energy associated with high-water flows, **protect against accelerated erosion**, capture sediment, and provide for groundwater recharge.
- Vegetation reflecting: **Desired Plant Community**, maintenance of riparian and wetland soil moisture characteristics, diverse age structure and **composition**, high vigor, **large woody debris** when site potential allows, and providing food, **cover, and other habitat** needs for dependent animal species.
- Revegetating point bars; lateral stream movement associated with natural **sinuosity; channel width, depth, pool frequency** and roughness appropriate to landscape position.
- **Active floodplain**

<p>Desired species, including native, threatened, endangered, and special-status species, are maintained at a level appropriate for the site and species involved</p>	<ul style="list-style-type: none"> • frequency, diversity, density, age classes, and productivity of desired native species necessary to ensure reproductive capability and survival 	<ul style="list-style-type: none"> • habitats connected at a level to enhance species survival • native species re-occupy habitat niches and voids caused by disturbances unless management objectives call for introduction or maintenance of non-native species • habitats for threatened, endangered, and special-status species managed to provide for recovery and move species toward de-listing • appropriate amount, type, and distribution of vegetation reflecting the presence of (1) the Desired Plant Community, where identified in a land use plan conforming to these Standards, or (2) where the DPC is not identified a community that equally sustains the desired level of productivity and properly functioning ecological processes
<p>Water Quality: BLM will apply and comply with water quality standards established by the state of Utah (R. 317-2) and the federal Clean Water and Safe Drinking Water Acts. Activities on BLM lands will fully support the designated beneficial uses described in the Utah water quality standards (R. 317-2) for surface and groundwater.</p>	<ul style="list-style-type: none"> • Measurement of nutrient loads, total dissolved solids, chemical constituents, fecal coliform, water temperature, and other water quality parameters • Macro invertebrate communities that indicate water quality meets aquatic objectives 	
<h2>Wyoming</h2>		
<p>Soils: Within the potential of the ecological site (soil type, landform, climate, and geology), soils are stable and allow for water infiltration to provide for optimal plant growth and minimal surface runoff.</p>	<p>Indicators may include but are not limited to:</p> <ul style="list-style-type: none"> • Vegetative cover (gully bottoms and slopes) • Bare ground and litter 	<p>Indicators may include but are not limited to:</p> <ul style="list-style-type: none"> • Water infiltration rates • Soil compaction • Erosion (rills, gullies, pedestals, capping) • Soil micro-organisms

<p>Riparian and Wetland Vegetation: Riparian and wetland vegetation has structural, age, and species diversity characteristic of the stage of channel succession and is resilient and capable of recovering from natural and human disturbance in order to provide forage and cover, capture sediment, dissipate energy, and provide for ground water recharge.</p>	<p>Indicators may include but are not limited to:</p> <ul style="list-style-type: none"> • Vegetative cover • Plant composition and diversity (species, age class, structure, successional stages, desired plant community, etc.) • Bank stability • Woody debris and instream cover • Bare ground and litter 	<p>Indicators may include but are not limited to:</p> <ul style="list-style-type: none"> • Erosion and deposition rate • Channel morphology and flood plain function • Channel succession and erosion cycle
<p>Upland vegetation on each ecological site consists of plant communities appropriate to the site which are resilient, diverse, and able to recover from natural and human disturbance.</p>	<p>Indicators may include but are not limited to:</p> <ul style="list-style-type: none"> • vegetative cover • plant composition and diversity (species, age class, structure, successional stages, desired plant community) • bare ground and litter • erosion (rills, gullies, pedestals, capping) • water infiltration rates 	
<p>Rangelands are capable of sustaining viable populations and a diversity of native plant and animal species appropriate to the habitat. Habitats that support or could support threatened species, endangered species, species of special concern, or sensitive species will be maintained or enhanced</p>	<p>Indicators may include but are not limited to:</p> <ul style="list-style-type: none"> • noxious weeds • species diversity 	<p>Indicators may include but are not limited to:</p> <ul style="list-style-type: none"> • age class distribution • all indicators associated with the upland and riparian standards • population trends • habitat fragmentation

<p>Water Quality: Water quality meets State standards</p>	<p>Indicators may include but are not limited to:</p> <ul style="list-style-type: none"> • Chemical characteristics (for example, pH, conductivity, dissolved oxygen) • Physical characteristics (for example, sediment, temperature, color) • Biological characteristics (for example, macro- and micro-invertebrates, fecal coliform, and plant and animal species) 	
<p>Air Quality: Air quality meets State standards</p>		<p>Indicators may include but are not limited to:</p> <ul style="list-style-type: none"> • Particulate Matter • Sulfur Dioxide • Photochemical Oxidants (Ozone) • Volatile Organic Compounds (Hydrocarbons) • Nitrogen Oxides • Carbon Monoxide • Odors • Visibility
<p>Appendix: State or RAC areas without a specific water quality Standard for Land Health.</p>		
<p>Arizona</p> <p>No specific water quality Land Health Standard. The Desired Resource Conditions Standard is the Land Health Standard in Arizona that if achieved, will assure that State water quality standards are achieved.</p>	<p>See indicators for Arizona's Desired Resource Conditions Standard.</p>	

<p>Nevada (Northeastern Great Basin Area)</p> <p>There is not a water quality specific Land Health Standard. The Riparian and Wetland Sites Standard is the Land Health Standard, that if achieved, will achieve state water quality criteria.</p>	<p>See indicators for the Riparian and Wetland Sites Standard.</p>	
<p>Nevada (Mojave-Southern Great Basin Area)</p> <p>There is not a water quality specific Land Health Standard. The Ecosystem Components Standard is the Land Health Standard, that if achieved, will achieve state water quality criteria.</p>	<p>See indicators for the Ecosystem Components Standard.</p>	
<p>New Mexico</p> <p>There is not a water quality specific Land Health Standard. The Upland Sites Standard and the Riparian Sites Standard are the Land Health Standards, that if achieved, assist in meeting State and Tribal water quality standards.</p>	<p>See indicators for the Upland Sites Standard and the Riparian Sites Standard.</p>	