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Interior Columbia Basin Supplemental Draft Environmental Impact Statement

Appendix 13b - Healthy Rangelands Standards and Guidelines

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Interior Columbia Basin Ecosystem Management Project
Supplemental Draft Environmental Impact Statement

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Table of Contents

Appendix 13b - Healthy Rangelands Standards and Guidelines

Introduction 13b-5
Idaho Standards and Guidelines 13b-5
Standard 1 (Watersheds) 13b-5
Standard 2 (Riparian Areas and Wetlands) 13b-5
Standard 3 (Stream Channel/Floodplain) 13b-6
Standard 4 (Native Plant Communities) 13b-6
Standard 5 (Seedings) 13b-6
Standard 6 (Exotic Plant Communities, Other than Seedings) 13b-7
Standard 7 (Water Quality) 13b-7
Standard 8 (Threatened or Endangered Plants and Animals) 13b-7
Guideline 1 ..... 13b-7
Guideline 2 ..... 13b-7
Guideline 3 ..... 13b-7
Guideline 4 ..... 13b-7
Guideline 5 ..... 13b-8
Guideline 6 ..... 13b-8
Guideline 7 ..... 13b-8
Guideline 8 ..... 13b-8
Guideline 9 ..... 13b-8
Guideline 10 ..... 13b-8
Guideline 11 ..... 13b-8
Guideline 12 ..... 13b-8
Guideline 13 ..... 13b-8
Guideline 14 ..... 13b-8
Guideline 15 ..... 13b-8
Guideline 16 ..... 13b-8
Guideline 17 ..... 13b-9
Guideline 18 ..... 13b-9
Guideline 19 ..... 13b-9
Guideline 20 ..... 13b-9
Montana Standards and Guidelines 13b-9
Butte District Preamble 13b-9
Standard 1 (Uplands are in Proper Functioning Condition) 13b-9
Standard 2 (Riparian and Wetland Areas are in Proper Functioning Condition) 13b-10
Hydrology/Streambanks 13b-11
Lateral Cutting 13b-11
Altered Streambanks 13b-11

Deep Binding Root Mass 13b-11
Downcutting 13b-11
Soils/Geology 13b-12
Bare Ground 13b-12
Vegetation 13b-12
Reproduction of Trees and Shrubs 13b-12
Dead and Decadent Trees and Shrubs 13b-12
Utilization of Trees and Shrubs 13b-12
Plant Composition 13b-12
Standard 3 (Water Quality Meets State Standards) 13b-12
Standard 4 (Air Quality Meets State Standards) 13b-14
Standard 5 (Provide Habitat as Necessary, to Maintain a Viable and Diverse Population of Native Plant and Animal Species, including Special Status Species) 13b-15
Guideline 1 ..... 13b-15
Guideline 2 ..... 13b-15
Guideline 3 ..... 13b-15
Guideline 4 ..... 13b-16
Guideline 5 ..... 13b-16
Guideline 6 ..... 13b-16
Guideline 7 ..... 13b-16
Guideline 8 ..... 13b-16
Guideline 9 ..... 13b-16
Guideline 10 ..... 13b-16
Guideline 11 ..... 13b-16
Oregon/Washington Standards and Guidelines 13b-16
Standard 1 (Watershed Function - Uplands) 13b-16
Standard 2 (Watershed Function - Riparian/Wetland Areas) 13b-16
Standard 3 (Ecological Processes) 13b-17
Standard 4 (Water Quality) 13b-17
Standard 5 (Native, Threatened, or Endangered; and Locally Important Species) 13b-17
General Guidelines 13b-17
Livestock Grazing Management 13b-17
Facilitating the Management of Livestock Grazing 13b-18
Accelerating Rangeland Recovery 13b-18

Table 1. Montana Air Quality Standards 13b-13

Introduction

This appendix is made up of two major sections. The first section is a (biological) crust evaluation and matrix for use in analyzing effects of livestock grazing on biological crusts. The second section is a reprint of the standards and guidelines for Healthy Rangelands on BLM - administered lands for Idaho, Montana, and Oregon/Washington.

The amendment to the Department of the Interior's grazing regulations, effective August 21, 1995, includes the mandate for Bureau of Land Management (BLM) State Directors to develop, in consultation with resource advisory councils, standards for rangeland health and guidelines for livestock grazing management (43 CFR 4180). These standards and guidelines are to provide for conformance with fundamentals of rangeland health, which describe desired conditions for watersheds, ecological processes, water quality, and habitats for special status species.

The standards and guidelines included in this appendix were developed by each of the BLM State Directors of Idaho, Montana, and Oregon/Washington, independent from one another, and approved by the Secretary of the Interior for use on public lands in each of the states within the Interior Columbia Basin Ecosystem Management Project area. Note that the definition for standards and guidelines, as referenced in this appendix, is the definition recognized by the BLM; whereas the definition for standards and guidelines, as used in this EIS, can be found in the glossary and in Chapter 3.

This appendix presents the approved standards and guidelines for Idaho, the portion of Montana that is within the project area, and Oregon/Washington. Inclusion of these BLM standards and guidelines is for the reader's convenience. We have reformatted the documents for readability, clarity, and consistency. It was not our intent to change their content. For implementation of these standards and guidelines, refer to the original documents:

U.S. Department of the Interior (USDI), Bureau of Land Management (BLM). 1997a. Idaho Standards for Rangeland Health and Guidelines for Livestock Grazing Management, Final. August 1997.

U.S. Department of the Interior (USDI), Bureau of Land Management (BLM). 1997b. Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in Montana and the Dakotas. August 1997.

U.S. Department of the Interior (USDI), Bureau of Land Management (BLM). 1997c. Standards for Rangeland Health and Guidelines for Livestock Grazing Managment for Public Lands Administered by the Bureau of Land Management (BLM) in Oregon and Washington. August 1997. The part of the appendix is widely available; therefore, it is unattached to this EIS.

Idaho Standards and Guidelines

Adapted from: U.S. Department of the Interior (USDI), Bureau of Land Management (BLM). 1997a. Idaho Standards for Rangeland Health and Guidelines for Livestock Grazing Management, Final. August 1997.

Standard 1 (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. Indicators may include, but are not limited to, the following:

1. The amount and distribution of ground cover, including litter, for identified ecological sites or soil-plant associations are appropriate for site stability.
2. 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.

Standard 2 (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. Indicators may include, but are not limited to, the following:

1. 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.
2. 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.
3. Age class and structural diversity of riparian/wetland vegetation is appropriate for the site.
4. Noxious weeds are not increasing.

Standard 3 (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, the following:

1. 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.
2. Stream width/depth ratio, gradient, sinuosity, and pool, riffle and run frequency are appropriate for the valley bottom type, geology, hydrology, and soils.
3. Streams have access to their floodplains and sediment deposition is evident.
4. There is little evidence of excessive soil compaction on the floodplain due to human activities.
5. Streambanks are within an appropriate range of stability according to site potential.
6. Noxious weeds are not increasing.

Standard 4 (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. Indicators may include, but are not limited to, the following:

1. 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.
2. The diversity of native species is maintained.
3. 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.
4. Noxious weeds are not increasing.
5. Adequate litter and standing dead plant material are present for site protection and for decomposition to replenish soil nutrients relative to site potential.

Standard 5 (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. Indicators may include, but are not limited to, the following:

1. In established seedings, the diversity of perennial species is not diminishing over time.
2. Plant production, seed production, and cover are adequate to enable recruitment when favorable climatic events occur.
3. Noxious weeds are not increasing.
4. Adequate litter and standing dead plant material are present for site protection and for decomposition to replenish soil nutrients relative to site potential.

Standard 6 (Exotic Plant Communities, Other Than Seedings)

Exotic plant communities, other than seedings, 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. Indicators may include, but are not limited to, the following:

1. Noxious weeds are not increasing.
2. The number of perennial species is not diminishing over time.
3. 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.
4. Adequate litter and standing dead plant material is present for site protection and for decomposition to replenish soil nutrients relative to site potential.

Standard 7 (Water Quality)

Surface and ground water on public lands comply with the Idaho Water Quality Standards. Indicators may include, but are not limited to, the following:

1. Physical, chemical, and biologic parameters described in the Idaho Water Quality Standards.

Standard 8 (Threatened or Endangered Plants and Animals)

Habitats are suitable to maintain viable populations of threatened and endangered, sensitive, and other special status species. Indicators may include, but are not limited to, the following:

1. Parameters described in the Idaho Water Quality Standards.
2. 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.
3. Age class and structural diversity of riparian/wetland vegetation are appropriate for the site.
4. 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.
5. The diversity of native species is maintained.
6. The amount and distribution of ground cover, including litter, for identified ecological sites or soil-plant associations are appropriate for site stability.
7. Noxious weeds are not increasing.

Guideline 1

Use grazing management practices and/or facilities to maintain or promote significant progress toward adequate amounts of ground cover (determined on an ecological site basis) to support infiltration, maintain soil moisture storage, and stabilize soils.

Guideline 2

Locate livestock management facilities away from riparian areas wherever they conflict with achieving or maintaining riparian-wetland functions.

Guideline 3

Use grazing management practices and/or facilities to maintain or promote soil conditions that support water infiltration, plant vigor, and permeability rates and minimize soil compaction appropriate to site potential.

Guideline 4

Implement grazing management practices that provide periodic rest or deferment during critical growth stages to allow sufficient regrowth to achieve and maintain healthy, properly functioning conditions, including good plant vigor and adequate vegetative cover appropriate to site potential.

Guideline 5

Maintain or promote grazing management practices that provide sufficient residual vegetation to improve, restore, or maintain healthy riparian-wetland functions and structure for energy dissipation, sediment capture, ground water recharge, streambank stability, and wildlife habitat appropriate to site potential.

Guideline 6

The development of springs, seeps, or other projects affecting water and associated resources shall be designed to protect the ecological functions, wildlife habitat, and significant cultural and historical/archaeological/paleontological values associated with the water source.

Guideline 7

Apply grazing management practices to maintain, promote, or progress toward appropriate stream channel and streambank morphology and functions. Adverse impacts due to livestock grazing will be addressed.

Guideline 8

Apply grazing management practices that maintain or promote the interaction of the hydrologic cycle, nutrient cycle, and energy flow that will support the appropriate types and amounts of soil organisms, plants, and animals appropriate to soil type, climate, and landform.

Guideline 9

Apply grazing management practices to maintain adequate plant vigor for seed production, seed dispersal, and seeding survival of desired species relative to soil type, climate, and landform.

Guideline 10

Implement grazing management practices and/or facilities that provide for complying with the Idaho Water Quality Standards.

Guideline 11

Use grazing management practices developed in recovery plans, conservation agreements, and Endangered Species Act, Section 7 consultations to maintain or improve habitat for federally listed threatened, endangered, and sensitive plants and animals.

Guideline 12

Apply grazing management practices and/or facilities that maintain or promote the physical and biological conditions necessary to sustain native plant populations and wildlife habitats in native plant communities.

Guideline 13

On areas seeded predominantly with non-native plants, use grazing management practices to maintain or promote the physical and biological conditions to achieve healthy rangelands.

Guideline 14

Where native communities exist, the conversion to exotic communities after disturbance will be minimized. Native species are emphasized for rehabilitating disturbed rangelands. Evaluate whether native plants are adapted, available, and able to compete with weeds or seeded exotics.

Guideline 15

Use non-native plant species for rehabilitation only in those situations where: a) native species are not readily available in sufficient quantities; b) native plant species cannot maintain or achieve the standards; or c) non-native plant species provide for management and protection of native rangelands. Include a diversity of appropriate grasses, forbs, and shrubs in rehabilitation efforts.

Guideline 16

On burned areas, allow natural regeneration when it is determined that populations of native perennial

shrubs, grasses, and forbs are sufficient to revegetate the site. Rest burned or rehabilitated areas to allow recovery or establishment of perennial plant species.

Guideline 17

Carefully consider the effects of new management facilities (e.g., water developments, fences) on healthy and properly functioning rangelands prior to implementation.

Guideline 18

Use grazing management practices, where feasible, for wildfire control and to reduce the spread of targeted undesirable plants (e.g., cheatgrass, medusa head, and noxious weeds) while enhancing vigor and abundance of desirable native or seeded species.

Guideline 19

Employ grazing management practices that promote natural forest regeneration and protect reforestation projects until the Idaho Forest Practices Act requirements for timber stand replacement are met.

Guideline 20

Design management fences to minimize adverse impacts, such as habitat fragmentation, to maintain habitat integrity and connectivity for native plants and animals.

Montana Standards and Guidelines

Adapted from: U.S. Department of the Interior (USDI), Bureau of Land Management (BLM). 1997b. Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in Montana and the Dakotas. August 1997.

Butte District Preamble

The Butte Resource Advisory Council (BRAC) has developed standards for rangeland health and guidelines for livestock grazing management for use on the Butte District of the Bureau of Land Management (BLM). The purpose of the Standards and Guidelines are to facilitate the achievement and maintenance of healthy, properly functioning ecosystems within the historic and natural range of variability for long-term sustainable use.

BRAC determined that the following considerations were very important in the adoption of these Standards and Guidelines:

1. For implementation, the BLM should emphasize a watershed approach that incorporates both upland and riparian standards and guidelines.
2. The standards are applicable to rangeland health, regardless of use.
3. The social and cultural heritage of the region and the viability of the local economy, are part of the ecosystem.
4. Wildlife is intergral to the proper function of rangeland ecosystems.

Standards are statements of physical and biological condition or degree of function required for healthy sustainable rangelands. Achieving or making significant progress towards these functions and conditions is required of all uses of public rangelands as stated in 43 CFR 4180.1. Baseline, monitoring and trend data, when available, should be utilized to assess compliance with standards.

Standard 1 (Uplands are in Proper Functioning Condition)

As addressed by the preamble to these standards and as indicated by:

Physical Environment:

- erosional flow patterns;
- surface litter;
- soil movement by water and wind;
- soil crusting and surface sealing;
- compaction layer;

- rills;
- gullies;
- cover amount;
- and cover distribution.

Biotic Environment:
- community diversity;
- community structure;
- exotic plants;
- photosynthesis activity;
- plant status;
- seed production;
- recruitment; and
- nutrient cycle.

The determination of rangeland health should be based on the evaluation of three criteria: degree of soil stability and watershed function, nutrient cycles and energy flows, and available recovery mechanisms.

Indicators to assess soil stability and watershed function relate to two fundamental processes of watershed degradation: (1) soil erosion by wind and water; and (2) infiltration or capture and utilization of precipitation. Indicators such as rills, gullies, flow patterns, pedestaling and compaction, may be used to assess watershed condition.

Indicators that can be used to evaluate nutrient cycles and energy flows relate to distribution of plants, litter, roots, and photosynthetic period; i.e., plant community diversity and structure, exotic plants, photosynthetic activity and plant status.

Recovery mechanisms or plant demographic indicators may include increasing vegetative cover, plant vigor, kind and number of seedlings, and changes in plant age distribution.

Physical environmental features of a proper functioning watershed are indicated by:
- little evidence of soil erosion by wind and/or water;
- rills, gullies, pedestaling, flow patterns are not resent (significant);
- surface sealing and soil crusting is not evident;
- plant (ground) cover and litter accumulation is adequate to protect site; and
- natural disturbance events are integral to proper ecosystem function.

Biotic environment features of a proper functioning watershed are indicated by:
- variety and number of plant life-forms (grass, forb, shrub, tree, succulent) across the site;
- plants exhibit a good diversity of size, height, distribution, and age/class well distributed;
- exotic plants, weeds are absent or sparse on site;
- plants display normal growth and root development;
- photosynthesis activity occurs throughout the site;
- plants are alive, productive with well developed root systems;
- seed stalks/seed adequate for stand maintenance for all life-forms;
- litter distribution and incorporation is uniform across site; and
- nutrient/energy cycle mechanisms are adequate for plant maintenance.

Standard 2 (Riparian and Wetland Areas are in Proper Functioning Condition)

As addressed by the preamble to these standards and as indicated by:

Hydrologic
- flood plain inundated in relatively frequent events (1-3 years);
- amount of altered streambanks;
- sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region);
- riparian zone widening; and
- upland watershed not contributing to riparian degradation.

Erosion Deposition
- flood plain and channel characteristics; i.e., rocks, coarse and/or woody debris adequate to dissipate energy;
- point bars are vegetating;
- 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); and

- bare ground.

Vegetation

- reproduction and diverse age structure of vegetation;
- 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;
- utilization of trees and shrubs;
- riparian plants exhibit high vigor;
- adequate vegetative cover present to protect banks and dissipate energy during high flows; and
- plant communities in the riparian area are an adequate source of large woody debris.

Broadly, "proper functioning condition" may be defined as the ability of a stream to perform its riparian functions. These functions include sediment filtering, bank building, water storage, aquifer recharge, and hydrologic energy dissipation.

No single factor or characteristic of a riparian site can provide a complete picture of either that site's condition or the direction of its successional change. Things considered "negative" in traditional evaluations of ecological sites may not be such for riparian sites. For example, the percent of exposed soil surface, which often reflects overgrazing or erosion on upland sites, may be a result of normal riparian activity; sediment deposition resulting after spring runoff, or a high water event.

Hydrology/Streambanks

The hydrology of a riparian area is perhaps its most important characteristic. Changes in hydrology may result in short and long-term vegetative changes. In some situations, construction (rip rap, roads, railroads, etc.) has influenced the streambanks and stability has been increased over the natural levels. These streambanks may eventually lose their stability, and become altered. This generally occurs if the problems which caused the weak streambanks have not been remedied. Also, constructed streambanks (especially those with rip rap) will often disrupt the normal energy dissipation of the stream and eventually the meandering of a stream can result in the erosion of streambanks downstream.

Lateral Cutting

Lateral cutting is indicated by new stream-caused bank disruption along the outside of stream curves, and much less commonly along the straight portions of a stream. A high degree of active lateral cutting can indicate a degraded watershed.

Altered Steambanks

In many instances, land used have degraded streambanks, accelerating stream movement across the flood plain. We define altered streambanks as those having impaired structural integrity (strength or stability) due to human-caused activities such as exposed soil surfaces from cattle trails and wallows, hiking and ATV trails, roads, logging skid trails, mining activities, etc.

Deep Binding Root Mass

Properly functioning streambanks are "armored by both vegetation and bank rock materials (e.g., boulders and cobbles). There have been few studies documenting the depth and extent of root systems of various plant species. Despite this lack of documented evidence, some generalizations can be made. All tree and shrub species are considered to have deep, binding root masses. Among riparian herbaceous species, the first rule is that annual plants do not have deep, binding root masses. Perennial species offer a wide range of root mass qualities. Some rhizomatous species, such as the deep-rooted sedges, are excellent streambank stabilizers. Other rhizomatous species such as Kentucky bluegrass, have only shallow root systems and are poor streambank stabilizers. Still others such as Baltic rush, appear to be intermediate in their ability to stabilize banks.

Downcutting

Active downcutting of a stream is often hard to recognize. Perched wetland vegetation and streambank features, plus the lack of a separate layer of channel bottom materials (i.e., the stream flows directly on the substrate materials), can be clues to downcutting. A stream is incised when downcutting

of the stream has resulted in a width to depth ratio so low that average 2-year floods do not come out of the banks.

Soils/Geology

The soils and geology (landform and parent material) of a riparian site influence how the site reacts to disturbances and changes over time. Changes in physical characteristics are often (but not always) more difficult to remedy through management actions than are vegetative changes. The depth and texture of soil, of a riparian site, influences the capacity of that site to hold water (act as a sponge) for prolonged late season flows and support desired vegetation.

Bare Ground

Exposed soil surface is important in evaluating the health of riparian areas for several reasons: (1) vulnerability to erosion; (2) it may contribute to, as well as reflect, streambank deterioration; (3) the more exposed soil, the less vegetation is available for soil protection and sediment entrapment; and (4) exposed soil provides opportunity for invasion by noxious weeds and undesirable species.

Vegetation

Because they are more visible than soil or hydrological characteristics, plants may provide early indications of riparian health.

Reproduction of Trees and Shrubs

One of the clearest indicators of ecological stability, and subsequent health, is the presence of all age classes (seedling, sapling, pole, mature, decadent, and dead) of tree and shrub species where the potential exists.

Dead and Decadent Trees and Shrubs

The amount of dead and decadent material in trees and shrubs is another indicator of the overall "health" of riparian areas. Large amounts of decadent and dead woody material can indicate severe stress due to high levels of browsing, and/or dewatering of the site from artificial or natural causes. If severe enough, this may change the potential from a riparian to an upland site. Large amounts of decadent and dead woody material may indicate fluctuations in climate, such as severe winter temperatures, spring freezes, or insect infestations.

In all cases, the overall biotic health is effected and may have implications on physical features of a stream such as streambank integrity, channel incisement, and lateral cutting.

Utilization of Trees and Shrubs

Heavy utilization by livestock and/or wildlife can prevent the regeneration or establishment of woody species and, thus block succession of the plant community toward a later seral stage. As the herbaceous species, excessive use of these woody species may cause their elimination from the site and their replacement by disturbance-induced species or undesirable invaders.

Plant Composition

The presence of disturbance-induced herbaceous plants (either native or introduced) may indicate that the site could be more healthy and thus is not performing its optimum riparian functions. Most of these species provide less soil holding and sediment trapping capability, and less desirable forage for livestock and wildlife.

Standard 3 (Water Quality Meets State Standards)

As addressed by the preamble to these standards and as indicated by:

- dissolved oxygen concentration;
- pH;
- turbidity;
- temperature;
- fecal coliform;
- sediment;
- color;
- toxins; and
- other parameters: ammonia, barium, boron, chlorides, chromium, cyanide, endosulfan, lindane, nitrates, phenols, phosphorus, sodium, sulfates, etc.

When discussing rangeland health, water quality is a relative term which must be associated with water-use to become meaningful. Since the beginning of time, natural processes have influenced the chemical, physical, and biological characteristics of water. The natural quality of water varies from place to place, with the season of the year, with the climate, and with the kind of rock and soil through which water moves. After reaching the earth, water dissolves minerals from the earth's crust, percolates through organic materials such as roots and leaves, and reacts with living things such as microscopic organisms like plankton and algae. Natural water quality is changed by stream sediments; it is modified by temperature, soil bacteria, and evaporation. These and other factors determine the quality of natures "impure" water.

Water quality criteria specify concentrations of water constituents which, if not exceeded, are expected to support an aquatic ecosystem suitable for higher uses of water. Water quality criteria are intended to protect essential and significant life in water, as well as the direct users of water, and also to protect life that is dependent on life in water for its existence.

Some of the common indicators of water quality are: Dissolved oxygen concentration (DO) is a function of temperature of the water, altitude, and barometric pressure. The ability of water to hold oxygen decreases with the increases in temperature, altitude and dissolved solids. This is important in fish spawning areas where DO levels must be maintained at specific levels for good growth and general well being of fish and associated biota.

Hydrogen-ion concentration (pH) is an indicator of acidity and/or alkalinity and an index of hydrogen-ion activity. Lower values indicated acid, higher values indicated alkaline. Fresh water organisms function properly if the pH ranges from 6.0 to 9.0

Table 1. Montana Air Quality Standards

PM_{10}	50 µg/m^3 annual average 150 µg/m^3 24-hr average*
Sulfur Dioxide	0.02 ppm annual average 0.10 ppm 24-hr average* 0.50 ppm 1-hr average**
Carbon Monoxide	23 ppm hourly average* 9.0 ppm 8-hr average*
Nitrogen Dioxide	0.05 ppm annual average 0.30 ppm hourly average*
Ozone	0.10 ppm hourly average*
Lead	1.5 µg/m^3 90 day average
Foliar Fluoride	35 µg/g grazing season average 50 µg/g monthly average
Settled Particulate Matter (dustfall)	10 mg/m^2 30-day average
Hydrogen Sulfide	0.05 ppm hourly average*
Visibility	Particle scattering coefficient of $3x10^5$ per meter annual average***

* Not to be exceeded more than once per year.
** Not to be exceeded more than 18 times per year.
***Applies to Prevention of Significant Deterioration mandatory Class I areas.

Abbreviations used in this table:
mg - milligrams
µg - micrograms
ppm - parts per million
m - meters

units. Concentrations below the recommended level are toxic to fish and other aquatic organisms.

Turbidity is the disturbance of water due to the presence of suspended matter such as clays, silt, organic matter, and various effluents. It is the expression of the optical property of water. Excess turbidity reduces light penetration, which reduces photosynthesis by phytoplankton, and submerged vegetation.

Temperature is an important function which affects aquatic productivity. Temperature changes may result from natural climatic conditions due to man's manipulation of the riparian environment. Temperature is a function of location, season, time, duration of flow, depth, and many other variables. Aquatic biota are adapted to certain thermal conditions existing in the habitat for their survival and well being. The interrelationship between these conditions is so great that small changes in temperature may have far-reaching effects.

Coliform groups including bacteria organisms in their natural habitat and sources; i.e., feces, soil, water, vegetation, etc. Fecal coliform may be an indicator of recent fecal pollution. Other coliform organisms may be the result of plant and soil runoff water.

Sediment is a measure of suspended sand, silt, colloid and organic matter which will settle, in time, to the stream bottom. They originate from sources such as erosion, mine waste, plowed fields, construction projects, natural erosion, or vegetative manipulation. They may affect fisheries by covering the bottom of the stream or lake with a blanket of material that destroys the bottom fauna or spawning grounds for fish.

Color is attributed to substances in solution after the suspensoid have been removed. It may be organic or inorganic substances that affect photosynthesis activity in the water. Organic substances include humic materials, peat, aquatic plants, etc. Inorganic sources include iron and manganese compounds, chemicals, industrial waste, etc.

Toxins are those compounds or substances which are found in by-products or waste of the various industries or activities that make their way into water sources which produce a variety of effects on fish or alter the biological productivity of water sources.

Acceptable water quality is indicated by:

- Dissolved oxygen concentrations - DO concentrations are being maintained at or near saturation levels.
- pH-concentrations are at or near recommended State levels.
- Turbidity-readings do not exceed Jackson Turbidity Unit readings for the water source.
- Temperature-water temperature readings meet State standard preferred for good growth and productivity.
- Coliform-organisms of the coliform group do not exceed State average for the site.
- Sediment-water normally contains suspended solids that do not exceed State standard.
- Color-water color does not limit or significantly restrict photosynthesis processes.
- Toxins-levels are in conformance with State standard.

Standard 4 (Air Quality Meets State Standards)

As addresses by the preamble to these standards and as indicated by Section 176(c) of the 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:

- cause or contribute to any violations of ambient air quality standards;
- increase the frequency of existing violations; and
- impede the State's progress in meeting its air quality goals.

The Clean Air Act established the Prevention of Significant Deterioration (PSD) regulations which set limits for increases in ambient pollution levels and established a system for preconstruction review of new major air pollution sources. Three PSD classes have been established: Class I, Class II, and Class III. Class I areas consist of all international parks, national parks greater than 5,000 acres, national wilderness areas greater than 5,000 acres, and national wildlife refuges which existed on August 7, 1977, when the amendment was signed into law.

Protection of air quality is provided to Class I areas by severely limiting the amount of additional human-caused air pollution which can be added. All other areas, except non-attainment areas, are classified as Class II in which a greater amount of additional human-caused pollution may be added. In no case, however, may pollutant concentrations exceed the National or State ambient air quality standards.

Standard 5 (Provide Habitat as Necessary, to Maintain a Viable and Diverse Population of Native Plant and Animal Species, including Special Status Species)

As addressed by these standards and as indicated by:

- plants and animals are diverse, vigorous and reproducing satisfactorily, noxious weeds are absent or insignificant in the overall plant community;
- 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;
- diversity of species (including plants, animals, insects and microbes) are represented; and
- plant communities in a variety of successional stages are represented across the landscape.

The BLM is charged with managing and developing habitat for a large variety of fish, wildlife, and special status species of plants. Basic habitat considerations can be categorized as including food, water, cover, and space. Specific habitat requirements often vary depending on what geographic area is being considered, species which are present, and the nature and extent of other uses which may be competing. A review of components of the above listed standards (Proper functioning Riparian-Wetland areas, Uplands and Water Quality) will provide much of the requirements needed to achieve fish, wildlife, and special status plant habitat.

Guideline 1

Manage grazing to maintain or improve watershed vegetation, biodiversity, and flood plain function. Maintain or improve riparian vegetative cover and structure to trap and hold sediments during run-off events to rebuild streambanks, restore/recharge aquifers, and dissipate flood energy. Promote deep-rooted herbaceous vegetation to enhance streambank stability. Where potential for woody shrub species (willows, dogwood, etc.) exists, promote their growth or expansion to aid in controlling access to streambanks, and to provide wildlife cover.

Guideline 2

Pastures and allotments will be periodically inventoried to determine their relative suitability for livestock grazing. Topography, slope, distance from water, or vegetation habitat types, wildlife, channel types, soil types, and other resource values must be considered when determining grazing potential. Specific areas could be excluded from grazing, fenced into separate management pastures, or managed more intensively.

Guideline 3

Management strategies for livestock grazing should produce sustainable hydrological, vegetative, and soil conditions. Thresholds for acceptable streambank alteration and vegetation utilization can be site-specific, and they should be the basis for establishing terms and conditions for allotments. These thresholds should by consistent with standards and result from application of scientifically acceptable hydrological and biological principles. Each allotment must have a monitoring plan, and monitoring results should be critical input to grazing system design. Long-term analysis of trend shall be the primary monitoring tool, and will be augmented by short term monitoring information. Monitoring plans should address rangeland standards including hydrologic, vegetative, and soil conditions.

Long-term and short-term monitoring attributes may include:

Hydrologic

- stream morphology; and
- streambank alteration.

Vegetative

- species composition;
- plant density;
- demographics;
- stubble height; and
- utilization.

Soils

- percent bare ground;
- compaction; and
- pedestaling.

Self-monitoring by permittee should be encouraged, but with these sideboards:

- permittee's data and BLM's data should be comparable;
- BLM must perform some level of compliance monitoring for each self monitored allotment to ensure the permittee's monitoring is being done and it is valid;
- there should be regular reporting of self-monitoring data; and
- when appropriate, monitoring should include the use of reference sites (such as exclosures).

Permittees and interested members of the public should be able to participate in the development of monitoring plans.

Guideline 4

Compatible seasons and duration of use, rest periods, stocking rates, structural facilities, and management activities, should be designed and implemented to ensure that standards are achieved.

Guideline 5

The development of springs and seeps or other projects affecting water and associated resources shall be designed to protect the ecological functions, processes and native species of those sites.

Guideline 6

Locate facilities (e.g., corrals, water developments) away from riparian areas and wetlands when possible.

Guideline 7

Supplemental salt and minerals should not be placed adjacent to watering locations or in riparian-wetland areas so not to adversely impact streambank stability, riparian vegetation, water quality, or other sensitive areas. Placement of salt in upland sites should consider critical winter wildlife habitat.

Guideline 8

Noxious weed control is essential and should include: cooperative agreements, public education, and integrated pest management (mechanical, biological, chemical). Butte RAC has addressed weeds in a Resolution dated May 8, 1996.

Guideline 9

Native species are preferred. Non-native species, where contributing to proper ecosystem function, are acceptable.

Guideline 10

Livestock management should utilize Best Management Practices for livestock grazing that meet or exceed those approved by the State of Montana in order to maintain, restore or enhance water quality.

Guideline 11

Grazing management practices should maintain or improve habitat for federally listed threatened, endangered, and sensitive plants and animals.

Oregon/Washington Standards and Guidelines

Adapted from: U.S. Department of the Interior (USDI), Bureau of Land Management (BLM). 1997c. Standards for Rangeland Health and Guidelines for Livestock Grazing Managment for Public Lands Administered by the Bureau of Land Management (BLM) in Oregon and Washington. August 1997.

Standard 1 (Watershed Function - Uplands)

Upland soils exhibit infiltration and permeability rates, moisture storage and stability that are appropriate to soil, climate and landform.

Standard 2 (Watershed Function - Riparian/ Wetland Areas)

Riparian-wetland areas are in properly functioning physical condition appropriate to soil, climate, and landform.

Standard 3 (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.

Standard 4 (Water Quality)

Surface water and groundwater quality, influenced by agency actions, complies with State water quality standards.

Standard 5 (Native, Threatened or Endangered, 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.

General Guidelines

1. Involve diverse interests in rangeland assessment, planning and monitoring.
2. Assessment and monitoring are essential to the management of rangelands, especially in areas where resource problems exist or issues arise. Monitoring should proceed using a qualitative method of assessment to identify critical, site-specific problems or issues using interdisciplinary teams of specialists, managers, and knowledgeable land users.

Livestock Grazing Management

1. The season, timing, frequency, duration and intensity of livestock grazing use should be based on the physical and biological characteristics of the site and the management unit in order to:

   A. Provide adequate cover (live plants, plant litter and residue) to promote infiltration, conserve soil moisture and to maintain soil stability in upland areas;

   B. Provide adequate cover and plant community structure to promote streambank stability, debris and sediment capture, and floodwater energy dissipation in riparian areas;

   C. Promote soil surface conditions that support infiltration;

   D. Avoid sub-surface soil compaction that retards the movement of water in the soil profile;

   E. Help prevent the increase and spread of noxious weeds;

   F. Maintain or restore diverse plant populations and communities that fully occupy the potential rooting volume of the soil;

   G. Maintain or restore plant communities to promote photosynthesis throughout the potential growing season;

   H. Promote soil and site conditions that provide the opportunity for the establishment of desirable plants;

   I. Protect or restore water quality; and

   J. Provide for the life cycle requirements, and maintain or restore the habitat elements of native (including threatened or endandered, special status, and locally important species) and desired plants and animals.
2. Grazing management plans should be tailored to site-specific conditions and plan objectives. Livestock grazing should be coordinated with the timing of precipitation, plant growth and plant form. Soil moisture, plant growth stage and the timing of peak stream flows are key factors in determining when to graze. Response to different grazing strategies varies with differing ecological sites.
3. Grazing management systems should consider nutritional and herd health requirements of the livestock.
4. Integrate grazing management systems into the year-round management strategy and resources of the permittee(s) or lessee(s). Consider the use of collaborative approaches (e.g., Coordinated Resource Management, Working Groups) in this integration.
5. Consider competition for forage and browse among livestock, big game animals, and wild horses in designing and implementing a grazing plan.
6. Provide periodic rest from grazing for rangeland vegetation during critical growth periods to promote plant vigor, reproduction and productivity.

7. Range improvement practices should be prioritized to promote rehabilitation and resolve grazing concerns on transitory grazing land.
8. Consider the potential for conflict between grazing use on public land and adjoining land uses in the design and implementation of a grazing management plan.

Facilitating the Management of Livestock Grazing

1. The use of practices to facilitate the implementation of grazing systems should consider the kind and class of animals managed, indigenous wildlife, wild horses, the terrain and the availability of water. Practices such as fencing, herding, water development, and the placement of salt and supplements (where authorized) are used where appropriate to:

   A. Promote livestock distribution;

   B. Encourage a uniform level of proper grazing use throughout the grazing unit;

   C. Avoid unwanted or damaging concentrations of livestock on streambanks, in riparian areas and other sensitive areas such as highly erodible soils, unique wildlife habitats and plant communities; and

   D. Protect water quality.
2. Roads and trails used to facilitate livestock grazing are constructed and maintained in a manner that minimizes the effects on landscape hydrology; concentration of overland flow, erosion and sediment transport are prevented; and subsurface flows are retained.

Accelerating Rangeland Recovery

1. Upland treatments that alter the vegetative composition of a site, like prescribed burning, juniper management and seedings or plantings must be based on the potential of the site and should:

   A. Retain or promote infiltration, permeability, and soil moisture storage;

   B. Contribute to nutrient cycling and energy flow;

   C. Protect water quality;

   D. Help prevent the increase and spread of noxious weeds;

   E. Contribute to the diversity of plant communities, and plant community composition and structure;

   F. Support the conservation of threatened or endangered, other special status species and species of local importance; and

   G. Be followed up with grazing management and other treatments that extend the life of the treatment and address the cause of the original treatment need.
2. Seedings and plantings of non-native vegetation should only be used in those cases where native species are not available in sufficient quantities; where native species are incapable of maintaining or achieving the standards; or where non-native species are essential to the functional integrity of the site.
3. Structural and vegetative treatments and animal introductions in riparian and wetland areas must be compatible with the capability of the site, including the system's hydrologic regime, and contribute to the maintenance or restoration of properly functioning condition.