

APPENDIX 9: BEST MANAGEMENT PRACTICES for WATER QUALITY -- NEVADA

The following is a listing of water quality best management practices for grazing on rangelands in Nevada from Chapter 7 of their grazing management plan. They were adopted by the State of Nevada on December 7, 1994.

LIVESTOCK

BMP 7-8 PLANNED GRAZING SYSTEM

DEFINITION

A livestock/wildlife grazing system in which two or more grazing units are alternately deferred or rested from grazing in a planned sequence over a period of years. The rest period may vary in duration given the specifics of the grazing area (ie. season, year, etc.).

PURPOSE

1. To maintain or improve plant cover, plant composition and forage production while properly using the forage on all grazing units
2. To improve efficiency of grazing by uniform use of all parts of each grazing unit.
3. To provide a supply of forage throughout the grazing season.
4. To improve the quality of forage available to animals during specific seasons.
5. To protect watershed, reduce runoff and sedimentation for the improvement of surface and ground water quality.
6. To improve wildlife habitat.

APPLICABILITY

Applies to native grazing lands, including those treated by spraying, seeding, etc., grazable woodlands and grazed wildlife lands. Grazing management may be applied to a single grazing unit and may be adequate to meet water quality objectives where proper grazing use and uniform distribution can be obtained.

PLANNING CRITERIA

The grazing system plan should:

1. Consider the climate, soils, range sites, present vegetative conditions, topography and other ecological conditions.
2. Allow forage use allocation for livestock and wildlife.

3. Be coordinated among all effected interest and natural resources. A "watershed" view should be established to identify all of the resources and interests. The coordinated approach should include federal land management agencies, state agencies, private land owners, other grazing users and applicable special interest groups. A variety of Resource Management and/or grazing systems are available given the specifics of the site including Holistic Resource Management, Coordinated Resource Management, and Savory Grazing Systems, to mention a few.
4. Consider specific management measures to alleviate livestock distribution problems such as concentrated use of riparian areas or other critical areas.
5. Should consider the kinds of livestock and the operator's objectives in conjunction with the federal land management objectives if the plan involves public lands.
6. Allow for practical application of the system and be flexible enough to meet the needs of key plant species and communities in relation to climatic fluctuations.
7. Consider the facilities needed for proper distribution and uniform use of grazing units such as fences, stock water developments, stock trails, access roads, salt, and supplemental feeding stations.
8. Provide for prolonged drought or other unusual circumstances. A monitoring plan should be included which monitors plant species use and condition with respect to the desired condition.
9. Consider economic costs in relation to the benefits expected from the entire system.

METHODS AND MATERIALS

1. **Grazing Management Systems** - Appropriate grazing management systems ensure proper grazing use by adjusting grazing intensity and duration to reflect the availability of forage and feed designated for livestock uses, and by controlling animal movement through the operating unit of range or pasture. Practices that accomplish this include:
 - A. Deferred grazing** - usually is defined as the postponing or resting of livestock grazing on an area for a prescribed period to provide for plant reproduction, establishment of new plants, or restoration of vigor to existing plants.
 - B. Deferred-rotation grazing** - Provides for a systematic rotation of deferment among two or more units.
 - C. Rest-rotation grazing** - Provides for adequate rest to restore and maintain plant vigor, reduced trampling of mature seeds after plant maturity, and establishment of seedlings. Grazing and rest are systematically rotated until all pastures within the system have received treatment. Rest periods may be throughout the year, during the growing season of key plant species or may include one full year of rest.
2. **Livestock Distribution** - Proper distribution of livestock is needed for the efficient and uniform use of each grazing unit. A livestock operator can implement the management

practice of herding or moving livestock when the desired plant use has been attained in a given area:

A. Fencing - Fences are usually required for livestock control and to divide ranges into grazing units of near equal capacity. Fences are also needed to exclude livestock from sensitive or critical areas. (See Appendix G-5 for fencing guidelines and specifications)

B. Stockwater Developments - It is essential to provide adequate water for livestock within reasonable distance of the grazing areas. Implementation of an improved grazing system often concentrates livestock requiring development of new or higher capacity watering facilities. In some applications water alone can be controlled to move livestock from one area to another.

There are several methods of developing stock water, including:

- (1) Spring developments - Improving springs and seeps by excavating, cleaning, capping or providing collection and storage facilities
- (2) Wells - Constructed or improved to meet the needs of livestock and wildlife.
- (3) Stockwater ponds and dugouts - A water impoundment made by constructing a dam or an embankment, or by excavation of a pit or dugout.
- (4) Pipelines, trough or tank - Pipeline to convey water to areas with no water source and a trough or tank for storage.
- (5) Photovoltaic pumping systems.
- (6) Ram pumps.
- (7) Windmills.

C. Stock Trails - May be needed where natural or man-made barriers limit access and movement of grazing animals. (See Appendix G-4 for guidelines and specifications for stock trails).

D. Salt, Mineral and Feed Supplement Locations - These need to be properly placed for good distribution of grazing animals throughout each grazing unit. They may be placed in light use areas away from water.

3. **Access** - It is necessary to have good access to all grazing areas for livestock management and to service and maintain facilities. Refer to NRS 535.010 on permit requirements for stock watering ponds and dams.

MAINTENANCE

Proper grazing will maintain enough live vegetation and litter cover to protect the soil from erosion; will achieve riparian and other resource objectives; and will maintain or improve the quality, quantity and age distribution of desirable vegetation. Maintain fences and other facilities for efficient operations. Follow proper grazing use, that is, grazing at an intensity that will maintain plant cover and maintain or improve the quantity and quality of desirable vegetation. Adjust system plans based on inspection and records of utilization.

EFFECTIVENESS

A properly operated grazing system provides for efficient use of forage and is an effective means of maintaining a plant cover that will reduce runoff and sediment delivery. How effective grazing management will be is dependent upon both the quality of the design in relation to the land and the skill utilized to implement, monitor and adjust management to meet objectives.

BMP 7-9 PROPER GRAZING USE

DEFINITION

Utilizing grazing practices at an intensity which will maintain enough cover to protect the soil and maintain or improve the quantity and quality of desirable vegetation.

PURPOSE

To improve or maintain the condition of plant species or community; to improve vegetative ground cover, and to maintain or improve the quality of surface runoff water on upland areas. In riparian areas, the purpose is to provide minimum vegetation stubble height to slow runoff, trap sediment, and ensure adequate root mass to hold banks during spring run off events.

APPLICABILITY

On all rangeland, woodland, pasture land, wetlands, riparian areas, and cropland utilized for livestock or wildlife grazing.

PLANNING CRITERIA

Specific grazing or allotment plans should consider the following:

1. Grazing frequency;
2. Stocking rates and distribution;
3. Class and age of livestock, wildlife or free roaming horses or burros;
4. Season of forage use and the duration of each rest and grazing period;

5. Historic and/or prior livestock distribution problems including areas with concentrated use or overuse and areas where forage has remained unused;
6. Manger preferences for plant species, the abundance of those species and the forage use allocation for livestock, wildlife or free roaming horses and burros;
7. The grazing system being used;
8. Physical terrain limitations; access and water sources;
9. Desired vegetation in riparian and/or critical areas is of significant importance to wildlife, fisheries and watershed function; and,
10. Other public land users.

The importance of climate and weather patterns must also be recognized with a certain flexibility provided for extreme variations in amounts of forage from year to year.

The best measure of proper use and management is the response of the range over a period of time to a comprehensive management system. An experienced range manager can recognize the signs of response and the range trend. Management decisions should then be based upon sound scientific data and analysis.

METHODS AND MATERIALS

Consult with a qualified range management professional in either the private or public sector before establishing a grazing management system. The following are key elements for proper grazing use.

1. Use a comprehensive data form that provides a use record of key forage species each year or grazing season.
2. Keep a record for each grazing unit and make evaluations of use in representative areas of each unit based on species composition and normal grazing patterns in the unit (See Appendix G-3).
3. Maintain a photographic record of range conditions at established photo points.

MAINTENANCE

Maintain proper use by adjusting grazing as indicated by plant response and trend in range condition.

EFFECTIVENESS

Proper grazing use will improve range production and vegetative cover to reduce runoff and sediment delivery.

BMP 7-10 RANGE IMPROVEMENTS

DEFINITION

Improving the existing rangeland through specific treatments including seeding, planting, prescribed burning, and brush/weed management.

PURPOSE

To improve watershed quality, conserve soil and water resources and reduce sediment delivery; produce forage for livestock and wildlife; improve plant species diversity; and improve recreation, wildlife and the natural resource values of the land.

APPLICABILITY

Applies to grazing lands where the land does not have enough desired plant species diversity to recover in a reasonable period by management alone; where existing vegetation would out compete introduced plant materials; following wildfires or brush management treatment, and where soil, climate, and topography are suitable for establishment of the desired plant community.

PLANNING CRITERIA

Compile the necessary base line data to determine the specific range improvement best suited for the site. Consultation with a qualified range management professional in the private or public sector is recommended.

1. Determine site suitability for seeding or containerized planting - slope, soils, elevation, available moisture, etc.
2. Select species for seeding or planting that are adapted to the site. Mixtures of grasses, forbs, shrubs, etc. are better than single species plantings on most sites.
3. Determine the requirements for acceptable methods of site preparation, soil amendments, planting or seeding.

METHODS AND MATERIALS

The following practices can be utilized to improve rangelands (See Appendix G).

Pasture and Hayland Plantings - Establishing and reestablishing long-term stands of adapted species of perennial, biannual, or reseeding forage plants.

Range Seeding - Establishing adapted plants by seeding on native grazing land.

1. On tillable land, the soil should be tilled with a rangeland plow, chisel plow, or one-way disk. Depth should be as shallow as possible while still eliminating competing vegetation. Double plow if necessary. Perform operations across the slope or on the contour.
2. Pitting or contour furrowing may be used in special situations where complete tillage is not practical or desired, or where other tillage methods would create serious erosion hazards. Chain drags can be used where plowing is not feasible.
3. Tillage operations should leave as much plant residue on the soil surface as possible for seeding protection, moisture conservation and erosion control.
4. Seed with a rangeland drill or, on well-prepared seed beds, a grain drill equipped with agitator and depth regulators. Broadcast seed only on areas that are too rocky or where seeding is not practical for other reasons.
5. Fall or early winter seedings are best. Spring seedings can be used on small areas or sites that remain wet and cold into late spring. (See Cooperative Extension Publication C-183 for species, mixtures, and seeding rates.)

Critical Area Planting - Planting vegetation, such as trees, shrubs, vines, grasses or legumes on highly erodible or critically eroding areas.

Brush and Weed Management - Managing and manipulating stands of brush and weeds on range, pasture and other areas by mechanical, chemical, biological means or by prescribed burning (See Appendix G-7).

Prescribed Burning - Applying fire to predetermined areas when the intensity and spread of the fire are controlled. (See BMP 6-6, "Prescribed Use of Fire").

MAINTENANCE

1. Seedings must not be grazed until the plants are well established. Usually it is necessary to protect seedings from grazing for one full year and through the growing season of the second year. Some seedings established during adverse weather cycles may need protection for a longer period.
2. After seedings are established, follow established grazing management practices. (See BMP 7-9, "Proper Grazing Use" and BMP 7-8, "Planned Grazing System").

EFFECTIVENESS

Well established and managed range seedings protect watersheds from excessive runoff, reduce runoff, reduce erosion and sediment delivery.

BMP 7-11 LIVESTOCK FACILITIES

DEFINITION

Livestock containment facilities are structures built or used to hold livestock, including but not limited to: corrals, holding pens, feed lots, barns and sheds.

PURPOSE

To reduce the degradation of surface runoff water quality and the potential to contaminate ground water resources resulting from the confinement of livestock.

APPLICABILITY

Applicable to areas where livestock are concentrated, such as horse corrals, feed yards, and holding pens. Runoff and leachate from these facilities can be high in nutrients from animal feeds and manure and create water quality problems especially if located near a streamside management area (SMA) or areas with a high water table.

PLANNING CRITERIA

The siting and construction of livestock containment facilities is important and sites should be carefully chosen based on the following guidelines.

1. Facilities should not be located in or near a SMA.
2. Facilities should not be located in areas subject to overland surface flow or flooding from upslope areas.
3. Facilities should be located on gently sloping to flat land (5% slope or less).
4. Facilities should not be located in areas which have less than four feet from the soil surface to the ground water table at any time of the year or areas having a high leaching potential.

In addition to the proper location of livestock confinement facilities, the following guidelines should be followed:

1. Surface runoff and related discharges from livestock containment facilities should be limited by:
 - * Storing both the facility waste water and the runoff from confined animal facilities that is caused by storms up to and including a 25-year, 24 hour frequency storm. Storage structures should:
 - a. Have a compacted clay seal or plastic membrane lining, or
 - b. Be constructed with concrete, or
 - c. Be a storage tank.

- * Managing stored runoff and accumulated solids from the facility through an appropriate waste utilization system.
- 2. Surface runoff from these facilities or animal waste stockpile should not be allowed to flow into a SMA.
- 3. Stockpiling of animal waste should be thoroughly investigated for the potential to degrade the soil profile and ground water resources. Any runoff or drainage from animal waste stockpiles or the facility area should be routed to the runoff storage system.
- 4. Manure storage or animal waste piles should be protected from precipitation and surface runoff.
- 5. When applied to agricultural lands, manure, stored runoff water, stored facility waste water, and accumulated solids from the facility are to be applied utilizing appropriate nutrient management measures. An appropriate waste utilization system to minimize impacts to surface water and to protect ground water may be achieved through implementation of the SCS Waste Utilization Practice (633).
- 6. Anaerobic ponds can be used to reduce odors and solids, improve water quality and generate methane gas.

METHODS AND MATERIALS

Livestock confinement facilities should be located, designed, and constructed under the direction of qualified professionals. If the facility is to be served by vehicle, the site should have loading-unloading areas that are outside of SMAs.

MAINTENANCE

A comprehensive inspection and maintenance program should be developed based upon the specifics of the site. Inspections should be conducted regularly, particularly after precipitation or storm events and repairs made as required.

EFFECTIVENESS

Properly maintained and operated facilities can be effective in preventing the discharge of degraded surface runoff and minimize ground water quality degradation.