Conway and Mattly Ranches

Livestock Grazing Management Plan

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Introduction

The Conway and Mattly Ranches, approximately 808 acres, were acquired by Mono County, California in two transactions, one in 1998 and one in 2000. The County purchased the ranches because of their high conservation values including wetlands, wildlife habitat, and forage resources as well as scenic, open space, public access and historic values. The Eastern Sierra Land Trust holds a Conservation Easement on both ranches to permanently protect these important values. The Conway Ranch Conservation Easement Management Plan specifies that the purpose of the plan is to manage the property as a sustainable working landscape, compatible with protection of conservation values.

Site Description

The Conway and Mattly Ranches are located in Mono County, California and encompass approximately 808 acres of irrigated native meadows, wetlands, riparian habitat and sagebrush scrub. The Conway Ranch comprises approximately 648 acres and the Mattly Ranch is approximately 160 acres (Appendix A). Adjacent landowners include the Bureau of Land Management, State of California, Los Angeles Department of Water and Power, Southern California Edison and eight privately owned parcels as part of a planned subdivision.

Goals

Management goals are to balance the traditional use of livestock grazing with important wildlife habitat, recreational, scenic and historic values. These goals are consistent with the Conservation Easement goals below:

1) Ensure the property will be retained forever in it its relatively natural, scenic, and open-space condition and that the conservation values will be protected;
2) Protect plant, wildlife species and habitat, such as wildlife migration corridor, resident wildlife, songbirds, waterfowl, plant and butterfly species;
3) Protect surface and groundwater resources and the wetlands, meadows, riparian habitats, and perennial freshwater springs that they support;
4) Protect open space and scenic resources;
5) Protect historic resources, including homestead, ranch buildings, corrals and Native American cultural resources;
6) Allow for public access for compatible recreation and educational purposes; and
7) Protect connectivity to other public and protected open space properties.

Current Condition and Resource Concerns

Important resource concerns identified during the field resource inventory in June 2018 include irrigation efficiency, operation and maintenance of structural improvements, presence of invasive weeds, and reduced plant productivity due to excessive litter accumulation. Fencing is minimal and is in disrepair. There are remnants of cross-fencing on the Conway Ranch. There are no livestock water developments on either ranch and there is an old corral and other historic structures on the Conway Ranch.

Management History

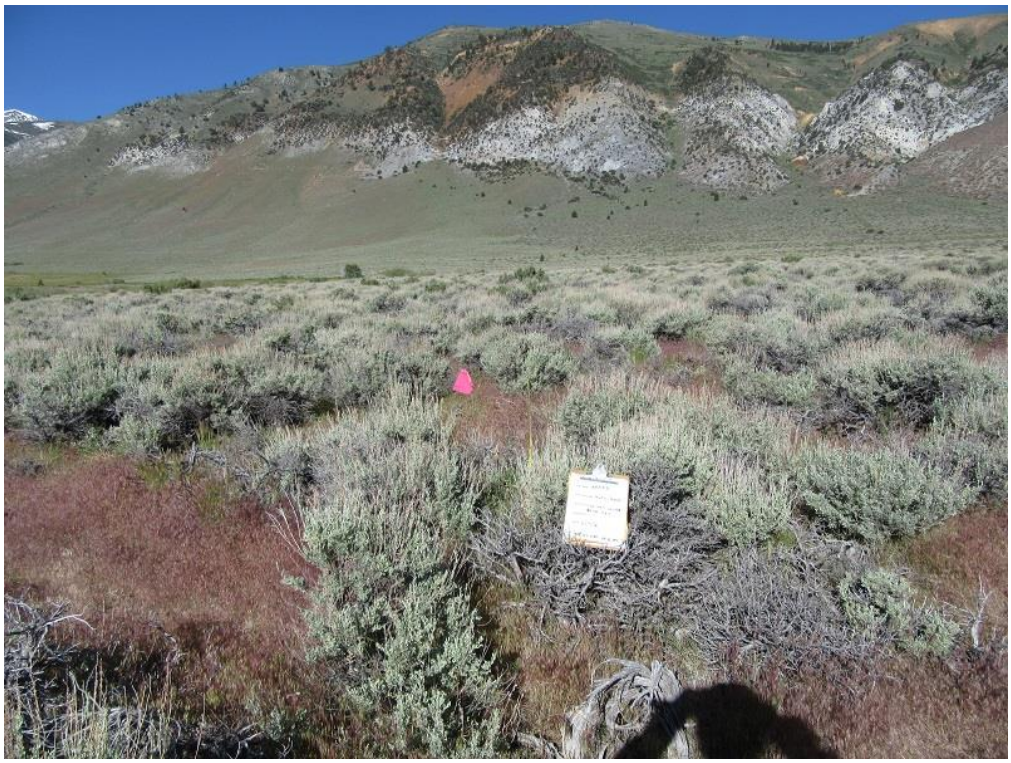
The Conway Ranch was homesteaded in 1872 and the Mattly Ranch was homesteaded in 1894. Water, diverted from Mill Creek and Virginia Creek, was used irrigate the native meadows in order to grow hay and other crops and graze horses and cattle. After passing through several owners, John Conway purchased the 900 acre ranch in 1903. The Conway family raised cattle on the ranch and later leased the ranch to the Saldubehere brothers who grazed sheep. Most recently, the Conway and Mattly ranches were grazed by sheep. Sheep were herded and watered in the ditches and creeks. Sheep grazing was terminated by the County in 2017 because of concerns with proximity to a Sierra Nevada bighorn sheep population.

Forage Resources

The Natural Resources Conservation Service (NRCS) divides rangeland landscapes into ecological sites for the purposes of inventory, evaluation, and management. An ecological site, as defined for rangeland, is a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation (USDA-NRCS 2003). Ecological sites represent a basis for data collection and interpretation, permitting their extrapolation to other areas and predicting the effects of management practices. Ecological sites are mapping units that provide information for ranchers and rangeland managers about ecological conditions, estimations of forage production, and carrying capacity.

The dominant ecological sites on the Conway and Mattly ranches are Wet Meadow (R026XF010CA), Gravelly Coarse Loamy 8-12" (R026XF004CA) Streambank (R026XF018CA), and Dry Meadow (R026XY055NV). Dominant plant species of the Wet Meadow ecological site include sedge (*Carex* spp.), tufted hairgrass (*Deschampsia caespitosa*), mountain rush (*Juncus arcticus*), beardless wildrye (*Leymus triticoides*) and Sandberg bluegrass (*Poa secunda*). Potential production ranges from 2000 to 4000 lbs/ac. The Gravelly Coarse Loamy ecological site is dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), antelope bitterbrush (*Purshia tridentata*), Indian ricegrass (*Achnatherum hymenoides*), needleandthread (Hesperostipa comata), and lupine (*Lupinus* sp.). Potential production ranges from 500 to 900 lbs/ac. The Streambank ecological site is dominated by an overstory of yellow willow (*Salix lutea*) and an understory of sedges, grasses and grass-like plants. Potential production ranges from 5000 to 6500 lbs/ac. Dominant plant species of the Dry Meadow include Douglas' sedge (*Carex douglasii*), mountain rush (*Juncus arcticus*), mat muhly *(Muhlenbergia richardsonis*) and Nevada bluegrass (*Poa secunda).*

Wet Meadow Ecological Site (R026XF010CA)



Gravelly Coarse Loamy 8-12" P.Z. Ecological Site (R026XF004CA)

Streambank Ecological Site (R026XF018CA)

Dry Meadow Ecological Site (R026XY055NV)

Stocking Rates

Annual forage production data was collected in the summer of 2018 at six study areas on the Conway Ranch and two study areas on the Mattly Ranch. Photos, GPS points, range inventory worksheets (ECS-01's), and production data sheets were collected. The production data collected was then used to estimate available forage in AUMs (Table 1). The total acres were approximated based on the Mono County ecological site map layer. The production estimate was calculated using the 2018 production data and a 65 percent harvest efficiency for the irrigated meadows (Wet and Dry Meadow) and 50 percent harvest efficiency for the Gravelly Coarse Loamy (sagebrush scrub) ecological site. Harvest efficiency is the percentage of forage that is consumed by an animal (reference Technical Note No. 73). It is the utilization percentage minus the amount of forage lost to weather, insects, and trampling. The production (pounds per acre) was rounded up to the nearest whole number. Table 1 contains the production data collected during June 2018 and shows a snapshot in time of what the pastures can yield in forage production in average to above average production years.

Forage production data from 2018 and potential production data from the ecological site descriptions were used to estimate animal unit months (AUM) and calculate initial stocking rates. An animal unit (AU) is considered one mature cow of approximately 1,000 pounds and a calf less than six months of age. The National Range and Pasture Handbook lists the forage requirement for an animal unit at 30 pounds oven-dry weight per day per animal unit or approximately 912 pounds of forage per month (USDA- NRCS 2003).

The initial stocking rate for the Conway Ranch property for a four-month grazing season is 168 cow/calf pairs. Potential stocking rate for a four-month grazing period is 275 cow/calf pairs.

TABLE 1: 2018 Conway Ranch Forage Production Data

Ecological Site	Acres	2018 Useable Forage Production (lbs/ac)	AU/acre	AUM's	Potential Forage Production (lbs/ac)	AU/acre	AUM's
Wet Meadow	361	~2400	1.7	614	4000	2.85	1029
Gravelly Coarse Loamy 8-12	150	~350	0.19	29	400	0.22	33
Streambank	10	~4300	3	30	5000	4	40
Total				**673**			**1102**

The initial stocking rate for the Mattly Ranch property for a one-month grazing season is 102 cow/calf pairs. Potential stocking rate for a one-month grazing period is 155 cow/calf pairs.

TABLE 1: 2018 Mattly Ranch Forage Production Data							
Ecological Site	**Acres**	**2018 Useable Forage Production (lbs/ac)**	**AU/acre**	**AUM's**	**Potential Forage Production (lbs/ac)**	**AU/acre**	**AUM's**
Wet Meadow	30	~2400	1.7	51	4000	2.85	86
Gravelly Coarse Loamy 8-12	100	~350	0.19	19	400	0.22	22
Dry Meadow	30	~1500	1.07	32	2200	1.57	47
Total				**102**			**155**

[1] Average Forage Production x (65% Harvest Efficiency) = AU/acre
(912 lbs./AUM)

[2] Average Forage Production x (50% Harvest Efficiency) = AU/acre
(912 lbs./AUM)

[3] AU/acre x Acres = AUM

Grazing System and Season of Use

The planned grazing system for the ranches is a rotational system with 3 to 4 pastures with one herd, either cow/calf pairs or dry cows. Rotational grazing involves using more than one pasture, grazed in a sequence followed by a rest period for recovery and regrowth of the grazed forage. The intensity of a rotational grazing system generally increases as more pastures are created.

The grazing period will be approximately four months (i.e. early June to early October), depending on recent weather and growing conditions. Livestock movements will be based on grazed height of forage plants and rest periods for recovery. The rotational system will be coordinated with the irrigation schedule to allow at least a 3-day dry-out period after irrigation.

- Begin the grazing season when the key forage species reaches the appropriate height (Table 3), typically mid-May to early June. **Move livestock before minimum height is reached on the majority of the forage.** *When defoliation is limited to only 50 to 65 percent of the growth present, root growth is not significantly reduced, and leaf regrowth will be fairly rapid.* If irrigation water is available, irrigate fields immediately after grazing to encourage regrowth. Rest fields between 20 to 30 days, depending on rate of growth of key species. If sufficient regrowth occurs, resume grazing when forage is 6 to 8 inches in height and end grazing at 3 to 4 inches in height, depending on key species in each pasture.

Conservation Practices

The USDA-Natural Resources Conservation Service (NRCS) has developed science-based tools and conservation practices that address resource concerns. The NRCS conservation practices (CP) that are needed to implement this grazing plan and address identified resource concerns include: Prescribed Grazing (CP 528), Spring Development (CP 574), Pipeline (CP 516), Watering Facility (CP 614), Fence (CP 382), Waterspreading (CP 640), Integrated Pest Management (CP 595) and Herbaceous Weed Treatment (CP 315).

A. Prescribed Grazing Management

Prescribed Grazing is defined as the controlled harvest of vegetation with grazing or browsing animals. Prescribed Grazing helps ensure that forage use does not exceed the production limitations of the forage being grazed to the extent that forage health, soil erosion/condition, water quality and animal health are affected negatively. Grazing systems are used to accomplish this goal and may be used to control the forage, the animals or both. Successful implementation of a grazing system requires periodic monitoring and adjustments of forage or livestock to ensure that goal is met.

The effect of herbivory on plants is a function of the time, duration, and intensity of grazing (Briske and Richard 1995). Time refers to the annual plant life cycle and when herbivory takes place. Duration is the length of time over which the herbivory occurs. Intensity is a measure of the amount of plant material removed by herbivory and is normally separated by current year's growth and previous year's growth. There are some general principles that relate to the three factors and should be a component of any prescribed grazing system:

1) Keep early defoliation periods short or delay initial defoliation:
2) Ensure adequate leaf area on grasses and grass-like plants remain at the end of the grazing period;
3) Ensure adequate growth of woody stems on shrubs remain at the end of the grazing period;
4) Provide adequate time between defoliation events to permit leaf area and carbohydrate reserves to build; and
5) Ensure adequate residual leaf area and time late in the growing season to permit carbohydrate build up and bud development.

Grazing rotation maximizes forage production by minimizing defoliation periods (grazing) and providing time for rest. During the growing season, plants produce energy for regrowth – thus the importance of leaving 3 to 4 inches of leaf growth. For plants to regrow after dormancy, they depend on reserve energy (carbohydrates) stored in the plant. This reserve energy is used for vegetative regrowth and root growth. Different plants store reserve energy in different parts of the plant. Other plants store energy in rhizomes or stolon's. Many non-rhizomatous grasses store reserve energy in the stem base near the ground. Therefore, it is important for plant health and regrowth to maintain an adequate stubble height. After grazing, the amount of remaining green leaves also has a significant effect on plant regrowth (Greene 2000). A 3 to 4-inch stubble height is recommended to maintain a healthy plant growth cycle. It is best to begin the grazing season in a different field each year, so the same field isn't grazed at the same time every single year.

Experience with the fields will help determine the best timing for rotation and guide management of the fields for optimum efficiency.

Best yields are obtained where the following management practices have been used: a) meeting the physiological requirements and facilitating reproduction of high yielding and palatable mixtures of plant species, b) proper irrigation management d) diligent weed management, e) implementing rotational grazing, and f) adding or removing animals according to available feed. Manage fields in a grazing rotation system with the following Best Management Practices:

- Avoid irrigating fields while animals are present. Irrigate pastures immediately after grazing to stimulate regrowth. Allow soil to dry (at least 3 days) to minimize forage production losses associated with trampling and soil compaction.

- Maintain sufficient residual vegetation and litter on both upland and meadow/riparian sites to protect the soil from wind and water erosion and support ecological functions.

- At the end of the grazing season, if irrigation water is available, irrigate fields after animals have been removed to encourage regrowth prior to the winter dormant period.

- Salt blocks or other supplements will be located away from riparian/wetland areas or known habitats of sensitive plants or wildlife species.

Properly managed grazing can be used to maintain a healthy and diverse vegetative community while providing varied habitat structure across the landscape. It is important to maintain or improve forb cover and tall grasses in the uplands. Timing and grazing intensity are the two factors that affect plant health and will therefore affect the long term and short term grazing objectives for livestock, sage grouse, and big game.

Key Grazing Areas and Key Forage Species:
A key grazing area is a small portion of the pasture selected because of its location, use or grazing value as a monitoring point for grazing use. It is assumed that key areas will reflect the current grazing management over the pasture as a whole. A key species is a single plant species (or in some situations two or more species) chosen to serve as a guide to the grazing use of the entire plant community. If the key species on the key grazing area is properly grazed the entire plant community will not be excessively grazed. Key species include clustered field sedge, Nebraska sedge, wooly sedge, beardless wildrye, Indian ricegrass and western needlegrass. Key areas are identified on the plan map and will be used to monitor grazing use. The stubble height method will be used to measure the height of herbage left ungrazed at any given time. Stubble height measurements are simple, quick and accurate and can be used to monitor large areas in less time than is needed with traditional utilization study methods. Table 2 provides information on the key species, key area location and guidelines on when to begin and end grazing.

Table 2 – Guide to proper grazing height based on key species

Key Area #	Key Species	Key Area Location	Average Plant Height to Begin Grazing (inches)	Phenological Stage of Plant Growth to Start Grazing	Average Plant Height to End Grazing (inches)	Regrowth Interval
CR KA#1	Nebraska sedge	38º 04' 10.92" N 119 09' 28.8" W	6	Vegetative	3	20-30 days
CR KA#2	Beardless wildrye	38º 03' 59.54" N 119 10' 48" W	8	Vegetative	4	20-30 days
CR KA#3	Clustered field sedge	38º 03' 46.15" N 119 09' 43.2" W	6	Vegetative	3	20-30 days
CR KA#4	Wooly sedge	38º 04' 16.0" N 119 09' 86.9" W	6	Vegetative	3	20-30 days
CR KA#5	Nebraska sedge	38º 03' 31.5"N 119º 09' 25.0"W	6	Vegetative	3	20-30 days
CR KA#5a	Beardless wildrye	38º 03' 37.1" N 119º 09' 32.8" W	8	Vegetative	4	20-30 days
MR KA#1	Mountain rush	38º 02' 39" N 119º 10' 29" W	4	Vegetative	3	20-30 days
MR KA#2	Indian ricegrass Western needlegrass	38º 03.032" N 119º 10.193" W	6 6	Vegetative	4 4	none

B. Fence

State of California Highway Fence along Highway 395 will need to be repaired prior to any cattle grazing. Property boundary fences (4 or 5-strand barbed) are recommended on the north and east sides of the Conway Ranch. The existing fence on the south side of Conway Ranch is in good condition. Riparian fencing is needed on both sides of Wilson Creek. A two-wire high tensile fence may be suitable for this area. The Mattly Ranch property boundary fence (4 or 5-strand fence is recommended on all sides. Fence markers to avoid sage grouse collisions should be applied every three feet around the entire perimeter of both ranches.

C. Livestock Water – Spring Development, Pipeline and Watering Facility

Historically, livestock watered from creeks, ditches and springs. On the Conway Ranch, a spring on the north end of the ranch, could be developed with pipelines and troughs to facilitate the proposed grazing system. The spring and the riparian corridor along Wilson Creek will be fenced to exclude livestock, although a fenced stream access area could provide livestock water. Livestock water on the Mattly Ranch can be supplied by the irrigation ditch or a pipeline and trough extending from the irrigation ditch.

D. Integrated Pest Management and Herbaceous Weed Treatment

Weed control is an important part of management because weeds reduce forage production, quality, and palatability of pastures. Weeds typically invade sites of uneven topography or where ground disturbance (rodent holes, fire, etc.) has taken place. They will also invade pastures that have declined as the desirable vegetation may have been grazed out. Overgrazing, low fertility and poor drainage will contribute to weed problems. Weeds are extremely competitive and invasive. Early detection, prevention and control can prevent large infestations. The most effective weed control depends on site conditions and the extent of infestation. A combination of mechanical, cultural, and chemical methods are more effective than any single method alone (Bossard et al 2000).

Integrated Pest Management includes Prevention, Avoidance, Monitoring, and Suppression techniques:

- Prevention – Activities such as cleaning equipment and gear when leaving an infested area, using pest-free seeds and irrigation scheduling to limit situations that are conducive to disease development.
- Avoidance – Activities such as maintaining healthy and diverse plant communities.
- Monitoring – Activities such as weed scouting and weather forecasting to help target suppression strategies and avoid routine preventative treatments.
- Suppression – Activities such as the judicious use of cultural, mechanical, biological and chemical control methods that reduce or eliminate a pest population or its impacts while minimizing risks to non-target organisms.

The following invasive or non-native species were documented during the range inventory:

Annual bursage (*Ambrosia acanthicarpa*) occurs near the old corrals and homestead. Annual bursage is a non-native, annual 1 to 3 feet tall. Control methods include tillage, hand pulling or hoeing or chemical application (DiTomaso et al 2013).

Bull thistle (*Cirsium vulgare*) occurs in scattered locations in the wet meadows on the Conway Ranch. Bull thistle is a non-native, biennial forb with a short, fleshy taproot and reproduces entirely by seed. Rosettes up to 3 feet in diameter will form the first year of growth. Control methods include hand pulling or hoeing before flowering, repeated mowing throughout the growing season, and/or chemical application in the rosette stage. Sheep, goats and horses will graze bull thistle early in the growing season which can prevent seed formation (DiTomaso et al 2013).

Cheatgrass (*Bromus tectorum*) occurs in disturbed areas and the sagebrush community that was burned in the Lundy Fire in 2003. Cheatgrass is a non-native, winter annual grass that germinates from late fall to early spring. Cheatgrass reproduces by seed and one plant may produce between 25 to 5000 seeds during a growing season. Sees typically mature by middle to late June. Seeds may remain dormant for 2 to 3 years. Control methods include hand pulling or digging for several consecutive years, repeated mowing, targeted grazing, and chemical control applied in fall or early winter before soils are frozen (USDA Forest Service 2014).

Common mullein (*Verbascum thapsus*) occurs in scattered locations in the wet meadows on both ranches. Common mullein is a non-native, biennial forb with a single, stout, erect stem that can reach 6 feet tall the second year of growth. It is unpalatable to livestock due to the wooly leaves. Control methods include hand pulling before seed set, repeated mowing in the bolting to early flowering stage, and chemical application during post or preemergence (DiTomaso et al 2013).

Lambsquarter (*Chenopodium album*) occurs near the old corrals and homestead on the Conway Ranch. Lambsquarter is a non-native, summer annual with alternate leaves and erect stems up to 40 inches tall. The best control methods are hoeing, digging or hand pulling or chemical application (DiTomaso et al 2013).

Redstem filaree (*Erodium cicutarium*) occurs in scattered locations in disturbed areas near the old corrals and homestead on the Conway Ranch. Redstem filaree is a non-native, winter annual or biennial with stems 1 inch to 2 feet long. It provides valuable forage in some areas and is considered noxious only when it crowds out more valuable crops (DiTomaso et al 2013).

Russian thistle (*Salsola tragus*) occurs in scattered locations in disturbed areas near the old ranch headquarters, along roadsides and the Aquaculture area on the Conway Ranch. Russian thistle is a non-native, rounded, bushy, much branched annual, 0.5 to 3 feet tall. It reproduces by seed every year and seeds are spread as mature plants break off at ground level and are scattered by the wind. Control methods include hoeing, piling and burning to prevent seeds from being scattered. Russian thistle also provides livestock forage early in the growing season (DiTomaso et al 2013).

Tall tumblemustard (*Sisymbrium altissimum*) occurs in disturbed areas near the old corrals and homestead on the Conway Ranch. Tall tumblemustard is a non-native, broadleaf winter annual or summer annual, 2 to 5 feet tall. The plant often breaks off at soil level when mature and scatters seed as it tumbles in the wind. Control methods include hand digging, pulling or tillage in early spring. Frequent mowing will also prevent the plants from producing seed. Grazing in the spring is also an effective control method (Donaldson and Mazet 2010).

Wild iris (*Iris missouriensis*) occurs in small patches in the wet meadows on both ranches. Wild iris is a native perennial forb that reproduces by rhizomes and seed. Wild iris is usually avoided by livestock because of the bitter tasting leaves. Control methods include hand grubbing to remove plants and rhizomes, reducing irrigation water, or chemical application of the foliage during the early bloom stage (Donaldson and Bowers 1998).

E. Waterspreading

Waterspreading is defined as a system of dams, dikes, ditches, or other means of diverting or collecting runoff from natural channels, gullies, or streams and spreading it over relatively flat areas. The purpose is to manage runoff from natural precipitation to support desired land use goals or ecological processes. Proper water management is essential for long-lived, high yielding pastures. Forage yields are more often limited by inappropriate water management than any other single production factor. Management of irrigated pastures requires that irrigation be

coordinated with other activities such as grazing, weed spraying and fertilization. Following irrigation, proper drying periods should be followed to optimize production. Proper management can help determine when water should be applied, amount, uniformity of application, capability to control delivery and to recognize when erosion problems arise. Never graze immediately following irrigation as this will compact the soil and may damage plant roots. When possible, irrigate as soon as possible after animals have grazed the field to allow for regrowth before the dormant season (Gildersleeve et al 1993).

As the soil water content is drawn down from field capacity (100% of available water) to permanent wilting point (0% of available water) production is generally not affect until a point where production drops off. This point is commonly chosen as a Management Allowable Deficit. Soil water draw-down below 50% will result in significant forage yield losses.

Estimating soil moisture by feel and appearance is a common and simple method to assist in determining the appropriate timing and amount of irrigation water (Table 3). The feel and appearance of soils vary with texture and moisture content. Soil moisture is typically sampled in 12-inch increments to the root depth of the plants at three or more sites per field. It is best to vary the number of sample sites and depths according to crop, field size, soil texture, and soil stratification (USDA-NRCS 1998).

The soils on the Conway and Mattly ranches are primarily sandy loams and the Moderately Coarse Texture column is appropriate.

Table 3. GUIDE FOR ESTIMATING AVAILABLE SOIL MOISTURE BY THE "FEEL" METHOD

Available Soil Moisture Remaining	Coarse Texture (fine sand)	Moderately Coarse Texture (sandy loam)	Medium Texture (loam)	Fine & Very Fine Texture (clay)
0 to 25%	Dry, loose, single grained, flows through fingers	Dry, loose flows through fingers	Powdery dry, sometimes slightly crusted but easily broken down into powdery condition	Hard, baked, cracked, sometimes has loose crumbs on surface
25 to 50%	Appears to be dry, will not form a ball with pressure[1]	Appears to be dry, will not form a ball[1]	Somewhat crumbly but holds together from pressure	Somewhat pliable, will ball under pressure[1]
50 to 75%	Moist, appears to be dry, darkened color, will not form a ball with pressure[1]	Moist, tends to ball under pressure, but seldom holds together[1]	Moist, forms a ball, somewhat plastic, will sometimes stick slightly with pressure[1]	Moist, forms a ball, ribbons out between thumb and forefinger
75% to field capacity (100%)	Wet, tends to stick together slightly, sometimes forms a very weak ball under pressure[2]	Wet, forms weak ball, breaks easily, will not stick[2]	Wet, forms a ball, is very pliable, sticks readily if relatively high in clay	Wet, easily ribbons out between fingers, has slick feeling
At field capacity (100%)	Wet, no free water appears on soil after squeezing, wet	Wet, free water appears on soil after squeezing, medium to	Wet, free water appears briefly on soil after squeezing, medium to	Wet, free water appears on soil after squeezing,

	outline of ball is left on hand	heavy wet outline of ball is left on hand	heavy wet outline of ball is left on hand	thick soil/water coating on fingers

[1]Ball is formed by squeezing a handful of soil very firmly.
[2]If the ball of soil is tossed in the air one foot and caught like a baseball and breaks with less than five tosses, it is a weak ball.

Monitoring Plan

Monitoring is effective in determining whether current grazing practices and treatments are meeting the desired objectives. Monitoring data can provide indicators of change that can be used to help make adjustments to the overall grazing management. Formulating objectives and selecting monitoring sites are key steps in any monitoring plan. Developing objectives requires the following components: 1) what will be measured, 2) how much of a particular attribute is desirable, and 3) what is the time frame for accomplishing said objective.

It is recommended that all monitoring points are not marked in such a way that they attract livestock to the monitoring point. For example, it is common to mark monitoring points with fence posts which often are used by livestock and wildlife as rubbing posts. Animals may concentrate in these areas and alter actual grazing use information. The following monitoring methods will provide the needed information to make informed management decisions.

1) ***Photo Points:*** Permanent photo points have been established in designated key areas of the fields. Photos should be taken annually prior to and following grazing. Photos can show change over time in vegetation, in the short or long term. Photos will also document any changes in land use in the fields and adjacent land units. The photo point should be selected based on a goal to improve the existing condition at the photo point or to maintain an already desirable area.
2) ***Line-point Intercept Transects:*** Transects can provide changes in plant cover, species composition, and structure information, as well as soil cover. A permanent transect is installed at each key area for monitoring species composition and cover. Transects should be read every 3 to 5 years.
3) ***Total Annual Plant Production:*** Annual production sampling in each key area can be used to adjust stocking rates and grazing rotations.
4) ***Stubble Height/Utilization:*** Stubble height or utilization of key forage plants should be measured during the grazing season to determine when to rotate fields and at the end of the grazing season (Appendix E).
5) ***Grazing Records:*** Monthly records of use should be kept by the livestock operator showing the time, number of livestock, and key forage plant height before and after grazing. Body condition of cattle and weight gain of calves at the end of the season can also be recorded.
6) ***Rangeland Health Assessments:*** Rangeland health is defined as the degree to which the integrity of the soil and ecological process of rangeland ecosystems are maintained (National Research Council 1994). Annual rangeland health assessments are a qualitative assessment of rangeland conditions and assist in identifying visual concerns in the field. The attributes of rangeland health include biotic integrity, soil/site stability, and

hydrologic function. Soil/site stability is defined as the capacity of an area to limit redistribution and loss of soil resources (including nutrients and organic matter) by wind and water. Hydrologic function is the capacity of an area to capture, store, and safely release water from rainfall, run-on, and snowmelt to resist a reduction in this capacity, and to recover this capacity when a reduction does occur. Biotic integrity is the capacity of the biotic community to support ecological process with the normal range of variability expected for the site, to resist a loss in the capacity to support these processes, and to recover this capacity when losses do occur. Annual rangeland health assessments are a qualitative assessment of rangeland conditions and assist in identifying visual concerns in the field.

Contingencies to the Grazing Management Plan

Contingency plans are developed as a way to deal with natural events that affect the carrying capacity of the land, such as drought, fire, insect or disease infestations. These conditions can cause a minor to severe loss in forage depending on the severity of the event and will likely affect the number of animals that can be grazed without causing damage to the land. Adaptive management is important when a landowner is faced with environmental conditions that require a contingency plan to be put into action. The stocking rate recommended in this plan is based on a normal or average forage production year. When that does not occur, livestock numbers or the grazing period should be reduced.

Evaluation

Adaptive management can be used to improve the grazing management. Adaptive management involves the evaluation of current strategies and identifying areas that can be changed. Follow-up evaluation assistance will be provided by NRCS on at least an annual basis. The evaluation assistance will include a review, on the ground, of the applied grazing management, a review of the monitoring data, and any observations of trends in plant community response, herd health, and livestock performance. Adjustment to the grazing management strategies may need to be made based on the evaluation. A plan revision may also include additional fencing, water developments, or additional treatments. If any new resource problems are identified the plan may also require revision.

References:

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Appendix A – Maps

Appendix B – NRCS Conservation Practice Standards and Specifications

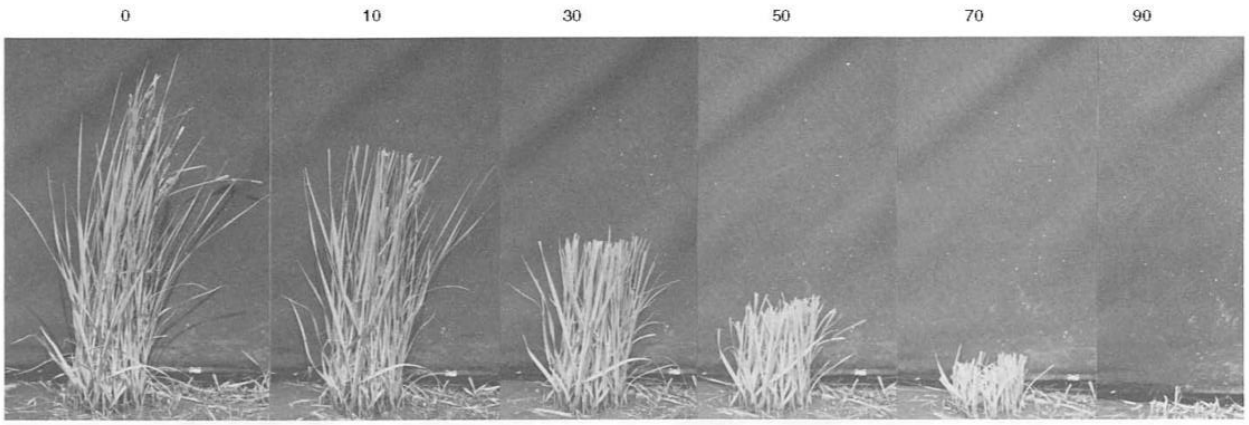
Appendix C – Rangeland Inventory Data Sheets

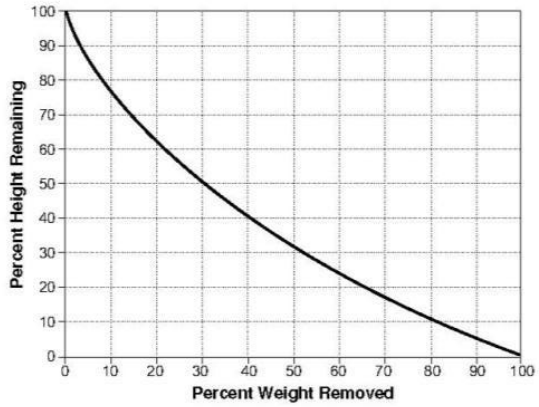
Appendix D – Plant Species Lists

Appendix E – Utilization Photo-Guides

Utilization photo-guide (Kinney and Clary 1994)

Nebraska sedge (*Carex nebrascensis* Dewey)





Plants coarse, stems stout and sharply triangular, vigorously rhizomatous, leaves firm, blue-glaucous

2 to 10 dm tall

Flowering period July to September

Seed set August

Palatability high

Wet meadows and other wet places, often in alkaline areas

Lower to middle elevations