

**NATURAL RESOURCES CONSERVATION SERVICE
PACIFIC ISLANDS AREA**

CONSERVATION PRACTICE SPECIFICATION

PRESCRIBED GRAZING

PURPOSE OF SPECIFICATION

This specification provides additional guidance for developing a grazing plan. Plans and specifications will be prepared for the application of the practice on a client's treatment unit in accordance with the requirements in the Conservation Practice Standard and the guidance in this Specification. The job specifications will be recorded in the practice Jobsheet.

GENERAL

The prescribed grazing plan will conform to all applicable federal, state, and local laws. Seek measures to avoid adverse affects to endangered, threatened, and candidate species and their habitats.

A prescribed grazing plan will be prepared for all management units where grazing will occur according to state standards and specifications.

Management unit is synonymous with such terms as pasture or paddock.

GOALS AND OBJECTIVES

The goals and objectives of the client for the management unit and/or the grazing operation will be clearly stated in the Pacific Islands Area Prescribed Grazing Jobsheet.

RESOURCE INVENTORY

A resource inventory for the management unit will be conducted and include: resource conditions, existing structures, facilities, soil, etc.

The NRCS Pacific Islands Area "Resource Problem Worksheets" Technical Note may be used to document existing or potential resource problems: ftp://ftp-fc.sc.egov.usda.gov/HI/pub/technotes/cons_planning/Cons_Planning_1_Resource_Problem_Worksheets/.

Maps and drawings may be used to document existing structures and facilities. All other information will be developed or collected as appropriate and included as part of and considered in the development of the grazing plan.

FORAGE INVENTORY

A forage inventory of the existing and/or expected forage quality, quantity and species of forage in each management unit(s) during the grazing period will be completed. Methods of estimating the forage yield for a management unit include: conducting sampling in the field (existing) and using existing soils information (expected). If possible, planners should use both methods and compare the results. In situations where yield information for soils is not available, then direct forage sampling will be conducted.

PI-RANGE-1 Forage Inventory & Estimated Stocking Rate Worksheet *(required)*

The PI-RANGE-1 Forage Inventory & Estimated Stocking Rate Worksheet will be used when field sampling is conducted. This worksheet calculates the forage yield in animal unit months (AUM) per acre per year based on actual forage sampling. Allowable sampling methods include: direct harvest, estimating and harvesting ("double sampling"), or estimating by weight units. The PI-RANGE-4 may be used if that is preferred by the planner and/or client.

Table 5 shows the plot conversion factors to use, depending on the size of area clipped. For example, if a 2.4 ft² plot size is clipped, the conversion factor is 40. To convert the grams/plot to pounds/acre, multiply the grams of air-dry forage weight by the plot conversion factor.

All planners will receive training on use of these monitoring methods before attempting to apply them. Contact the State Rangeland Management Specialist to schedule training.

FORAGE-ANIMAL BALANCE

The **PI-RANGE-2 Animal Forage Requirements & Pastures Needed Worksheet** will be used to determine if the available forage supply meets or exceeds the forage demands of the livestock and/or wildlife of concern. The results will be used to help develop a sustainable grazing plan for each management unit and the entire grazing operation. If the animal forage demand exceeds the forage supply, management actions may need to be taken such as decreasing the number of animals and/or providing supplemental feed. For planners and clients familiar with the PI-RANGE-5 worksheet, that is also acceptable to use for forage and animal balancing.

The **Grazingland Spatial Analysis Tool (GSAT)** may be used in lieu of the PI-RANGE-2 or PI-RANGE-5. If the planner has been trained in the use of GSAT, it is encouraged that the GSAT Forage-Animal Balance Report be used instead of the PI-RANGE-2 or PI-RANGE-5.

Comparing Actual Sampling and Soils Forage Yields

If forage yield estimates based on sampling and soils are both available, they may be compared and analyzed to determine which amount or a reasonable amount to use as the quantity of forage available for further planning.

Actual yields (as estimated by sampling on the PI-RANGE-1) will certainly vary due to climatic factors as well as current and previous management. Sampling should always try to capture a full year's growth in order to be comparable to the soil's estimated yield. Planners should note that the information from the soils reports are very general "ball-park" annual yields for pasture. Planners should use their professional judgment to determine the amount to use as the forage yield to complete the PI-RANGE-2 Animal Forage Requirements & Pastures Needed Worksheet and the grazing management plan.

GRAZING PLAN

A grazing plan will be developed for that identifies periods of grazing, resting, and other treatment activities for each management unit. The **PI-RANGE-3 Grazing Plan Worksheet** may be used for this purpose. However, if a different method of portraying the grazing plan is more effective with the land manager, use that other method. For example, the planner can use the conservation plan map to denote which fields will be grazed, in what sequence, for each year or season. Many times, that visual representation of the grazing plan is easier to follow and understand than the PI-RANGE-3 Grazing Plan Worksheet format. It is up to the planner to

devise the best method of grazing plan representation for each land manager. All grazing plans should consider forage, cover and watering needs of wildlife that graze the pastures.

Examples of types of grazing plans for livestock include short duration grazing, deferred rotation grazing, and rest rotation grazing.

A grazing plan will provide sufficient rest for the forage type throughout the year or during the major growing season of the predetermined key forage plants, as is the case of arid and semi-arid climates in the Pacific Islands Area. However, the dormant season or periods of slowed plant growth should not be exempt from the grazing schedule. The initial grazing plan can serve to utilize vegetative growth from previous years. The grazing plan should increase the efficiency of grazing by more uniformly using all portions of the grazing management unit(s). If necessary, salt, mineral, and other supplements should be placed away from livestock water developments and moved around the management unit(s) to encourage more uniform grazing.

The grazing plan should allow for vigorous plant re-growth following a period of grazing and never more than 50% use during the major growing season, and not more than 65% use during the dormant season or slowed growth period. A grazing plan should also consider the reproductive cycles and allow for successful seed set and drop of desirable forage species to ensure these species will persist and increase in the pasture. An implemented grazing plan should maintain or improve range/pasture ecological condition and rangeland and/or pastureland health, reduce soil erosion, as well as improve livestock performance.

A grazing plan should generally not be planned for more than three consecutive years in advance. At the end of those three years, the effects of the grazing plan on all the management units should be evaluated and a new grazing plan should be developed.

CONTINGENCY PLAN

A contingency plan will be developed that details potential problems (eg, severe drought, flooding, wildfire) and serves as a guide for adjusting the grazing prescription to ensure resource management and economic feasibility without resource degradation.

The contingency plan will include a plan to evacuate or de-stock all grazing management units except a "sacrifice lot" in order to minimize damage to the greater grazing resource. Supplemental feed requirements necessary to meet the desired nutritional level for a kind or class of livestock or wildlife, as related to the operating unit or a portion of the operating unit will be considered.

The Pacific Islands Area Prescribed Grazing Jobsheet will be used to document the contingency plan.

MONITORING PLAN

A Monitoring Plan will be developed with appropriate records to assess whether the grazing strategy is meeting objectives. Identify the key areas and key plants that the manager should evaluate in making grazing management decisions.

In the Pacific Islands Area, the Monitoring Plan will include the use of the **PI-RANGE-6 Stubble Height and Frequency Worksheet** (if appropriate), **PI-RANGE-7 Stubble Height and Basal Gap Worksheet**, **Photo Documentation**, the **PI-RANGE-414 Prescribed Grazing Certification Worksheet** and/or the **PI-RANGE-416 Browse Resource Evaluation Worksheet**.

PI-RANGE-6 Stubble Height and Frequency Worksheet *(optional)*

The PI-RANGE-6 Stubble Height and Frequency Worksheet will be used where the key grazing plants are predominantly herbaceous (grasses and forbs), *and the grazing management goals include a change in overall species composition*. It is used to assess whether the grazing strategy is meeting the client's objectives.

This worksheet is a field data collection form. The Stubble Height monitoring (page 1) will be conducted at least once annually, after the last grazing event in the driest part of the growing season. If $\geq 50\%$ of the forage plants measured in the representative area(s) meet the post-grazing height requirements shown in Tables 2 and 3, then this part of the prescribed grazing specification has been met.

The Frequency monitoring (page 2) will be conducted prior to the change in grazing management (benchmark), and then at least once every 3 years to document any change in species composition within the pasture(s).

If a change in species composition is not a management objective, then do not use this form; use the PI-Range-7 form for field monitoring instead.

All planners will receive training on use of these monitoring methods before attempting to apply them. Contact the State Rangeland Management Specialist to schedule training.

PI-RANGE-7 Stubble Height and Basal Gap Worksheet *(required)*

The PI-RANGE-7 Stubble Height and Basal Gap Worksheet will be used where the key grazing plants are predominantly herbaceous (grasses and forbs). It is used to assess whether the grazing strategy is meeting the client's objectives.

This worksheet is a field data collection form. Both monitoring methods (stubble height and live plant basal gaps) will be conducted at least once annually, after the last grazing event in the driest part of the growing season. For stubble height, if $\geq 50\%$ of the forage plants measured in the representative area(s) meet the post-grazing height requirements shown in Tables 2 and 3, then this part of the prescribed grazing specification has been met.

The live plant Basal Gap monitoring (page 2) is used to monitor any reduction in basal gaps greater than one-foot within the plant community. As basal gaps (distance between plant bases) decreases, the plant community becomes more "filled in" with plants. This can significantly reduce soil erosion from wind or water, improve nutrient cycling, improve annual forage production, etc. Monitoring live plant basal gaps will be conducted in pastures where the dominant forage species are bunchgrasses. When the dominant forage species are stoloniferous or rhizomatous, this method will not be used. In those situations, the ground cover data acquired with the Stubble Height method (page 1) will be sufficient.

All planners will receive training on use of these monitoring methods before attempting to apply them. Contact the State Rangeland Management Specialist to schedule training.

Photo Documentation Requirements *(required)*

In addition to the quantitative field data collection using stubble height, plant frequency, basal gap, etc, all key areas will be photographed annually to document change.

All planners will receive training on proper photo documentation methods before attempting to apply them. Contact the State Rangeland Management Specialist to schedule training.

PI-RANGE-414 Prescribed Grazing Certification Worksheet *(required)*

The PI-RANGE-414 Prescribed Grazing Certification Worksheet will be used where the key grazing plants are predominantly herbaceous (grasses and forbs). It is used to assess whether the grazing strategy is meeting the client's objectives, and to certify the 528-Prescribed Grazing practice. Grazing management units that are determined not to have met proper grazing use standards will not be reported as successfully applied Prescribed Grazing. The following Tables 1, 2, and 3 will be used to complete the PI-RANGE-414 Prescribed Grazing Certification worksheet.

Judging Proper Grazing Use. Proper grazing use is judged by the use of key forage species in designated key grazing areas. Proper use of the key forage species benefits the key grazing area. Where the key area is properly used, the grazing management unit as a whole is not overused. However, proper grazing use will not be considered as applied if more than 10% of the grazing management unit is overgrazed or is of excessive use.

The key forage species for judging degree of use for each key grazing area is selected with the client's participation after considering the plant needs, the area and its potential vegetation, present plant composition, kind of grazing animals, season of grazing, and frequency and length of rest periods. When the key forage species is properly selected and grazed, the key grazing area should also be properly grazed. The grazing animal will generally have a relatively high preference for the key forage species. Normally, the key forage species provides more than 15% of the available forage on the area and is accessible.

The key grazing area is that part of a grazing management unit which indicates the grazing pressure being applied to the entire grazing management unit. Identifying and locating the key grazing area is done after considering grazing use patterns and preference areas within each grazing management unit. The key grazing area provides a significant amount, but not necessarily the majority of, the available forage in the grazing management unit. For relatively small grazing management units where the vegetation type is basically the same the entire grazing management unit can be evaluated as the key grazing area.

The single key grazing area and the single key forage species will be designated for each grazing management unit. The only exceptions are:

- 1) When the grazing management unit is grazed for a 12-month period and has a mixture of warm and temperate season forage species, it may be necessary to designate the key forage species for different periods during the year.
- 2) When the grazing management unit is grazed by two kinds of animals, and each animal has distinctly different forage preferences for grazing.

Degree of Use. Manage the intensity of grazing to remove no more than the specified percent, by air dry weight, of the annual forage production by the end of the grazing season from the key forage species on the key grazing area on each grazing management unit.

Determine grazing use by comparing grazed plants of the key forage species with ungrazed plants of comparable size and vigor on the key grazing area. (It may be necessary to use ungrazed plants from a nearby area having similar soils or to install a cage that protects the key forage species for comparison.)

Proper grazing use will leave 50% or more, by air-dry weight, of the current year's growth of the key forage species at the end of a period of grazing when grazing is limited to the major growing season or when grazing is yearlong. When grazing is limited to the dormant season or slowed

growth period, proper grazing use will leave a minimum of 35% to 40% of the current year's growth of the key forage species.

Stubble Height. An acceptable and alternate method for determining proper grazing use is stubble height field measurements. Acceptable post-grazing stubble heights of the key forage species are to be measured in the key grazing area. An average stubble height is determined by measuring the average height of grazed key forage species. A minimum of 100 stubble height measurements will be conducted within the key grazing area for determining an average stubble height of key forage species. When measuring stubble heights of key forage species, good, professional judgment is needed.

Measure stubble height at or near the end of the grazing period. This determination will be made no later than the beginning of the new major plant growth period.

PI-RANGE-416 Browse Resource Evaluation Worksheet *(required if woody forage present)*

The PI-RANGE-416 Browse Resource Evaluation Worksheet is to be used when the key grazing plants and dominant forage resource is woody plants (shrubs or trees). The worksheet may assist managers evaluate the composition and trend of the browse resource as well as document the actual use of key browse species over time. Browse species (woody plants used for forage) include most shrubs and trees; "browse" does not include herbaceous plants. This worksheet may be used to identify problems, formulate alternatives, and measure progress in attaining browse management goals. A key browse plant and key browsing area will be determined for each grazing management unit, when applicable. The dates when browse resource evaluations should be conducted on each management unit will be specified on the Prescribed Grazing Jobsheet.

NRCS does not recommend livestock utilization of native trees or shrubs. Proper use of preferred and desirable introduced (non-native) browse species can be recorded, if utilization of current year's growth of an identified key browse species is 50% or less by air-dry weight during the major plant growth period, or 60-65% or less during dormant or slower plant growth periods. Examples of preferred and desirable introduced browse species include koa haole (ekoa), desmanthus, and bush indigo.

PRESCRIBED GRAZING JOBSHEET

The Pacific Islands Area Prescribed Grazing Jobsheet will be completed to pull together all the elements of a prescribed grazing plan including operation and maintenance requirements.

FACILITATING PRACTICES

The following practices may be implemented to facilitate or accelerate the implementation of the grazing plan:

- Animal Trails and Walkways (575)
- Brush Management (314)
- Fence (382)
- Fuelbreak (383)
- Forage Harvest Management (511)
- Grazing Land Mechanical Treatment (548)
- Pasture and Hay Planting (512)
- Pest Management (595)

- Pipeline (516)
- Pond (378)
- Prescribed Burning (338)
- Range Planting (550)
- Use Exclusion (472)
- Water Harvesting Catchment (636)
- Water Well (642)
- Watering Facility (614)

Table 1
General Guidelines for Judging Proper Grazing Use on Rangeland

Maximum Allowable Use of Key Forage Species (Determined at the end of a grazing period and expressed as percent used by air-dry weight.)				
Type of Grazing System	Type of Vegetation			
	Bunch Grasses (buffelgrass, guineagrass) ^{1/}	Native Ecological Types ^{2/}	Sod-Forming Grasses	
			Loose Mat Forming (pangola, limpo, star grasses, paragrass-California grass) ^{1/}	Tight Mat Forming (kikuyugrass, Bermudagrass) ^{1/}
<ul style="list-style-type: none"> • Continuous • Deferred • Deferred Rotation • Rest Rotation • Rotational Deferment 	50	2/	50	60
<ul style="list-style-type: none"> • High Intensity - Low Frequency, Short Duration 	60	2/	60	65
<ul style="list-style-type: none"> • Other Intensive Grazing Systems (during major growth period only) 	15 – 30	2/	15 – 30	70 – 80 ^{3/}
<ul style="list-style-type: none"> • Forage use for the entire grazing season 	60	2/	60	3/

^{1/} Type of vegetation not limited to these species.

^{2/} Consult with the Pacific Islands Area State Rangeland Management Specialist before making grazing recommendations for native ecological types.

^{3/} Maintain a 3-inch or greater stoloniferous mat.

Table 2
General Guidelines for Judging Proper Grazing Use on
Grass Pasture ^{6/}

Key Grass Species	Minimum Height to Begin Grazing (inches)	Minimum Height to Remove Livestock (inches) ^{3/}	Recovery Period (days) ^{4/}
Giant Bermudagrass	4 – 6	3	18 – 40
Buffelgrass	8 ^{2/}	3	30 – 60
Californiagrass ^{1/}	24	6 – 8	18 – 40
Dallisgrass	8 ^{2/}	3	30 – 60
Green panicgrass	12 ^{2/}	4	25 – 40
Guineagrass	18 – 24 ^{2/}	8 – 10	25 – 40
Kikuyugrass	5 – 9	4 ^{5/}	18 – 40
Limpograss	6	3	30 – 60
Napierrgrass	18 – 24 ^{2/}	8 – 10	25 – 40
Orchardgrass	8 ^{2/}	3	30 – 60
Pangolagrass	6 – 10 ^{2/}	3	30 – 60
Stargrass	8 - 10	4	18 - 40

^{1/} Manage for grass when interseeded with a legume. Exception is when grass is interseeded with tropical legumes such as glycine and desmodium.

^{2/} Height to begin grazing is not as important as the stage of growth. When possible, begin grazing between the boot stage (when the seed heads begin to emerge from the sheath) and early flower stage.

^{3/} Remove livestock before minimum height is reached on the majority of the forage.

^{4/} Recovery period will vary according to the climatic conditions, soil moisture and fertility, and amount of leaf area remaining after grazing.

^{5/} Includes the height of the stoloniferous mat.

^{6/} This table can be used as a concurrent general guide, with Table 1, on rangeland. Table 2 guides must be used with considerable judgement and care on rangeland.

Table 3
General Guidelines for Judging Proper Grazing Use on
Legume Pasture ^{8/}

Key Legume Species ^{1/}	Minimum Height to Begin Grazing (inches) ^{2/}	Minimum Height to Remove Livestock (inches) ^{3/}	Normal Recovery Period (days) ^{4/}
Big trefoil	8	4	30 – 60
Desmodium ^{6/}	24	18 ^{7/}	60 – 90
Glycine ^{6/}	24	18 ^{7/}	60 – 90
Kaimi clover	12	4	60 – 90
Koa haole ^{5/}	-	^{5/}	60 – 90
Siratro	24	18 ^{7/}	60 – 90
Stylo ^{6/}	12	4	60 – 90
White clover	10	3	30 – 60

^{1/} Following initial planting, legumes should not be grazed until they have set seed.

^{2/} Height to begin grazing is not as important as stage of growth. When possible, begin grazing after ¼ of the plants are flowering.

^{3/} Remove livestock before minimum height is reached on a majority of the forage.

^{4/} Recovery period should vary according to climatic conditions, soil moisture and fertility, and amount of leaf area remaining after grazing.

^{5/} Normally this plant is used with guineagrass or green panicgrass. Do not allow this plant to grow out of the animal's reach. Cut stumps less than 4 feet high to induce coppicing. Management will be based on the companion grass(es).

^{6/} These legumes only flower during short days (October – March). Allowing them to flower and set seed once or twice a year is usually sufficient to maintain a good stand and retain vigor.

^{7/} Trailing legumes need about 18" of stem as residual.

^{8/} This table can be used as a concurrent and general guide, with Table 1, on rangeland. Table 3 guides must be used with considerable judgement and care on rangeland.

Table 4
List of Plants Used in this Specification

Common Name	Scientific Name	NRCS Plant Symbol
Big trefoil	<i>Lotus pedunculatus</i>	LOPE80
Buffelgrass	<i>Pennisetum ciliare</i>	PECI
Bush indigo	<i>Indigofera suffruticosa</i>	INSU
California grass	<i>Urochloa mutica</i>	URMU
Dallisgrass	<i>Paspalum dilatatum</i>	PADI3
Desmanthus	<i>Desmanthus spp.</i>	DESMA
Desmodium	<i>Desmodium spp.</i>	DESMO
Giant Bermuda grass	<i>Cynodon spp.</i>	CYNOD
Glycine	<i>Neonotonia wightii</i>	NEWI2
Green Panicgrass	<i>Urochloa maxima var. trichoglume</i>	URMA3
Guineagrass	<i>Urochloa maxima</i>	URMA3
Kaimi clover	<i>Desmodium incanum</i>	DEIN3
Kikuyugrass	<i>Pennisetum clandestinum</i>	PECL2
Koa	<i>Acacia koa</i>	ACKO
Koa haole (ekoa)	<i>Leucaena leucocephala</i>	LELE10
Limpograss	<i>Hemarthria altissima</i>	HEAL5
Napier grass	<i>Pennisetum purpureum</i>	PEPU2
Orchardgrass	<i>Dactylis glomerata</i>	DAGL
Pangola grass	<i>Digitaria eriantha</i>	DIER
Siratro	<i>Macroptilium atropurpureum</i>	MAAT80
Stargrass	<i>Chloris divaricata</i>	CHDI2
Stylo	<i>Stylosanthes spp.</i>	STYLO4
White clover	<i>Trifolium repens</i>	TRRE3

Table 5
Hoop Attributes for Clipped Forage Production Plots
(most common sizes highlighted)

Hoop Size (Ft ²)	Area (2% of Hoop) (Ft ²)	Area (1% of Hoop) (Ft ²)	Conversion Factor (English)	Conversion Formula (English)	Conversion Factor (Metric)	Conversion Formula (Metric)
19.2	0.38	0.19	5	g/hoop * 5 = lbs/acre	6	g/hoop * 5.61 = kg/ha
9.6	0.19	0.10	10	g/hoop * 10 = lbs/acre	11	g/hoop * 11.21 = kg/ha
4.8	0.10	0.05	20	g/hoop * 20 = lbs/acre	22	g/hoop * 22.42 = kg/ha
2.4	0.05	0.02	40	g/hoop * 40 = lbs/acre	45	g/hoop * 44.85 = kg/ha
1.2	0.02	0.01	80	g/hoop * 80 = lbs/acre	90	g/hoop * 89.70 = kg/ha
0.96	0.02	0.01	100	g/hoop * 100 = lbs/acre	112	g/hoop * 112.12 = kg/ha
0.6	0.01	0.01	160	g/hoop * 160 = lbs/acre	179	g/hoop * 179.39 = kg/ha
0.096	0.002	0.001	1000	g/hoop * 1000 = lbs/acre	1121	g/hoop * 1121.21 = kg/ha
0.048	0.0010	0.0005	2001	g/hoop * 2000 = lbs/acre	2242	g/hoop * 2242.42 = kg/ha
1.92	0.0384	0.0192	50	g/hoop * 50 = lbs/acre	56	g/hoop * 56.06 = kg/ha

Conversions:

1 Acre = 43,560 FT Squared

1 Acre = 24,710 Meters Squared

1 Hectare = 2.471 Acres

1 Acre = 0.405 Hectares

1 Pound = 453.59 Grams

1 Pound = 0.45 Kilograms

1 Foot Squared = 0.0000229 Acres

1 Foot Squared = 0.0000092 Hectares

1 Meter = 3.281Feet

1 Foot = 0.3048 Meters

1 Kilogram = 2.20 Pounds

1 Kilogram = 1,000 Grams