ILRI Kapiti Plains Research Station
Grazing plan for early 2020

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Executive summary

Effective planning of livestock grazing is an essential component of rangeland management. Much more than a vague notion of 'carrying capacity' is needed as livestock production and effects of grazing livestock on wildlife populations are each significantly influenced by the pattern of livestock grazing over time in different areas. Well-planned livestock grazing can maintain and produce livestock, and conserve rangeland resources in terms of pasture condition and soil quality, including soil carbon storage. Furthermore, it can provide and maintain habitat for wild herbivores that sustain populations of carnivores.

This document provides an overview of ecology and management of the International Livestock Research Institute (ILRI) Kapiti Plains Research Station ('Kapiti' herein) and describes the approach used to plan grazing management of the ILRI research livestock herds. Integrated management of rangelands at Kapiti includes livestock grazing management, intensive rangeland restoration, haymaking and fodder cultivation in limited areas, and mostly 'hands off' wildlife management. The philosophy of grazing management is appropriate stocking for healthy livestock and conservation of rangelands and wildlife. The approach for grazing management is adaptive rotational grazing which is planned using holistic grazing management based on animal days of forage available after accounting for grazing wildlife consumption

In addition to providing a plan for productive livestock management compatible with conservation of Kapiti rangeland ecosystems and their substantial populations of naturally occurring wildlife, the grazing planning process and the example grazing plan provided here serve as a basis for long-term experimentation able to reveal how stocking levels, patterns of spatial and temporal distribution, and livestock species and composition of herds affect the sustainability of livestock production in natural semi-arid rangelands.

Background: ecology and land use

Ecology

The climate of the Kapiti area is semi-arid (type BSh, hot semi-arid in the Köppen-Geiger classification system, or agro-climatic zone V-4, warm temperate semi-arid). Elevation ranges from 1,620–1,900 masl, with approximate long-term mean annual precipitation of 550 mm/year and mean annual temperature of 19°C. Soils are primarily vertisols (black cotton soils), heavy cracking clays with high water holding capacity. The central hills in Kapiti are cambisols (red soils), clay with a substantial sand fraction and shallow in rocky locations. Throughout the area, vertisols are overlain with sand eroded from cambisols on the hills over the ages such that the proportion of sand declines with distance from the hills, except in the lowest areas where erosive deposition of sand is substantial.

The topography of Kapiti is mostly undulating plains with higher, better-drained areas and lower, moisture-retaining areas intermixed across the landscape. Drainage occurs primarily outward from the central Wami hill, exiting Kapiti through streams to the north, south, east and west, then flowing into Athi River on its route north toward Thika before bending south toward the coast.

The primary habitats found in Kapiti are mixed grassy and shrubby savanna plains with scattered trees, typical of the Athi-Kaputei Plains ecosystem and similar to Nairobi National Park and other nearby areas. Forage diversity is immense, even among the dominant grasses *Themeda triandra* (kangaroo or red oat grass), *Cynodon dactylon* (couch grass), *Pennisetum mezianum*, *Chloris gayana* (Rhodes grass), and *Cenchrus ciliaris* (buffelgrass), which occur alongside multiple other species such as *Aristida, Cenchrus, Chloris, Eragrostis, Panicum, Pennisetum* and *Setaria* spp. Higher areas within the plains tend to be grassy with few scattered *Balanites* trees and shrubs due to high wildlife utilization. Lower plain areas retain moisture that fuels plant growth year-round, which, together with lower grazing pressure and fire frequency than historically existed, has resulted in substantial cover of shrubs, especially *Acacia drepanolobium* and *Aspilia* spp. A mix of multiple *Acacia* spp. occurs in riparian habitats along streams. Wami hill at the center of Kapiti punctuates the plains and presents a unique higher area that contributes significantly to habitat diversity, with savanna and thornscrub composed of mostly Acacia trees and shrubs that provide cover and browse. The main freshwater habitats in Kapiti are naturally occurring streams and seasonally inundated wetlands, as all ponds are not natural but from damming of streamflow.

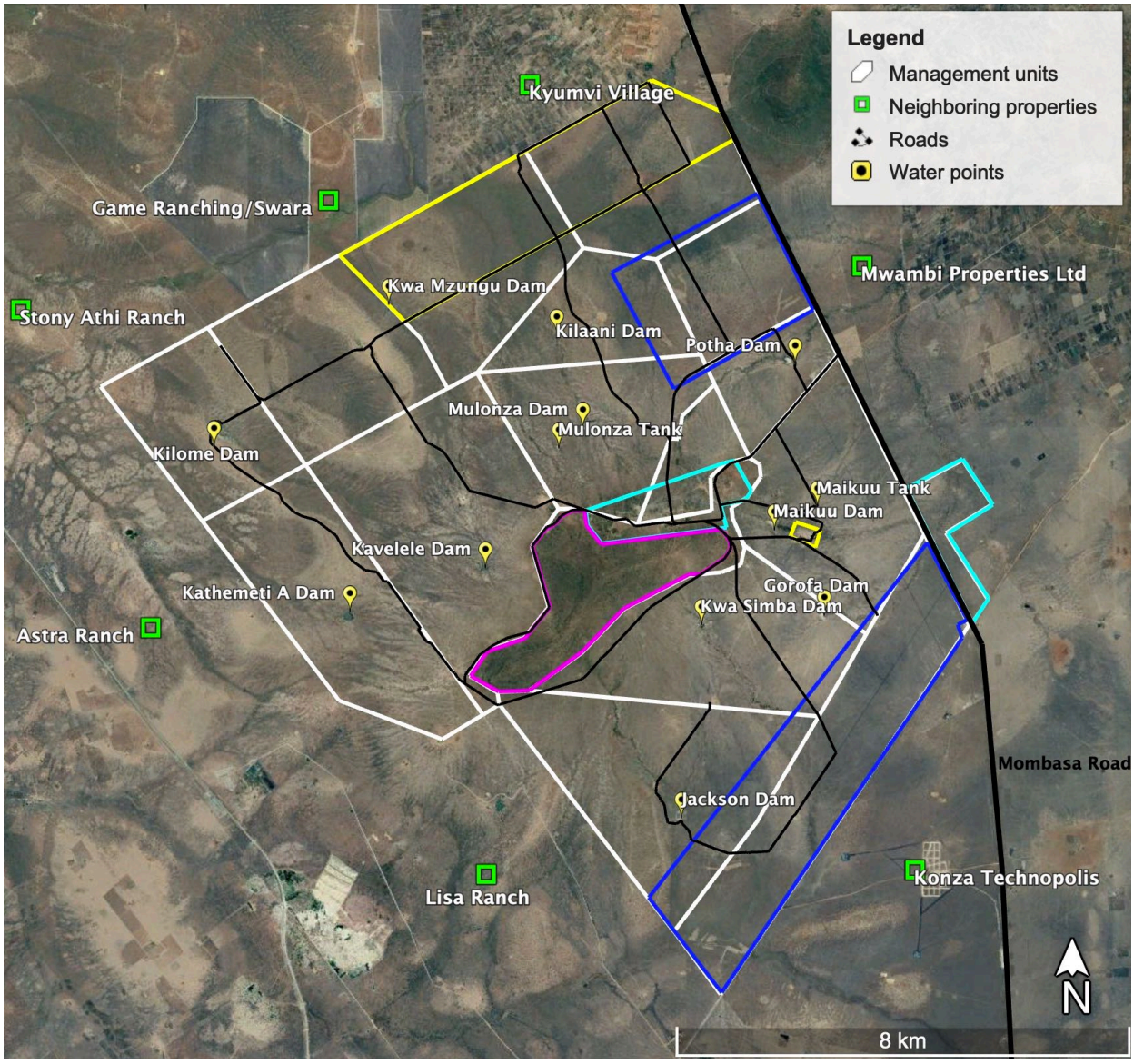
Land uses and zones

The primary land use on Kapiti is research on livestock production and environment in rangelands, including research on livestock grazing and fodder production, animal health, genetics and productivity, and the interactions of livestock production practices with environmental quality in terms of conservation of biodiversity, livestock-wildlife coexistence, measurement of greenhouse gas emissions and the dynamics and resilience of rangeland ecosystems. Research includes hay cutting and cultivated fodder production in limited areas (Figure 1).

Research is conducted to be fully complementary to the secondary land use in Kapiti—the conservation of the wide array of carnivore species and migratory wildlife species that frequent or disperse through the area, along with the rangeland ecosystems that support these wildlife populations.

A third and smaller land use is the facilities for staff, researchers and visitors, in a small area around the former ranch house. This area is used for Kapiti staff housing; operational facilities such as vehicle repair; an encampment of KWS staff; dairy and limited cropping of mostly vegetables for staff consumption; and meetings, conferences and laboratories for staff, researchers and visitors.

Figure 1. Key features of Kapiti, including management units, neighboring properties, roads, water points and land use zones



Note: Light blue areas: mixed facilities, grazing and agricultural zones (existing and proposed). Pink area: wildlife-dominated zone (existing—Wami hill). Yellow areas: cultivation zones (existing and proposed) of which only a portion would be cultivated. Dark blue areas: haymaking zones (existing) of which only portions are cut (new hay-making zones may be proposed).

Rangeland condition and degradation

Much of the area is in excellent ecological and pasture condition for both wildlife and livestock, thereby maintaining excellent condition and function of the greater ecosystem. Some areas are affected by encroachment of unpalatable shrubs into grassy plains, notably *Acacia drepanolobium, Solanum incanum* and *Aspilia* spp. Some areas along the boundaries have been affected by overgrazing and poorly timed, uncontrolled fires where incursions occur.

Management for research and conservation

Integrated rangeland management

Integrated management of rangelands at Kapiti includes livestock grazing management, intensive rangeland restoration, haymaking and fodder cultivation in portions of limited zones (Figure 1), and wildlife management. All management actions related to livestock grazing, hay and fodders, rangeland restoration, and wildlife are conducted primarily for the purposes of research on the environment and livestock production in rangelands, and secondarily for the purpose of conserving biodiversity within Kapiti and the greater Athi-Kaputei Plains ecosystem.

The philosophy of grazing management is appropriate stocking for healthy livestock and conservation of rangelands and wildlife. The approach for grazing management is adaptive rotational grazing which is planned using holistic grazing management based on animal days of forage available after accounting for grazing wildlife consumption. Within management units, livestock are rotated among paddocks according to forage availability, the need for areas to be grazed or rested from grazing in accordance with light or heavy past grazing and the locations of bomas and water points. Grazing management increasingly utilizes short-duration, high-impact restorative grazing, targeted resting, and targeted grazing and browsing, according to management and restoration needs. Some limited areas are used for fodder production and cutting of hay (Figure 1). Intensive restoration is conducted in some areas, especially in areas degraded by major encroachment of unpalatable shrubs, notably *Acacia drepanolobium, Solanum incanum* and *Aspilia* spp., into grassy plains. Wildlife management is largely 'hands-off', including an area mostly dominated by wildlife (Figure 1) with normally lower livestock grazing on the central Wami hill, and joint collaboration with KWS for security patrols and wildlife-human conflict and compensation.

Management goals

The first and central goal of land management activities is to conduct research on livestock production and the environment in rangelands, including but not limited to research on livestock grazing and fodder production, animal health, genetics and productivity, and the interactions of livestock production practices with environmental quality in terms of conservation of biodiversity, livestock-wildlife coexistence, measurement of greenhouse gas emissions and the dynamics and resilience of rangeland ecosystems.

The second goal of land management activities is to provide and maintain high-quality rangeland habitats in Kapiti for environmental and conservation research and for conservation of biodiversity in terms of naturally occurring plant and animal species and ecosystem types.

The third goal of land management activities is to improve the quality of rangeland habitats as appropriate through restoration of portions of the rangeland including through restorative livestock grazing, targeted livestock grazing, resting from livestock grazing, the use of mobile bomas to restore soil fertility, and intensive restoration efforts such as reduction or removal of encroaching shrubs and management of natural regeneration.

The fourth goal of land management activities is to provide and maintain connectivity for key wildlife species, especially carnivores and migratory wildlife, with other parcels of park and non-park lands in the area, thereby enhancing large-scale connectivity and the resilience of rangeland ecosystems at and beyond the scale of the Athi-Kaputei Plains ecosystem.

Livestock grazing management planning

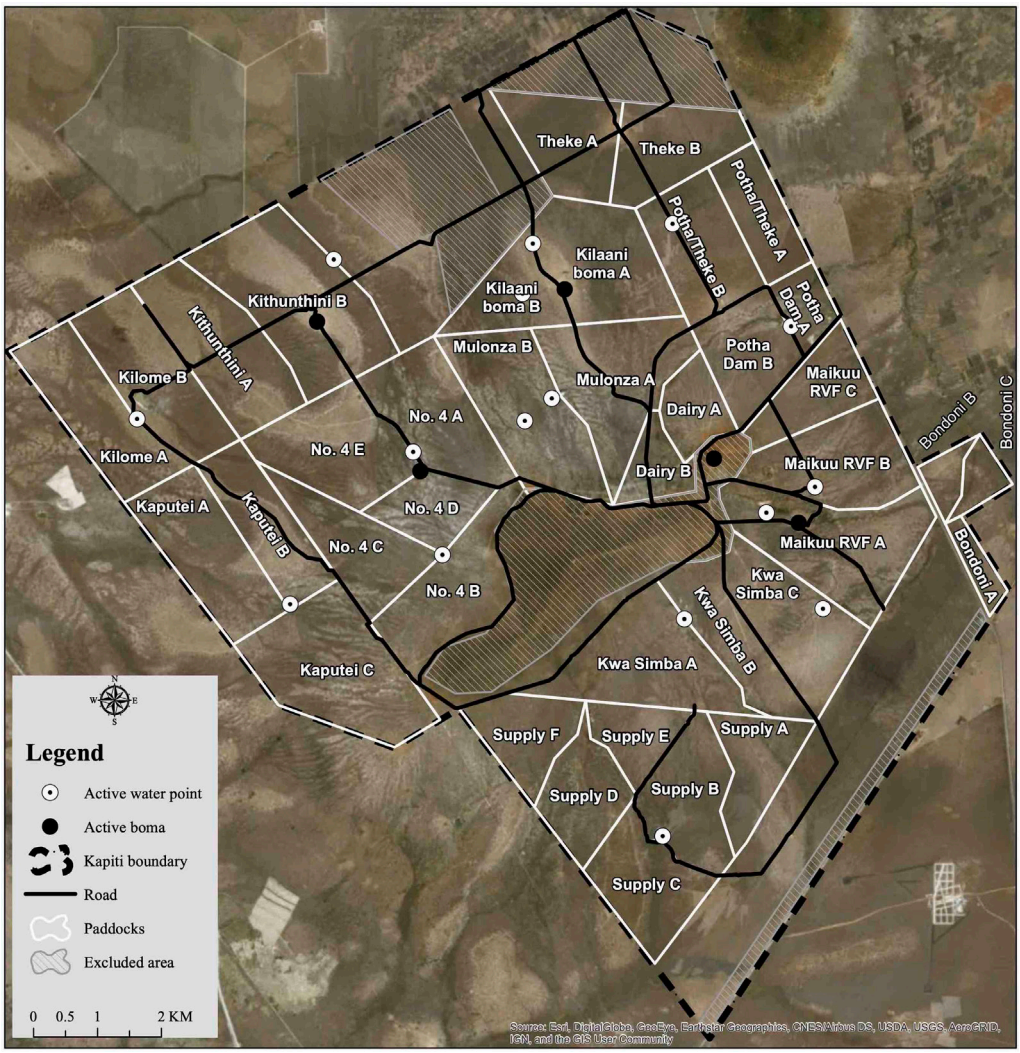
The philosophy of grazing management is appropriate stocking for healthy livestock and conservation of rangelands and wildlife. Over-stocking and under-stocking are avoided to prevent degradation. Forage allocation to livestock is determined to provide forage for wildlife to reduce the need for supplementary feeding of the research herds during droughts. Grazing management is increasingly shifting towards the goal of shorter term, higher impact restorative grazing to break soil crusts, enhance soil fertility and pasture production, and limit invasions of shrubs unpalatable to livestock and wildlife.

The grazing management approach at Kapiti is adaptive rotational grazing based on animal days of forage available after accounting for grazing wildlife consumption. Within management units, livestock are rotated among paddocks (Figure 2) according to forage availability, the need for areas to be grazed or rested from grazing in accordance with light or heavy past grazing, and the locations of facilities and water points.

The use of mobile bomas enables the return of nutrients from manure and urine to the soil for long-term improvement of rangeland productivity. Kapiti has transitioned in recent years from static bomas to mobile bomas. Mobile bomas are created with moveable steel fences that are shifted according to the number of animals residing in the boma and the amount of rainfall received. During times of higher rainfall, mobile bomas must be shifted more often to prevent excessive deposition of nutrients and encourage a shorter time period for grass production improvement to occur. During the rainy seasons, mobile bomas are moved every second day, while during the dry seasons mobile bomas are moved every fourteen days. Mobile bomas have the additional advantage of being predator-resistant, an attribute that is further enhanced by the use of predator lights to discourage depredation of the research herds.

Planning of livestock grazing management for research at Kapiti draws significant inspiration from the approach of holistic grazing management (Butterfield et al. 2006). Holistic grazing management usually approaches grazing planning through estimating the animal days (AD) of forage available throughout different seasons of the year, and allocating herds of known size, composition and dietary requirement of livestock types. This approach contrasts strongly with planning grazing based on prescribed stocking rates according to a theoretical carrying capacity normally conceptualized as static and unchanging. On the other hand, using a dynamic carrying capacity acknowledges that forage availability varies with rainfall in semi-arid and arid rangelands (Behnke and Scoones 1992), although it is more complicated and likely of little to no added value over holistic grazing planning. For these reasons, stocking according to carrying capacity is generally of limited value in dry rangelands (Campbell et al. 2006). The advantages of flexible, adaptive and holistic planning include first and foremost the ability to damper the non-equilibrium dynamics of semi-arid and arid rangelands including droughts and routine variation in rainfall over time and over short distances (e.g. < 5 km). By definition, holistic management involves the use of flexible and adaptive management rangelands, improving the planning of grazing as new information avails itself from forage surveillance, other qualitative observations of management staff, and rangeland monitoring including scientific data whether detailed or coarse. For this reason, all areas, herds and calculations applied in grazing planning thus far at Kapiti are necessarily subject to review and revision at all times, normally on a seasonal basis.

Figure 2. Paddocks currently in use for grazing management at Kapiti, including active bomas and water points, main roads and areas excluded from grazing planning.



Note: Paddock locations and grazing management plans are adaptive and subject to change.

Grazing planning begins with the total stocking of cattle and shoats (Table 1). The average number of animal days of grazing provided by Kapiti pastures was estimated from Kapiti management and staff experience that a single cow requires an area with dimensions of approximately 11 m × 11 m, or 121 m^2 in area (0.0121 ha) of pasture on a daily basis. The daily areal pasture requirement for shoats was estimated as 17 m^2 (0.0017 ha), or a box approximately 4.1 m × 4.1 m in dimension. These estimates of forage availability per unit space and time—121 m^2 cow^{-1} d^{-1} or 0.0121 ha cow^{-1} d^{-1}—are assumed for simplicity to be consistent throughout Kapiti as there are generally minimal large-scale differences in pasture quality and biomass production, with most variation at small scales within management units and paddocks, and less variation among management units and paddocks. These values may change in the future if medium-term forage availability declines (or increases) and daily animal requirements will be reassessed as necessary. Although there are camels at Kapiti, their browsing habit means they consume little grass and there is no shortage of browse for the small number of camels, nor for the moderate to large populations of browsing wildlife such as kudu, eland and giraffe. If browse becomes limited, competition with wildlife and over-browsing would become possible or likely and camels and wild browsers would need to be addressed in management planning explicitly.

There are 17 management units in Kapiti, each of which is divided into two to six paddocks (Table 2) to enable rotational movement of livestock herds within each management unit. Management units and paddocks are not fenced. All livestock herds are controlled and directed by Kapiti staff to the correct management units and paddocks. There are 21 herds (some of which are combinations of herds) of Kapiti livestock (Table 3). Most herds are separated according to stock types so that each herd has only one stock type, although some herds have a mix of stock types.

Table 1. Kapiti livestock total stocking as of early 2020

	Total head	head/ha	ha/head
Cattle	2,919	0.225	4.439
Sheep	2,461	0.190	5.266
Goats	172	0.013	75.342
Tropical livestock units (TLU)	2,306.6	0.178	5.618
Shoats: Cattle ratio (S:C)	0.902		
Total area (ha)	12,958.9		

Table 2. Kapiti management units and paddocks

Management unit	Paddock	Area (ha)	Management unit	Paddock	Area (ha)
Kilome	Kilome A	298	Potha/Theke	Potha/Theke A	163
	Kilome B	316		Potha/Theke B	276
Kaputei	Kaputei A	312	Theke	Theke A	238
	Kaputei B	236		Theke B	238
	Kaputei C	423	Wami hill	NA	NA
Kithunthini	Kithunthini A	350	Maikuu RVF	Maikuu RVF A	406
	Kithunthini B	489		Maikuu RVF B	294
No 4	No 4 A	291		Maikuu RVF C	185
	No 4 B	304	Kwa Simba	Kwa Simba A	366
	No 4 C	241		Kwa Simba B	255
	No 4 D	150		Kwa Simba C	299
	No 4 E	315	Supply	Supply A	185
Kilaani (water)	NA	NA		Supply B	255
	NA	NA		Supply C	241
Kilaani boma	Kilaani boma A	321		Supply D	196
	Kilaani boma B	174		Supply E	126
Mulonza	Mulonza A	365		Supply F	184
	Mulonza B	371	Konza Road	NA	NA
Dairy	Dairy A	121	Bondoni	Bondoni A	53
	Dairy B	102		Bondoni B	53
Potha dam	Potha dam A	85		Bondoni C	57
	Potha dam B	210			

Note: Management units marked 'NA' were not presently used for planned grazing.

Table 3. Kapiti livestock herds as of early 2020

Herd #	Livestock species	Livestock type	Number
1	Cattle	Heifers, cull	483
2	Cattle	Mixed	233
3	Sheep	Rams/bucks	300
4	Sheep	Bucks	129
5	Sheep	Ewes and lambs	676
6	Sheep	Lactating does	80
7	Cattle	"SLICK"	122
8	Sheep	Ewes	155
9	Sheep	Dry does	91
10	Goats	Weaner	99
11	Cattle	Mixed	194
12	Cattle	Mixed	364
13	Camels/goats	Mixed	72/172

Herd #	Livestock species	Livestock type	Number
14	Cattle	Dairy/maternity	150
15	Cattle	Mixed	364
16	Cattle	"RVF"	179
17	Sheep	"RVF"	100
18	Goats	"RVF"	172
19	Cattle	"Argarp"	275
20	Cattle	Steers	397
21	Cattle	Bulls	113

Grazing planning included only areas to be used for planned grazing of livestock, such that areas not to be used for grazing are removed from grazing planning. Management units with major shrub encroachment (e.g. Kilaani water) that are planned to be restored or utilized otherwise are currently not grazed and were removed. Portions of one management unit without sufficient livestock water access and major shrub encroachment (in Theke) are currently not grazed and were removed. One management unit (Wami hill) dominated by wildlife which is sometimes used for grazing and more frequently for browsing camels is not currently being used for grazing and was removed. Portions of one unit where fires have occurred and management has been periodically disrupted (near Konza Road) were set aside as areas for proposed haymaking and will doubly serve as a firebreak.

Forage consumed by wildlife is removed from grazing planning. Kapiti management and staff estimated that, of the amount of forage potentially available to livestock, the amount consumed by grazing wildlife is approximately 50% of livestock-available grazing forage. This perhaps high figure of 50% consumption by grazing wildlife is applied for several reasons: (1) because grazing wildlife populations are high; (2) to provide space for grazing wildlife; and (3) to conservatively estimate (underestimate) the amount of forage available to livestock for grazing. Underestimating the forage available for livestock helps ensure that both grazing livestock and grazing wildlife have enough forage, encouraging wildlife-livestock co-existence and maintenance of consistent vegetation cover. The area of each paddock was divided by two to remove 50% of forage consumed by wildlife from grazing planning. The estimates for forage provided are for available forage after accounting for trampling by livestock and wildlife. At this point, the grazing resource base upon which livestock grazing is planned becomes clear.

To determine forage availability for livestock grazing at the scale of management units and paddocks, the total forage availability of each paddock in each management unit is calculated as a function of the size of paddocks and the forage available. To obtain the total forage available in each paddock in units of animal days, the area of the paddock (in m^2) is divided by the average daily areal pasture requirement in Kapiti, 121 m^2 cow^{-1} d^{-1}. The total animal days (AD) of forage available determines how large of a herd can graze the paddock for what length of time until the forage allocated to livestock has been consumed. Animal days of livestock forage allocated can be for many animals for a shorter time (e.g. 200 cattle for two months) or few animals for a longer time (e.g. 50 cattle for eight months) being the same number of animal days (400 AD).

To plan the locations and movements of research livestock herds, each herd is initially assigned to a management unit according to availability of facilities, distance from water points and the need for areas to be restored through brief, heavy grazing or resting from grazing in accordance with light or heavy past grazing and restoration objectives such as allowing grasses to recover or to trample invading shrub species. Specific herds with known livestock types and size (Table 3) are assigned to specific paddocks of management units (Table 2) for the period until forage allocated to livestock will have been consumed. The number of days of grazing for a specific herd in a specific paddock is calculated as the total animal days of forage available in a paddock, divided by the size of the herd (in animal units). At this point the available forage is likely to be diminished to a level where the same herd is shifted to another paddock in the same management unit, enabling the herd to remain in the same general area and utilize the same water point throughout the season. Normally, grazing within each management unit begins with paddock A, continues to paddock B, etc. but not necessarily in that order. The final grazing plan (Table 4), used only for a limited period of time, is complete when all herds have been allocated to areas with sufficient forage.

In this case, the 'final' grazing plan is an 'open' plan or 'open-ended' plan (Table 4) for a limited period of time, after which the remaining grazing will be allocated to paddocks where forage remains available. 'Open' grazing plans are typically used during growing seasons, as in this case where grazing planning focused on the end of the short dry season 2020 into the main long rains season 2020 with rain expected to begin falling approximately mid-March, after which grazing for the coming months is planned. In contrast, 'closed' plans are based on the limited amount of forage available for the non-growing season when new forage is being produced as growing conditions do not exist. In this case, a closed plan can be created for the long dry season lasting from approximately June–September. The use of temporary open grazing plans has the central advantage that variability in expected rainfall, including spatial variability in rainfall within Kapiti and over time, and even possible failure of rainfall, is accounted for in this flexible approach to grazing planning and management. Herds are redirected according to variation in forage availability in space and time given how much rain has fallen and where it has fallen. The main disadvantage of using an open grazing plan is that it requires periodic reassessment of forage availability, and re-planning of grazing movements according to these changes in forage availability. In semi-arid climates such as Kapiti, actual rainfall often varies greatly from expectations based on annual averages, and a flexible and adaptable approach to planning grazing based on actualized rainfall is recommended.

Table 4. 'Open' grazing plan for Kapiti, February–May 2020 the short dry season 2020 into the long rains season 2020 (the long rains beginning approximately mid-March).

Paddock	Area (ha)	Area (ha) corrected for wildlife grazing	Animal days (AD) available	Herd #	Livestock species	Livestock type	Herd size (#)	Days	Months and Weeks (Weeks = 1, 2, 3, 4)															
									February				March				April				May			
									1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Kilome A	298	149	12,314	1	Cattle	Heifers, cull	483	25	G	G	G													
Kilome B	316	158	13,058	1	Cattle	Heifers, cull	483	27				G	G	G	G									
Kaputei A	312	156	12,893	2	Cattle	Mixed	233	55	G	G	G	G	G	G	G									
Kaputei B	236	118	9,752	2	Cattle	Mixed	323	30								G	G	G	G	G				
Kaputei C	430	215	36,000	3	Sheep	Rams/bucks	300	120	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Kaputei C	430	215	15,480	4	Sheep	Bucks	129	120	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Kithunthini A	350	175	20,280	5	Sheep	Ewes and lambs	676	30	G	G	G	G												
Kithunthini A	350	175	7,200	6	Sheep	Lactating does	80	90	G	G	G	G	G	G	G	G	G	G	G	G				
Kithunthini B	489	245							R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
No 4 A	291	146	12,025	7	Cattle	"SLICK"	122	99	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G
No 4 B	304	152	4,650	8	Sheep	Ewes	155	30	G	G	G	G												
No 4 B	304	152	66,480	8	Sheep	Ewes	831	80					G	G	G	G	G	G	G	G	G	G	G	G
No 4 B	304	152	8,190	9	Sheep	Dry does	91	90	G	G	G	G	G	G	G	G	G	G	G	G				
No 4 B	304	152	8,910	10	Goats	Weaner	99	90	G	G	G	G	G	G	G	G	G	G	G	G				
No 4 C	241	121	9,959	11	Cattle	Mixed	194	51	G	G	G	G	G											
No 4 D	150	75																						
No 4 E	315	158																						
Kilaani (water)	648	324	26,777	12	Cattle	Mixed	364	74	G	G	G	G	G	G	G									
Kilaani (water)	240	120		13	Camels/Goats	Mixed	72/172	30			G	G	G	G	G									
Kilaani boma A	321	161							R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Kilaani boma B	174	87							R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Mulonza A	365	183							R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Mulonza B	371	186							R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Dairy A	121	61							R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Dairy B	102	51							R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Potha Dam A	85	43	3,512	14	Cattle	Dairy/maternity	150	23	G	G														
Potha Dam B	210	105	8,678	14	Cattle	Dairy/maternity	150	58			G	G	G	G										
Potha Theke A	163	82	6736	15	Cattle	Mixed	364	19							G	G								
Potha Theke B	276	138	11,405	15	Cattle	Mixed	364	31									G	G	G					
Maikuu RVF A	406	203	16,145	16	Cattle	"RVF"	179	90	G	G	G	G	G	G	G	G	G	G	G	G				

Paddock	Area (ha)	Area (ha) corrected for wildlife grazing	Animal days (AD) available	Herd #	Livestock species	Livestock type	Herd size (#)	Days	Months and Weeks (Weeks = 1, 2, 3, 4)																
									February				March				April				May				
									1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Maikuu RVF A	406	203	4,500	17	Sheep	"RVF"	100	45			G	G	G	G	G	G									
Maikuu RVF B	294	147	1,500	17	Sheep	"RVF"	100	15	G	G															
Maikuu RVF B	294	147	2,580	18	Goats	"RVF"	172	15	G	G															
Maikuu RVF C	185	93																							
Kwa Simba A	366	183	15,124	19	Cattle	"Argarp"	275	55	G	G	G	G	G												
Kwa Simba B	255	128	10,537	19	Cattle	"Argarp"	275	38						G	G	G									
Kwa Simba C	299	150	12,355	19	Cattle	"Argarp"	275	45									G	G	G	G					
Supply A	185	93																							
Supply B	255	128	10,537	20	Cattle	Steers	397	27	G	G	G														
Supply C	241	121	9,959	20	Cattle	Steers	397	25						G	G	G	G	G	G	G	G	G	G		
Supply D	196	98																							
Supply E	126	63	5,207	20	Cattle	Steers	397	13				G	G												
Supply F	184	92																							
Bondoni A	53	43	3,554	21	Cattle	Bulls	113	31	G	G	G	G													
Bondoni B	53	43	3,554	21	Cattle	Bulls	113	31					G	G	G										
Bondoni C	57	47	3,884	21	Cattle	Bulls	113	34								G	G	G							

Note: Paddocks, months and weeks marked "G" indicate active planned grazing. Paddocks, months and weeks marked "R" indicate planned resting. As this is an 'open' plan, grazing needs to be allocated later for the following months. Paddocks with no grazing indicated are to be grazed later in the season along with any paddocks where the livestock-allocated forage has not yet been fully consumed after the grazing period.

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