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## MANAGEMENT & COST ASPECTS OF RANGELAND IN HUMBOLDT COUNTY, CALIFORNIA

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Every Humboldt County ranch is an individual unit, with its own peculiarities in soils, slope, and weather. But there are areas of the county within which similarities exist. For this study of the economics of owning rangeland in the county, it has been divided into four distinct grazing areas: Northeastern Humboldt, Southeastern Humboldt, the Coast, and Southwestern Humboldt.

Northeastern Humboldt lies north of the Van Duzen River, east of Carlotta, Freshwater, and Blue Lake.

The Coast area lies north of the Mattole River, west of the North Fork of the Mattole River, and includes Bear River Ridge.

The Southeastern Humboldt area is bounded on the north by the Van Duzen River and on the west by the South Fork of the Eel River. The county lines form the south and east boundaries.

The Southwestern area lies west of the South Fork of the Eel River, east of the Pacific Ocean and North Fork of the Mattole River, and south of Taylor Peak and Rainbow Ridge. These areas were selected to reflect, as nearly as possible, similar soils, weather, and other related factors. The differences are reflected in the number of acres required to carry an animal unit for a year in each of the areas.

Table I shows the productive capacity of eight grassland soils of Humboldt County. The series listed occur throughout the county but in varying acreages in the four areas. For example: the Coast area consists primarily of Zanone, Mattole, and McMahon series; the Southeastern Humboldt area consists primarily of Laughlin, Tyson, and Yorkville; the Northeastern unit consists of Kinman, Kneeland, McMahon, Tyson, and Yorkville; and the Southwestern unit consists of Laughlin, Kinman, Kneeland, Yorkville, some McMahon, and considerable Wilder.

Soil productivity is not the only factor in grazing capacity. Other important aspects that must be considered are type of livestock, past grazing use, water distribution, elevation, slope, shade, wildlife numbers, animal preference for forage produced by the soils, weather, and the distribution of poisonous plants.

Extensive observations and measurements have shown that the soils of Humboldt County produce forage of widely-varying preference by grazing cattle and sheep; in decreasing order--Yorkville, Laughlin, Kinman, Kneeland, Wilder, McMahon, Mattole, Zanone, and Tyson.

Deer appear to have about the same preferences except in their selection of plants on Tyson soil above all others. Cattle and sheep rarely graze on this soil until late autumn if forage is available on others. Quail and other upland game birds tend to congregate around or in areas of Wilder soils. This may be related to the opportunity for dusting afforded by the fine texture and dusty nature of this soil.

Forage from the three soils of highest production--Mattole, Zanone, and McMahon--is seldom grazed by deer and cattle and sheep do not stay on these soils by choice. When fenced onto these soil areas and forced to graze the forage on them, both cattle and sheep do well. This presents a management problem to the rancher. Fencing is required to keep the animals on some of the high-production soils and prevent over-grazing the preferred types of forage.

Soil series boundaries are irregular and mosaics of several series frequently occur. Fencing and management of each landscape type, therefore, is not economically feasible. However, relatively large blocks of a single soil series do occur and similar soils may be grouped together for pastures of practical size. Fencing such soil areas separately gives better opportunity to manage each according to its productivity and animal preference.

The land manager should know the soils and plant species that make up his range complex. Characteristics of some soils are distinguishing enough to be recognizable features of the landscape.

Mattole and Zanone soil series are found only in the Coastal area of Humboldt County. They are highly productive as Table I indicates. Both soils are slightly acid (pH 6.5) at the surface but become more alkaline with depth. Free lime is found below three to four feet. This is true of all but two of the soil series: Kneeland and Kinman.

Mattole soil series can be distinguished by its humpy appearance. It usually supports an excellent stand of native perennial grasses.

Zanone soil series is a natural geological slide area. It is distinguished from Mattole soils by its sliding characteristics rather than

hummocky appearance. The Zanone series has some woody vegetation which occurs as a natural part of its plant community. Where extremely heavy grazing has occurred on Zanone soils, the brush species tend to take over and become dominant. Fire and reseeding to grasses and legumes are excellent ways to retard this dominance of brush. When good land management is applied to Zanone soil, it retains its original plant cover--mainly grassland with a few scattered brush plants--which offers excellent browsing. This series requires considerably more intensive management than the Mattole series.

McMahon series is usually found inland. In its hummocky appearance, it is similar to the Mattole series. McMahon series is always dotted with rushes (*Juncus* species) while these are absent from the Mattole series.

These three series produce the most forage of all the grassland soils in Humboldt County. Although none of them is especially favored by grazing animals on a free-choice basis, a preference rating by animal choice would be Zanone, Mattole, and McMahon. Large bodies of Mattole, McMahon, and Zanone usually occur side-by-side. Because they are not usually separated by fences, there is over-use of the Zanone series and under-use of the Mattole and McMahon series.

The Kneeland and Kinman series can be grouped together because of their close relationship to each other. Kinman can be considered a deep Kneeland. These two series usually occur just over the ridge breaks and extend down the slopes a fourth of the distance. They are excellent soils and all classes of animals use the forage produced by these soils. They are undulating soils without hummocks or slides. They support excellent stands of native perennial grasses and can be easily recognized by the occurrence of tufted hair grass (*Deschampsia caespitosa*). Although, nation-wide, tufted hairgrass is not praised for its palatability, on these two soils it is relished as much as the extremely palatable California oatgrass (*Danthonia californica*).

These two soils have a stone line about six to eight inches underneath the surface which, in places, rises to the surface or within an inch or two. Here, Death Camas (*Zygadenus venenosus*) comes into the plant community on these soils. The presence of this poisonous plant presents a management problem, especially when overstocking occurs.

The Yorkville series lies down the slope below the Kneeland-Kinman and McMahon series. It is geologically an unstable soil, characterized by slides. Locally, it is called Blue Slide soil. It produces the most preferred forage of all soils in the county. All types of animals frequent this soil as often as possible, even after it is completely overgrazed and covered with Medusa head (*Elymus caput-medusae*). When properly used, Yorkville soil supports an excellent stand of native perennial grasses.

Yorkville is usually associated with Kneeland, Kinman, McMahon, and Laughlin series. Unless the Yorkville soils area is fenced off by itself so that grazing can be regulated, heavy overgrazing gives it the appearance of low productivity. The Yorkville series is distinguished by its sliding appearance and scattered woody vegetation. The woody vegetation never seems to increase.

The Laughlin series occurs at the toe of the slope and has an undulating topography. Forage produced on this soil is relished by all grazing animals but to a lesser degree than that produced on Yorkville. The abundance of the needle-and-thread grasses (*Stipa* series) distinguishes this soil from the rest. The *Stipas* occur scatteringly on the other soils but become dominant on the Laughlin series.

The Tyson series is intermingled with all the other series but is easily distinguished by the presence of scrub oak. It is classified as an oak woodland grass soil and is used primarily in the late fall by domestic livestock. Deer use it all year long. It might be considered the home of the deer.

One of the most serious poisonous plants, the Larkspur (*Delphinium*), occurs on this soil. Since it is intermingled with the other soil series, Tyson presents a difficult management problem. The rough terrain prevents the economic use of effective weed control measures and grazing use must be withheld until the Larkspur has matured.

The Wilder series lies along the ridge tops. Wilder is a highly acid soil with a low waterholding capacity and is considered a poor soil. It is easily recognized by the abundance of bracken fern (*Pteris aquilina* var *lanuginosa*) and Sheep Sorrel (*Rumex acetacella*). Animals seem to like what little forage is produced on this soil and upland game birds flock to it.

For Humboldt County's four areas, typical grazing capacity should be approximately as follows:

Northeastern Humboldt .....	20 acres per animal unit year
Coast .....	6 acres per animal unit year
Southeastern Humboldt .....	35 acres per animal unit year
Southwestern Humboldt .....	25 acres per animal unit year
County average .....	22 acres per animal unit year

Tables II through V give detailed cost information for the four areas. The Tables show the typical-size ranch in terms of animal units for each area and the number of acres required for each animal unit. The various segments of cost including taxes, the costs related to fences, corrals, water development, barns, land, and miscellaneous items are included. Interest is shown as a cost on all items of investment. It is charged on the full value of land and the half-value of improvements. The rate used is 6%. It is the amount that could be earned if taken out of ranching and reinvested in a similar risk venture.

The total annual cost per animal unit and per acre is given.

Table VI is a summary of data contained in the preceding four Tables and gives averages for all the areas.

Table VII shows the annual expenses of main production items per animal unit.

A committee of knowledgeable ranch operators, with a wealth of experience in the range-livestock enterprise, assisted in this study.

The taxes shown in this study may be altered as individual ranches sign up under the Land Conservation Act.

The Land Conservation Act was implemented for Humboldt County by the Board of Supervisors with two Resolutions: "Resolution 69-48, June 24, 1969, declaring policies for the establishment of agricultural preserves, and Resolution 69-49, establishing procedures initiating, filing, and processing requests to establish agricultural preserves".

TABLE I

HERBAGE PRODUCTION, WATER STORAGE, AND NITROGEN  
DATA FOR 8 GRASSLAND SOILS OF HUMBOLDT COUNTY

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SOIL SERIES	WATER STORAGE IN INCHES TO A DEPTH OF 4 FT.*	NITROGEN IN LBS./A TO DEPTH OF 4 FT.*	HERBAGE PRODUCTION TONS/A**
MATTOLE	8.8	33,446	5.9
McMAHON	9.09	24,728	5.4
ZANONE	7.2	35,965	5.1
KINMAN or KNEELAND	7.4	18,494	4.6
YORKVILLE	9.65	11,963	3.7
LAUGHLIN	6.02	8,989	3.1
TYSON	4.97	16,838	2.2
WILDER	3.15	18,886	0.9

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\* Information supplied by the Soil-Vegetation Survey Formula for calculating nitrogen and water storage capacity is taken from Zinke, Paul J. (1960) Forest Site Quality as Related to Soil Nitrogen Content, Trans. 7th Intern. Congress of Soil Science, Madison, Wisconsin, 1V52 Vol. III pp. 411-418. Nitrogen and water storage capacity are an indices of the soil's productive potential. The water storage capacity is available to the plant throughout the growing season.

\*\* The herbage was clipped at ground level, air dried, and weighed, and is the average over a 7-year period. It does not necessarily represent the amount of herbage available to grazing animals.

ANNUAL COST OF RANGELAND (Northeastern Humboldt County)  
 (Based upon 300 Animal Units at 20 Acres per Animal Unit)  
 Typical size Ranch: 6,000 Acres

TABLE II

Total/A.U.  
 (20 acres)

Land Interest (20 acres @ \$35.00 = \$700 @ 6%)		\$42.00
Taxes		
Land & Improvements (\$450 per A.U. x 25% x \$8.60 tax rate)		\$9.68
Barns (\$33,500 x 25% x \$8.60 tax rate ÷ 300 A.U.s)	<u>2.40</u>	12.08
Fences (6,000 acres x \$11.25/acre = \$67,500 ÷ 300 A.U.s = \$225/A.U.)		
Depreciation \$225 ÷ 20 years =		11.25
Interest \$225 ÷ 2 x 6% =		6.75
Repairs \$225 x 1% =	<u>2.25</u>	20.25
Corrals (\$2,700 ÷ 300 A.U.s = \$9/A.U.)		
Depreciation \$9 ÷ 20 years =		.45
Interest \$9 ÷ 2 x 6% =		.27
Repairs \$9 x 2% =	<u>.18</u>	.90
Water Dev. (\$3,960 ÷ 300 A.U.s = \$13.20/A.U.)		
Depreciation \$13.20 ÷ 20 years =		.66
Interest \$13.20 ÷ 2 x 6% =		.40
Repairs \$13.20 x 1% =	<u>.13</u>	1.19
Barn (\$33,500 ÷ 300 A.U.s = \$111.67/A.U.) (Cow \$29,000 + Horse \$4,500)		
Depreciation \$111.67 ÷ 40 years =		2.79
Interest \$111.67 ÷ 2 x 6% =		3.33
Repairs \$111.67 x 2% =	<u>2.23</u>	8.35
Liability Insurance (\$105 ÷ 300 A.U.s)		.35
Fire Insurance (\$244 ÷ 300 A.U.s)		.81
Pest Control (\$.23/acre)		4.60
Road Maintenance (4 miles @ \$150 = \$600 ÷ 300 A.U.s)		<u>2.00</u>
Total Annual Cost for 20 Acres of Rangeland		\$92.53
Total Annual Cost for 1 Acre		\$ 4.63



ANNUAL COST OF RANGELAND (Coast - including Bear River Ridge)

Based Upon 300 Animal Units at 6 Acres per Animal Unit

Typical size Ranch: 1800 Acres

TABLE III

	Total/A.U. (6 acres)
Land Interest (6 acres @ \$125.00 = \$750.00 @ 6%)	\$45.00
<b>Taxes</b>	
Land & Improvements ((\$500 per A.U. x 25% x \$9.30 tax rate)	\$11.63
<b>Barns</b>	
(\$40,800 x 25% x \$9.30 tax rate ÷ 300 A.U.s)	<u>3.16</u>
	\$14.79
Fences (1,800 acres @ \$12.50/acre = \$22,000.00 ÷ 300 A.U.s = \$75/A.U.)	
Depreciation \$75 ÷ 20 years =	3.75
Interest \$75 ÷ 2 x 6% =	2.25
Repairs \$75 x 2% =	<u>1.50</u>
	7.50
Corrals (\$2,700 ÷ 300 A.U.s = \$9/A.U.)	
Depreciation \$9 ÷ 20 years =	.45
Interest \$9 ÷ 2 x 6% =	.27
Repairs \$9 x 2% =	<u>.18</u>
	.90
Water Dev. (\$3,960 ÷ 300 A.U.s = \$13.20/A.U.)	
Depreciation \$13.20 ÷ 20 years =	.66
Interest \$13.20 ÷ 2 x 6% =	.40
Repairs \$13.20 x 1% =	<u>.13</u>
	1.19
(cow -- 40' x 120' @ \$4/sq.ft. = \$28,800)	
Barns (horse -- 40' x 40' @ \$5/sq.ft. = \$12,000) ((\$40,800 ÷ 300 A.U.s = \$136/A.U.)	
Depreciation \$136 ÷ 40 years =	3.40
Interest \$136 ÷ 2 x 6% =	4.08
Repairs \$136 x 2% =	<u>2.72</u>
	10.20
Liability Insurance (\$105 ÷ 300 A.U.s)	.35
Fire Insurance (\$244 ÷ 300 A.U.s)	.81
Pest Control (\$.23/acre)	1.38
Road Maintenance (4 miles @ \$150 = \$600 ÷ 300 A.U.s)	<u>2.00</u>
<b>Total Annual Cost for 6 Acres of Rangeland</b>	<b>\$84.12</b>
<b>Total Annual Cost for 1 Acre</b>	<b>\$14.02</b>

ANNUAL COST OF RANGELAND (Southeastern Humboldt County)

Based upon 200 Animal Units at 35 Acres per Animal Unit

Typical size Ranch: 7,000 Acres

TABLE IV

Total/A.U.  
(35 acres)

Land Interest (35 acres @ \$16.00 = \$560.00 @ 6%)		\$33.60
Taxes		
Land & Improvements (\$435/A.U. x 25% x \$8.10 tax rate)		\$8.81
Barns (\$12,000 x 25% x \$8.10 tax rate ÷ 200 A.U.s)		<u>1.22</u>
		10.03
Fences (7,000 acres x \$11.79/acre = \$82,500 ÷ 200 A.U.s = \$412.50/A.U.)		
Depreciation \$412.50 ÷ 25 years =		16.50
Interest \$412.50 ÷ 2 x 6% =		12.38
Repairs Estimate		<u>3.48</u>
		32.36
Corrals (\$2,700 ÷ 200 A.U.s = \$13.50/A.U.)		
Depreciation \$13.50 ÷ 20 years =		.68
Interest \$13.50 ÷ 2 x 6% =		.41
Repairs \$13.50 x 2% =		<u>.27</u>
		1.36
Water Dev. (\$4,880 ÷ 200 A.U.s = \$24.40/A.U.)		
Depreciation \$24.40 ÷ 30 years =		.81
Interest \$24.40 ÷ 2 x 6% =		.73
Repairs (20 troughs @ \$7.50 = \$150 ÷ 200 A.U.s) =		<u>.75</u>
		2.29
Barns (\$7,500 (cow) + \$4,500 (horse) = \$12,000 ÷ 200 A.U.s = \$60.00/A.U.)		
Depreciation \$60.00 ÷ 40 years =		1.50
Interest \$60.00 ÷ 2 x 6% =		1.80
Repairs Estimate		<u>.15</u>
		3.45
Liability Insurance (\$105.00 ÷ 200)		.53
Fire Insurance (\$244 ÷ 200 A.U.s)		1.22
Pest Control (\$.23/acre)		8.05
Road Maintenance (15 miles @ \$42.00 = \$630.00 ÷ 200 A.U.s)		<u>3.15</u>
Total Annual Cost for 35 Acres of Rangeland		\$96.04
Total Annual Cost for 1 Acre		\$ 2.74

ANNUAL COST OF RANGELAND (Southwestern Humboldt County)

Based upon 200 Animal Units (1,000 sheep) at 25 Acres/ A.U.

Typical size Ranch: 5,000 Acres

TABLE V

Total/A.U.  
(25 acres)

Land Interest (25 acres @ \$26.00 = \$650.00 x 6%)		\$39.00
Taxes		
Land & Improvements ((\$435 per A.U. x 25% x \$5.40 tax rate)		\$5.87
Barns ((\$12,000 x 25% x \$5.40 tax rate ÷ 200 A.U.s)	<u>.81</u>	6.68
Fences (5,000 acres x \$12.00/acre = \$60,000 ÷ 200 A.U.s = \$300/A.U.)		
Depreciation \$300.00 ÷ 25 years =	12.00	
Interest \$300.00 ÷ 2 x 6% =	9.00	
Repairs \$300.00 x 1% =	<u>3.00</u>	24.00
Corrals (\$2,700 ÷ 200 A.U.s = \$13.50/A.U.)		
Depreciation \$13.50 ÷ 20 years =	.68	
Interest \$13.50 ÷ 2 x 6% =	.41	
Repairs \$13.50 x 2% =	<u>.27</u>	1.36
Water Dev. (\$3,520 ÷ 200 A.U.s = \$17.60/A.U.)		
Depreciation \$17.60 ÷ 25 years =	.70	
Interest \$17.60 ÷ 2 x 6% =	.53	
Repairs (20 troughs @ \$7.50 = \$150 ÷ 200 A.U.s)	<u>.75</u>	1.98
Barns (\$7,500 + \$4,500 = \$12,000 ÷ 200 A.U.s = \$60/A.U.)		
Depreciation \$60.00 ÷ 40 years =	1.50	
Interest \$60.00 ÷ 2 x 6% =	1.80	
Repairs Estimate	<u>.15</u>	3.45
Liability Insurance (\$105 ÷ 200 A.U.s)		.53
Fire Insurance (\$244 ÷ 200 A.U.s)		1.22
Pest Control (\$.23/acre)		5.75
Road Maintenance (15 miles @ \$100 = \$1500 ÷ 200 A.U.s)		<u>7.50</u>
Total Annual Cost for 25 Acres of Rangeland		\$91.47
Total Annual Cost for 1 Acre		\$ 3.66

SUMMARY OF COST OF RANGE LANDS BASED ON TYPICAL ANIMAL UNIT  
CARRYING CAPACITY FOR 4 SECTIONS OF HUMBOLDT COUNTY

TABLE VI

SECTIONS	N.E. HUMB.	COAST	S.E. HUMB.	S.W. HUMB.	AVERAGES
No. of A.U.	300	300	200	200	250
Acres/A. U.	20	6	35	25	22
Total Acres	6,000	1,800	7,000	5,000	4,955
<u>INVESTMENT PER ANIMAL UNIT</u>					
Bare land	\$700.00	\$750.00	\$560.00	\$650.00	\$665.00
Fences	225.00	75.00	412.50	300.00	253.10
Corrals	9.00	9.00	13.50	13.50	11.25
Water Dev.	13.20	13.20	24.40	17.60	17.10
Barns	111.67	136.00	60.00	60.00	91.92
Total ...	\$1,058.87	\$983.20	\$1,070.40	\$1,041.10	\$1,038.39
<u>ANNUAL EXPENSES PER ANIMAL UNIT</u>					
<u>Depreciation</u>					
Fences	\$11.25	\$3.75	\$16.50	\$12.00	\$10.88
Corrals	0.45	0.45	0.68	0.68	0.57
Water Dev.	0.66	0.66	0.81	0.70	0.71
Barns	2.79	3.40	1.50	1.50	2.30
Total ...	\$15.15	\$8.26	\$19.49	\$14.88	\$14.45
<u>Interest</u>					
Land	\$42.00	\$45.00	\$33.60	\$39.00	\$39.90
Fences	6.75	2.25	12.38	9.00	7.60
Corrals	0.27	0.27	0.41	0.41	0.34
Water Dev.	0.40	0.40	0.73	0.53	0.52
Barns	3.33	4.08	1.80	1.80	2.75
Total ...	\$52.75	\$52.00	\$48.92	\$50.74	\$51.10
<u>Repairs</u>					
Fences	\$2.25	\$1.50	\$3.48	\$3.00	\$2.64
Corrals	0.18	0.18	0.27	0.27	0.23
Water Dev.	0.13	0.13	0.75	0.75	0.44
Barns	2.23	2.72	0.15	0.15	1.31
Roads	2.00	2.00	3.15	7.50	3.66
Total.....	\$6.79	\$6.53	\$7.80	\$11.67	\$8.20
<u>Taxes</u>					
Land & Imp.	\$9.68	\$11.63	\$8.81	\$5.87	\$9.00
Barns	2.40	3.16	1.22	0.81	1.90
Total ...	\$12.08	\$14.79	\$10.03	\$6.68	\$10.90
<u>Misc.</u>					
Liab. Ins.	\$0.35	\$0.35	\$0.53	\$0.53	\$0.39
Fire Ins.	0.81	0.81	1.22	1.22	1.02
Pest Control	4.60	1.38	8.05	5.75	4.95
Total ....	\$5.76	\$2.54	\$9.80	\$7.50	\$6.36
<u>Totals</u>					
Total/A.U.	\$92.53	\$84.12	\$96.04	\$91.47	\$91.04
Total/acre	\$ 4.63	\$14.02	\$ 2.74	\$ 3.66	\$ 6.26

TABLE VII

ANNUAL EXPENSES OF MAIN PRODUCTION ITEMS  
 (From Average Column in Table VI)  
 Per Animal Unit

	Land	Fences	Corrals	Water Development	Barns	Roads	Total
Depreciation		\$10.88	\$ .57	\$ .71	\$2.30		\$14.46
Interest 6%	\$39.90	7.60	.34	.52	2.75		51.11
Repairs		2.64	.23	.44	1.31	\$3.66	8.28
Taxes	9.00				1.90		10.90
Liability Ins.	.39						.39
Fire Ins.					1.02		1.02
Pest Control	4.95						4.95
<b>Total</b>	<b>\$54.24</b>	<b>\$21.12</b>	<b>\$1.14</b>	<b>\$1.67</b>	<b>\$9.28</b>	<b>\$3.66</b>	<b>\$91.11</b>

Totals in Tables VI and VII vary by .07 due to rounding of figures.