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Determining Market Areas for Livestock Grazing

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DETERMINING MARKET AREAS FOR LIVESTOCK GRAZING

by

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Robert G. Williams

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ABSTRACT

Determining Market Areas

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Differentials between rancher costs of operating on private and public range were studied in an attempt to define market areas for livestock grazing in western United States.

The problem of defining market areas is basically a problem of grouping differentials between rancher costs of grazing on private leased range and National Forests that are reasonably homogeneous and statistically testing differences among means of the different groups.

Several methods were used to group forests with reasonably uniform differentials into market areas for cattle. A grouping of forests which have the same average grazing fee does not, however, yield market areas which are statistically different from each other.

Available data are not conclusive enough to define market areas for sheep.

(95 pages)

INTRODUCTION

Establishing grazing fees has long been a problem for those who administer policies on our public lands. Presently a wide range of grazing fees exists on our National Forests. In 1967, fees ranged from $.21 to $1.80 per cow month[1] for cattle and $.04 to $.41 per sheep month for sheep.

Current fees for grazing on National Forests are related to a base fee structure derived from a study undertaken in the 1920's. Following this study base fees were established in 1931 based on an analysis of rental rates on private rangeland and determination of grazing values on comparable National Forest lands. As a result of differences in location of allotments, grazing capacity,and other factors,a large number of base fees were established. Currently there are 19 different base fee rates for cattle and 17 for sheep on the western National Forests. Annual fees are derived by adjusting base fees according to differences between current livestock prices in the 11 western states and an established set of base livestock prices.[2]

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[1] A cow month is the amount of feed required to sustain one head of livestock (cattle) for one month. A cow with a calf less than six months of age is considered as one cow month. Five sheep months equal one cow month.

[2] U. S. Departments of Agriculture, Defense and Interior, "Review of Federal Land Administration for Livestock Grazing," Report of the Interdepartmental Grazing Fee Committee, Washington, D.C.: Government Printing Office, January 1967.

The Problem

It is apparent that changes have occurred which have affected factors that were originally considered when the first base fees were established. Annual adjustments to grazing fees based on livestock prices do not reflect supply and demand conditions for livestock grazing. Although grazing fees have been adjusted each year, they do not necessarily reflect the market conditions for forage. In addition, as population continues to increase more demand is being placed on our National Forests for recreational purposes. As a result of these factors policies governing grazing and especially the area of grazing fees are coming under close scrutiny.[3] It is anticipated that the policy governing grazing fees will require considerable up-dating.

In 1964, The Bureau of the Budget set principles and guidelines to be followed by Federal Agencies in establishing grazing fees. These principles provided that "a uniform basis should be used by all Federal agencies in establishing fees; fees should be based on the economic value of the use of public grazing lands to the users . . . ."[4]

If the fee is to be based on the economic value of the use to the user, the fee should reflect what users of public lands are willing to pay for grazing on comparable private lands within the same area. This follows because supply and demand factors set the price which prevails

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[3]Edward P. Cliff, "Grazing on the National Forests." Address to American National Cattlemen's Association, Memphis, Tennessee. January 28, 1964, p. 2. (Mimeographed)

[4]U. S. Forest Service, Division of Range Management, "U. S. Forest Service Grazing Fees Program." Report to the American Farm Bureau Federation Special Multi-State Grazing Fee Conference, Salt Lake City, Utah, January 16, 1968, p. 2. (Mimeographed)

for private grazing in a given area. The permit system currently in use on Forest Service lands, however, does not allow the fees for use of public lands to reflect what the forage is actually worth to the user. This problem will be discussed in more detail in a later section.

Originally the Forest Service set its base fees under the assumption that supply and demand factors were different in different areas and market areas were thus defined. The problem now is to determine if supply and demand factors are significantly different in the various areas of the west and if market areas can be defined for livestock grazing today. If market areas for grazing can be defined, each market area could have a separate fee based on the economic value of the range to the user.

Objectives of the Study

The objectives of this study are: (1) To define an area for each National Forest in the six Forest Regions of the western United States, showing where base properties of permittees on each forest are located, and determine where ranchers from these areas go to lease private rangeland that would substitute for grazing on each National Forest. (2) To compare the total cost of using public range with the total cost of using comparable private leased range, where the smallest unit of aggregation is a National Forest. (3) To determine if grazing market areas exist which could be used to determine a fee for grazing that would be based on the economic value of grazing to users within that market area.

REVIEW OF LITERATURE

Although literature in the area of defining market areas for livestock grazing is limited, various studies have advanced at least two different methods of defining market areas for livestock grazing.

Permit Value Method of Determining Market Areas

Gardner demonstrates that the permit system is a rationing device, which is necessary to allocate the services of public grazing land to users. This system becomes necessary as a result of the cost of operating on public lands being less than the value of the marginal product of the grazing. The permit, or authorization to graze on Forest Service lands has taken on value, as a result of the owner being able to transfer the permit. Where transferability is allowed a market for permits exists among the group of prospective holders.[5]

Jensen used permit values to define market areas for grazing in the state of Utah. He defines a market area as "an area or region in which a uniform price per unit of grazing or permit value prevails." By taking permit value data from the various National Forests in Utah,

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[5]B. Delworth Gardner, "Transfer Restrictions and Misallocation in Grazing on Public Range." Journal of Farm Economics, XXXXIV, No. 1 (February, 1962).

definite market areas were defined.[6] Although the study was conducted only within the state of Utah, it is conceivable that if permit value data were available the same procedure could be used to determine market areas for all National Forests.

Certain problems are encountered, however, when one deals with grazing permit values. Gardner states that there are impediments that do not allow grazing permits to be freely transferred. Common impediments to free transferability are ownership of cattle and land, dependency upon Forest Service lands for year-round operation and commensurate property. In addition to these rather obvious impediments, attention is brought to others not so obvious. Until recently it had been the Forest Service policy to cut grazing when permits were transferred. Although this practice has been discontinued, stockmen are not necessarily convinced it has been abandoned entirely.[7] If ranchers fear a transfer will result in a cut obviously they will not be willing to pay as much for the permit as it would be worth if the fear did not exist.[8] Topham concludes that because of this fear of permit cuts, ranchers avoid purchasing permits. He found that permit values have leveled off in the last ten years because of past, and fear of future

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[6]Bartell C. Jensen, "Determining Grazing Fees on National Forests," Utah State University, Logan, Utah. Unpublished Report (September 12, 1967).

[7]B. Delworth Gardner, "A Proposal to Reduce Misallocation of Livestock Grazing Permits." Journal of Farm Economics, XXXXV, No. 1, p. 111, (February, 1963).

[8]N. K. Roberts and Mardell Topham, Discovering Grazing Values. Utah Agriculture Experiment Station Ag. Ec. Series 65-3, 1965. p. 13.

permit reductions. In contrast the value of private rangeland has continued to increase.[9]

It can be assumed that these impediments to permit transfer will vary from area to area. We can thus conclude that in some cases permit values will be influenced by restrictions placed on their transfer, or fears resulting from cuts. In addition, on some forests permits tend to be exchanged rather infrequently.

The Forest Service after analyzing permit values collected by the Statistical Reporting Service,which represented actual transfer prices over the past five years, concluded that there were not enough permit value observations to allow them to reliably stratify forests into market areas.[10] Where this is the case the permit value is not an accurate indicator of economic value and as such, would not be an effective tool in defining market areas for the purpose of determining grazing fees.

Total Cost Method of Determining Market Areas

The Forest Service defined market areas by using the total cost of operating on Forest Service land. By taking the total operating cost

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[9] Mardell D. Topham, "The Economic Value of Forage for Livestock on Public and Private Ranges in Utah" (unpublished M.S. thesis, Utah State University Library, Logan, Utah, 1966), p. 63.

[10] U. S. Forest Service, "Forest Service Grazing Fees Program." Report presented at the Fees and Directives Conference with the American National Cattlemen's Association and the National Wool Growers Association, 1967. p. 7. (Mimeographed)

of permittees on each National Forest in the six Forest Regions of the western United States and statistically testing for the differences among the total cost means, 18 major market areas for cattle were thus defined. These market areas are shown in Table 1.[11]

Procedure and Source of Data

This thesis will attempt to define market areas by obtaining a differential between the total rancher non-fee cost of operating on each National Forest and the cost of operating on comparable private range. Market areas will then be defined by grouping these differentials into regions which are reasonably uniform.

The Statistical Reporting Service in cooperation with the Forest Service and the Bureau of Land Management undertook the data collection project. In addition to the Bureau of Land Management and National Grasslands, this project was designed to provide data necessary to estimate grazing values on 98 National Forests located in 17 western states. Some 10,000 individuals were interviewed in the survey. These included Forest Service and Bureau of Land Management grazing permittees and ranchers (permittee and non-permittee), who lease private grazing lands. Information was obtained on grazing permit values, lease rates on private lands and non-fee costs of using public and private lands. Table 2 shows these itemized costs for National Forests and National Grasslands as an average for the entire survey area. Although the data included 17 western states, this study is primarily concerned with data

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[11] U. S. Forest Service, "Forest Service Grazing Fees Program," p. 14.

Table 1. Market areas for cattle as determined by the Forest Service using the total cost method

Forest	Total non-fee cost per AUM of operating on Forest Service land
Area A:	
Umpqua, Willamette, Mt. Hood	$4.19
Deschutes	5.62
Umatilla	4.02
Wallowa-Whitman	3.89
Payette	4.42
Boise	5.32
Nezperce	4.32
Rogue River	4.50
Winema	4.54
Six Rivers	4.85
Klamath	4.41
Shasta-Trinity	4.56
Mendocino	3.70
Los Padres	3.23
Siskiyou	6.69
Weighted Average	4.25
Range	3.23-6.69
Area B:	
Angeles, Cleveland, San Bernardino	9.65
Area C:	
Tahoe	5.44
Eldorado	7.03
Stanislaus	5.34
Sierra	6.17
Inyo	4.45
Sequoia	4.45
Weighted Average	5.17
Range	4.45-7.03
Area D:	
Modoc	3.14
Lassen	3.63
Plumas	3.68
Fremont	3.47
Ochoco	3.14
Malheur	2.75
Weighted Average	3.16
Range	2.75-3.68

Table 1. Continued

Forest	Total non-fee cost per AUM of operating on Forest Service land
Area E:	
Okanogan	$3.65
Mt. Baker, Gifford Pinchot, Snoqualmie	3.59
Siuslaw	3.84
Wenatchee	4.87
Weighted Average	3.73
Range	3.59-4.87
Area F:	
Clearwater	5.53
St. Joe	6.57
Coeur d'Alene	4.58
Weighted Average	6.19
Range	4.58-6.57
Area G:	
Colville	2.67
Kaniksu	3.35
Kootenai	2.94
Weighted Average	2.80
Range	2.67-3.35
Area H:	
Flathead	2.21
Lolo	2.18
Lewis & Clark	1.68
Weighted Average	1.77
Range	1.68-2.21
Area I:	
Custer	2.50
Black Hills	2.73
Bighorn	3.17
Medicine Bow	2.62
Weighted Average	2.73
Range	2.50-3.17
Area J:	
Nebraska	1.65

Table 1. Continued

Forest	Total non-fee cost per AUM of operating on Forest Service land
Area K:	
Deerlodge	$3.27
Helena	3.63
Bitterroot	3.65
Beaverhead	2.90
Targhee	3.77
Teton	3.60
Shoshone	4.04
Bridger	3.40
Caribou	3.23
Ashley	3.06
Sawtooth	3.43
Gallatin	4.61
Weighted Average	3.44
Range	2.90-4.61
Area L:	
Salmon	2.41
Challis	2.04
Weighted Average	2.16
Range	2.04-2.41
Area M:	
Toiyabe	3.42
Humboldt	3.66
Dixie	3.14
Weighted Average	3.47
Range	3.14-3.66
Area N:	
Wasatch	4.61
Cache	4.21
Uinta	4.80
Manti-Lasal	4.57
Fishlake	4.77
Weighted Average	4.63
Range	4.21-4.80
Area O:	
Kaibab	3.29
Prescott	4.02
Coconino	3.43
Coronado	4.12
Tonto	3.07

Table 1. Continued

Forest	Total non-fee cost per AUM of operating on Forest Service land
Weighted Average	3.61
Range	3.07-4.12
Area R:	
Sitgreaves	$5.76
Apache	3.99
Cibola	7.27
Gila	4.75
Lincoln	6.35
Weighted Average	5.19
Range	3.99-7.27
Area S:	
Carson	5.11
Santa Fe	6.05
Weighted Average	5.54
Range	5.11-6.05
Area T:	
San Juan	3.89
Rio Grande	3.37
San Isabel	4.02
Gunnison	3.24
Grand Mesa	3.07
White River	4.16
Pike	1.85
Arapaho	2.88
Routt	3.80
Roosevelt	3.50
Weighted Average	3.47
Range	1.85-4.16
Survey Weighted Average	3.75
Range	1.65-9.65

Table 2. Itemized rancher non-fee costs per animal unit month for grazing livestock on National Forests and grasslands

Cost item	Cattle	Sheep
Lost animals	$ .61	$ .72
Association fees	.19	.05
Veterinary	.13	.10
Moving livestock to and from allotment	.33	.39
Herding	.47	1.48
Salt and feeding	.41	.29
Travel to and from allotment	.41	.50
Water	.04	.07
Horses	.23	.24
Fence maintenance	.27	.08
Water maintenance	.18	.08
Development depreciation	.13	.06
Other costs	.17	.28
Total costs- National Forest and National Grasslands in survey[a]	3.59[b]	4.35[b]
National Forests, 11 Western States	3.75[b]	4.49[b]

[a]Summation may not equal total costs due to rounding.

[b]Does not include grazing fee or cost of holding permit.

on National Forests within the 11 western states. Exceptions are: two forests which are partly in South Dakota, and one which is completely in Nebraska.[12]

Costs of operating on each National Forest were summarized. Cost data for private rangeland was made available by the Forest Service. These data contained the same cost items as data for Forest Service lands (see Table 2). Private cost data required aggregation as the appropriate areas were defined.

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[12] U. S. Forest Service, "U. S. Forest Service Grazing Fees Program."

DETERMINING MARKET AREAS FOR CATTLE

Market Areas for Grazing on National Forests

Over time ranchers have bid for control of forest grazing by buying grazing permits as they were offered for sale. Therefore, it is appropriate to locate the current permit holders and define the geographic area which encompasses these permittees as the market area for grazing permits.

The addresses of permittees on 98 National Forests in the western states were available from Forest Service data. By using these addresses, the geographic location of permittees on each forest was determined. With permittees for each forest thus geographically located, it was possible to define grazing permit market areas for each forest. These market areas include those counties in which permittees on a given National Forest are located. Market areas for permits for each of the National Forests in the western states are shown in the Appendix. These areas provide a base from which a market area can be defined for private range that could be used as a substitute for grazing on each National Forest.

Market Areas for Grazing on Private Leased Range

Suppose permittees on a given National Forest are located in a five county area. This would then be the grazing permit market area for that

forest, (assuming that over time ranchers have been bidding for control of the forest grazing permits). Ranchers (both permittee and non-permittee) in this five-county area undoubtedly lease private rangelands for grazing. Data were available which listed the location of the ranchers who leased rangeland and the location of the rangeland leased. By taking all ranchers in the five counties who lease rangeland and locating the rangeland leased, one can determine a market area for private range for each forest. The private lease cost data include all items listed for forest lands (Table 2) plus the actual cash cost of the lease. Private lease data are summarized on a county basis. Therefore, the market area for private leased range includes all counties where ranchers for each forest go to lease rangeland.

Only private leased rangeland that would substitute seasonally for National Forest grazing was included in the analysis. Using this procedure, market areas for private grazing which would substitute for grazing on each National Forest were determined. Cost of operating on private rangeland could then be compared with the cost of operating on the associated National Forest to give a basis for a grazing fee.

Private lease data were analyzed in much the same manner as data on costs of grazing forest lands. The private lease areas for each National Forest are shown in the Appendix. There is some overlap in the private lease areas, i.e., the same county may appear in more than one market area. This is to be expected, however, since private range in a given county can substitute for grazing on more than one National Forest.

Costs of Grazing on National Forests Compared to Costs of Grazing on Private Leased Range

Costs of grazing on private rangeland were summarized for each county, based on private lease cost data provided by the Forest Service. The same cost items used by the Forest Service (Table 2), for determining the cost of operating on Forest Service land, were used to determine private costs. After aggregating costs and AUM's[13] for each county, totals for each area of private grazing were computed. By dividing total costs for each area by total AUM's, it was possible to determine the per AUM costs for the private lease area associated with each National Forest.

Costs of operating on each National Forest had previously been determined by the Forest Service. By comparing costs of operating on Forest Service land with those of operating on private lands in the same area, a differential was obtained for each forest. This differential represents the full value differential for forage on that forest. Table 3 shows costs of operating on National Forests and private leased range summarized for each forest, along with full value differentials and permit values where available.

It should be noted that several of the forests show a negative differential when rancher costs of operating on National Forests are

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[13] An animal-unit-month (AUM) is the amount of feed required to sustain a cow or its equivalent for the period of one month. Five sheep are considered the equivalent of one cow.

Table 3. Summary of rancher costs for grazing cattle on National Forests and private leased range[a]

Forest	Rancher non-fee costs of operating on National Forests	Rancher cost of operating on private leased range	Differential between rancher costs of operating on private leased range and National Forests	Permit value
Forest Region 1:				
Beaverhead	$2.90	$4.19	$1.29	$21.75
Bitterroot	3.65	4.32	.67	[b]
Clearwater	5.53	4.47	-1.06	[b]
Couer d'Alene	4.58	3.44	-1.14	[b]
Colville	2.67	3.45	.78	16.44
Custer	2.50	4.14	1.64	11.34
Deerlodge	3.27	4.89	1.62	32.03
Flathead	2.21	4.20	1.99	48.64
Gallatin	4.61	4.88	.27	25.07
Helena	3.63	5.43	1.80	22.89
Kaniksu	3.35	3.40	.05	[b]
Kootenai	2.94	2.72	- .22	[b]
Lewis & Clark	1.68	6.43	4.75	15.03
Lolo	2.18	4.63	2.45	5.06
Nezperce	4.32	6.70	2.38	9.55
St. Joe	6.57	3.19	-3.38	32.20
Average	3.54	4.41	.87	21.82
Range	1.68-6.57	2.72-6.70	-3.38-4.75	5.06-48.64
Forest Region 2:				
Arapaho	2.88	6.45	3.57	29.11
Bighorn	3.17	2.72	- .45	26.84
Black Hills	2.73	3.43	.70	25.64
Grand Mesa	3.07	4.73	1.66	21.76
Gunnison	3.24	5.02	1.78	18.23
Medicine Bow	2.62	4.80	2.18	7.02
Nebraska	1.65	4.81	3.16	[b]
Pike	1.85	5.34	3.49	26.75
Rio Grande	3.37	5.84	2.47	26.90
Roosevelt	3.50	4.77	1.27	39.34
Routt	3.80	5.92	2.12	29.45
San Isabel	4.02	5.22	1.20	59.47
San Juan	3.89	4.70	.81	24.20
Shoshone	4.04	6.66	2.62	35.81
White River	4.16	4.20	.04	25.04
Average	3.20	4.97	1.77	28.47
Range	1.65-4.16	2.72-6.66	-.45-3.57	7.02-59.47

Table 3. Continued

Forest	Rancher non-fee costs of operating on National Forests	Rancher cost of operating on private leased range	Differential between rancher costs of operating on private leased range and National Forests	Permit value
Forest Region 3:				
Apache	$3.99	$4.97	$ .98	$52.25
Carson	5.11	5.06	- .05	20.27
Cibola	7.27	4.64	-2.63	29.51
Coconino	3.43	5.29	1.96	10.76
Coronado	4.12	4.89	.77	[b]
Gila	4.75	5.09	.34	23.30
Kaibab	3.29	4.87	1.58	37.48
Lincoln	6.35	6.07	- .28	9.98
Prescott	4.02	4.80	.78	32.20
Santa Fe	6.05	4.86	-1.19	17.53
Sitgreaves	5.76	5.96	.20	50.77
Tonto	3.07	5.39	2.32	37.48
Average	4.77	5.17	.40	29.23
Range	3.07-7.27	4.64-6.07	-2.63-2.32	9.98-52.25
Forest Region 4:				
Ashley	3.06	6.82	3.76	18.03
Boise	5.32	4.37	- .95	18.26
Bridger	3.40	6.04	2.64	11.77
Cache	4.21	5.05	.84	10.87
Caribou	3.23	4.53	1.30	14.75
Challis	2.04	6.11	4.07	23.58
Dixie	3.14	4.60	1.46	15.02
Fishlake	4.77	4.80	.03	15.86
Humboldt	3.66	4.44	.78	32.27
Manti-Lasal	4.57	5.23	.66	16.43
Payette	4.42	3.86	- .56	75.86
Salmon	2.41	4.75	2.34	15.71
Sawtooth	3.43	5.14	1.71	24.04
Targhee	3.77	4.58	.81	19.69
Teton	3.60	7.03	3.43	10.93
Tioyabe	3.42	4.35	.93	35.43
Uinta	4.80	5.81	1.01	21.01
Wasatch	4.61	5.51	.90	7.99
Average	3.77	5.17	1.40	21.53
Range	2.04-5.32	3.86-7.03	- .95-4.07	7.99-75.86
Forest Region 5:				
Angeles	9.65	4.65	-5.00	[b]
Cleveland	9.65	3.73	-5.92	[b]
Eldorado	7.03	6.05	- .98	16.08

Table 3. Continued

Forest	Rancher non-fee costs of operating on National Forests	Rancher cost of operating on private leased range	Differential between rancher costs of operating on private leased range and National Forests	Permit value
Inyo	$4.45	$4.60	$ .15	$ 4.97
Klamath	4.41	2.99	-1.42	6.86
Lassen	3.63	5.42	1.79	9.67
Los Padres	3.23	5.02	1.79	[b]
Mendocino	3.70	5.20	1.50	[b]
Modoc	3.14	4.22	1.08	26.28
Six Rivers	4.85	7.50	2.65	[b]
Plumas	3.68	5.19	1.51	25.92
San Bernardino	9.65	4.67	-4.98	[b]
Sequoia	4.45	6.83	2.38	8.61
Shasta-Trinity	4.56	5.58	1.02	[b]
Sierra	6.17	4.30	-1.87	2.65
Stanislaus	5.34	4.41	- .93	[b]
Tahoe	5.44	4.22	-1.22	[b]
Average	5.47	4.98	- .49	12.63
Range	3.14-9.65	2.99-7.50	-5.92-2.65	2.65-26.28
Forest Region 6:				
Deschutes	5.62	4.46	-1.16	8.03
Fremont	3.47	5.41	1.94	40.36
Gifford Pinchot	3.59	4.04	.45	25.58
Malheur	2.75	6.21	3.37	20.36
Mt. Baker	3.59	8.20	4.61	25.58
Mt. Hood	4.19	2.29	-1.90	28.39
Ochoco	3.14	4.13	.99	17.82
Okanogan	3.65	2.86	- .79	12.31
Olympic	[b]	4.71	[b]	[b]
Rogue River	4.50	5.21	.71	7.61
Siskiyou	6.69	4.57	-2.12	[b]
Siuslaw	3.84	4.13	.29	[b]
Snoqualmie	3.59	3.55	- .04	25.58
Umatilla	4.02	4.38	.36	2.78
Umpqua	4.19	4.85	.66	28.39
Wallowa-Whitman	3.89	5.07	1.18	14.30
Wenatchee	4.87	3.45	-1.42	2.99
Willamette	4.19	3.47	- .72	28.39
Winema	4.54	5.46	.92	[b]
Average	4.13	4.54	.41	19.23
Range	2.75-6.69	2.29-8.20	-2.12-4.61	2.78-40.36

[a] All values are computed on an AUM basis.

[b] Data not available.

subtracted from costs of operating on private leased range. It is normally assumed that the private leased range costs per AUM would be higher than the non-fee costs of operating on National Forests. If this were not the case, the operator would be better off economically speaking to discontinue grazing on Forest Service lands and lease private range.[14] If the costs of operating on private land were less expensive than Forest Service land, we would also expect the permit on the forest to have no value. On some of these forests, however, the Forest Service had determined that a permit value does exist (see Table 3). The presence of this permit value strongly suggests that a cost differential exists, with the cost of operating on National Forests being less than the cost of operating on private leased range.[15] On the other hand, on some forests there appears to be a very high differential, where the relative low permit value would suggest that the differential should be less than the data would indicate. Several factors can be considered to explain the above conditions.

On many forests having a negative differential (costs of operating on National Forests are higher than costs of operating on private leased range), it is noted that most and in some cases all of the permits are temporary. Temporary permits are issued to accomplish certain objectives of the Forest Service which cannot completely be met with the more common term permit. Temporary permits are issued for one year and may or may not be reissued, depending on the availability of forage.

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[14] U. S. Forest Service, "Forest Service Grazing Fees Program."

[15] Ibid.

Ownership of base ranch property is not required to hold a temporary permit, the requirement of commensurability is also waived. On the other hand, to be eligible to hold term permits, a rancher must own commensurate ranch property. Term permits are normally issued for a period of ten years.[16]

Due to the differences that exist between temporary and term permits it is obvious that forests which have mostly temporary permittees would differ to a large degree from those that are largely term. These differences would be expected to influence the cost of operating on Forest Service lands. It is noted that in many cases the forests with few term permittees are also the ones whose costs differentials seem to be "out of line." In most cases the result is a high cost of operating on the Forest Service land, which results in a negative differential. High costs of operating on National Forests can largely be attributed to relaxing of the requirements for holding temporary permits, as well as to the nature of the permit itself. To be eligible to hold temporary permits it is no longer necessary for the permittee to own a livestock operation which is dependent on Forest Service grazing to operate. In fact the operation need not even be located near the forest on which the permit is issued. Use of temporary permits would quite naturally result in higher moving and travel costs for the permittee than for the term permit. Because temporary permits are not necessarily renewed each year, permittees are not in a position to take advantages of inherent

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[16]U. S. Forest Service, "Title 2200, Range Management," Forest Service Manual, Washington, D.C. n.d.

economics which could result from a continual operation in the same area year after year. It does not then seem unreasonable to expect that costs of operating on public lands would be higher than usual where we are dealing with mostly temporary permits. Forests which have less than 25 term permittees are shown in Table 4.

Statistical Analysis

Once the differential between the cost of operating on private leased range and National Forests is obtained for each forest, the problem of defining market areas is essentially the problem of statistically testing for the difference among the means of two or more populations.[17] For example, if the differentials are grouped into n groups with cost differentials μ_1 μ_2... $_n$ an application of analysis of variance procedure can be used to test the hypothesis that all means are equal, i.e., $\mu_1 = \mu_2 = \ldots = \mu_n$. If the hypothesis is accepted it could be concluded that no significant difference exists among the group's cost differential means and that the groups would not represent separate market areas. If, on the other hand, the hypothesis is rejected, one could conclude that separate and distinct market areas exist for livestock grazing. A different fee could then be justified for different areas. The problem is how to group the forests into fee or market areas that will prove to be statistically different. Several different methods of grouping were used in an attempt to define market areas.

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[17] Bartell C. Jensen, "Determining Grazing Fees on National Forests." p. 7.

Table 4. National Forests which have less than 25 term permittees

Forest	No. of term permittees	Total permittees	Differential between rancher costs of operating on private leased range and National Forests	Permit value
Clearwater	0	18	-$1.06	a
Couer d'Alene	9	35	-1.14	a
Flathead	0	30	1.99	$48.64
Kootenai	17	64	- .22	a
St. Joe	0	43	-3.38	32.20
Angeles	1	1	-5.00	a
Cleveland	2	2	-5.92	a
Inyo	22	45	-1.42	6.86
Mendocino	9	33	1.50	a
San Bernardino	4	13	-4.98	a
Shasta-Trinity	12	37	1.02	a
Deschutes	25	30	-1.16	8.03
Gifford Pinchot	8	14	.45	25.58
Mt. Baker	1	1	4.61	25.58
Mt. Hood	16	17	-1.90	28.39
Olympic	1	1	a	a
Siskiyou	10	16	-2.12	a
Siuslaw	0	41	.29	a
Snoqualmie	5	6	- .04	25.58
Umpqua	7	11	.66	28.39
Wenatchee	25	37	-1.42	2.99
Willamette	0	8	- .72	28.39
Winema	15	28	.92	a

[a]Data not available.

Source: Barton F. Bailey, "An Analysis of Forest Service Grazing Statistics and a Case Study of Public Grazing in Rich County, Utah." Unpublished M.S. Thesis, Utah State University Library, Logan, Utah, 1969.

The first and perhaps the most obvious method is to study the differentials to determine if any obvious groupings are recognizable. The private-public cost differentials were arranged in numerical order and studied to determine if there were any obvious breaks or gaps in the data. By looking at the differentials in this manner it was determined that they could be broken into 15 distinct groups. Each group contained differentials which were fairly homogeneous, numerically speaking. At the same time the groups were separated from each other for the most part by a considerable and obvious gap.

As would be expected, when the hypothesis $\mu_1 = \mu_2 \cdots = \mu_{15}$ was subjected to an analysis of variance the results were highly significant and the hypothesis was rejected (Table 5). Table 6 shows the forests within each of the 15 market areas.[18]

Table 5. Analysis of variance for the 15 market areas determined by numerical grouping

Source of variation	Degrees of freedom	Mean squares	F
Total	95	--	
Treatments	14	23.9462	219.8550**
Experimental Error	81	.1090	

**Significant at the 1 percent level.

[18]Only 96 National Forests are used in the analysis instead of the expected 98. The Manti and Lasal National Forests have been combined into one observation. No public costs were available for the Olympic National Forest.

Table 6. Market areas for cattle as determined by numerical grouping

Forest	Differential between rancher costs of operating on private leased range and National Forests
Area A:	
Cleveland	-$5.92
Angeles	-5.00
San Bernardino	-4.98
St. Joe	-3.38
Cibola	-2.63
Average	-4.38
Area B:	
Siskiyou	-2.12
Mt. Hood	-1.90
Sierra	-1.87
Average	-1.96
Area C:	
Klamath	-1.42
Wenatchee	-1.42
Tahoe	-1.22
Santa Fe	-1.19
Deschutes	-1.16
Couer d'Alene	-1.14
Clearwater	-1.06
Eldorado	- .98
Boise	- .95
Stanislaus	- .93
Average	-1.15
Area D:	
Okanogan	- .79
Willamette	- .72
Payette	- .56
Bighorn	- .45
Lincoln	- .28
Kootenai	- .22
Average	- .50
Area E:	
Carson	- .05
Snoqualmie	- .04
Fishlake	.03
White River	.04
Kaniksu	.05
Average	.006

Table 6. Continued

Forest	Differential between rancher costs of operating on private leased range and National Forests
Area F:	
Inyo	$ .15
Sitgreaves	.20
Gallatin	.27
Siuslaw	.29
Gila	.34
Umatilla	.36
Gifford Pinchot	.45
Average	.29
Area G:	
Umpqua	.66
Manti-Lasal	.66
Bitterroot	.67
Black Hills	.70
Rogue River	.71
Coronado	.77
Prescott	.78
Humboldt	.78
Colville	.78
San Juan	.81
Targhee	.81
Cache	.84
Wasatch	.90
Winema	.92
Toiyabe	.93
Apache	.98
Ochoco	.99
Uinta	1.01
Shasta-Trinity	1.02
Modoc	1.08
Average	.84
Area H:	
Wallowa-Whitman	1.18
San Isabel	1.20
Roosevelt	1.27
Beaverhead	1.29
Caribou	1.30
Average	1.25

Table 6. Continued

Forest	Differential between rancher costs of operating on private leased range and National Forests
Area I:	
Dixie	$1.46
Mendocino	1.50
Plumas	1.51
Kaibab	1.58
Deerlodge	1.62
Custer	1.64
Grand Mesa	1.66
Sawtooth	1.71
Gunnison	1.78
Lassen	1.79
Los Padres	1.79
Helena	1.80
Average	1.65
Area J:	
Fremont	1.94
Coconino	1.96
Flathead	1.99
Average	1.96
Area K:	
Routt	2.12
Medicine Bow	2.18
Average	2.15
Area L:	
Tonto	2.32
Salmon	2.34
Sequoia	2.38
Nezperce	2.38
Lolo	2.45
Rio Grande	2.47
Average	2.39
Area M:	
Shoshone	2.62
Bridger	2.64
Six Rivers	2.65
Average	2.64

Table 6. Continued

Forest	Differential between rancher costs of operating on private leased range and National Forests
Area N:	
Nebraska	$3.16
Malheur	3.37
Teton	3.43
Pike	3.49
Arapaho	3.57
Ashley	3.76
Challis	4.07
Average	3.55
Area O:	
Mt. Baker	4.61
Lewis & Clark	4.75
Average	4.68

It should be recognized that even though the areas are highly significant statistically speaking, one cannot attach too much importance to the results. In view of the fact that the groups were selected from data which is arranged in numerical order one would expect the analysis of variance to reject the hypothesis. Furthermore, if a different number of groups had been used, say 12 or even 20, the results would still prove to be significant from a statistical point of view. Taking one or more forests from one group and moving them to another still does not change the conclusion that there is a significant difference among the 15 groups.

The second method of grouping forests was to use the 18 market areas defined by the Forest Service (see Table 1). By using these areas and subjecting the cost differentials to an analysis of variance,

it was determined that the hypothesis $\mu_1 = \mu_2 \ldots = \mu_{18}$ was rejected (Table 7). Results of this test would tend to substantiate the results of the Forest Service, even though the Forest Service market areas were defined using total public cost figures as opposed to the method of cost differentials. The fact that both our results will statistically support the same market areas would indicate that the Forest Service would be justified in using the 18 market areas previsouly defined to determine grazing fees.

As has been pointed out previously, there is a wide range of fees presently being charged by the Forest Service. Base fees were originally computed from private lease data similar to that used in this study. If changes in costs of private leased range have not occurred to any great extent, or if these changes have occurred equally in all areas, market areas could be defined as those forests which have the same average grazing fee. Over time, adjustments were made in all base fees as a result of changing livestock prices. Changing livestock prices would be added equally to the base fee for each forest, and as such would not be a factor in defining market areas based on current fee data.

Table 7. Analysis of variance for 18 market areas defined by the Forest Service using the total cost method

Source of variation	Degrees of freedom	Mean squares	F
Total	95	--	
Treatments	17	12.9754	8.1142**
Experimental Error	78	1.5991	

** Significant at the 1 percent level.

An average grazing fee was obtained for each National Forest from the 1967 fee data as computed by the Forest Service. The Forests were then grouped into 33 separate market areas, with each group having a different average grazing fee. As was previously noted there are 19 different base fees currently in effect. Some forests, however, are broken into grazing allotments with a different fee being charged on each allotment. Where this is the case an average of the different fees was used to determine the overall fee for that forest. This then accounts for the 33 different fees instead of the expected 19. Table 8 shows the forests within each of the 33 fee areas.

When the hypothesis $\mu_1 = \mu_2 = \ldots = \mu_{33}$ is subjected to an analysis of variance, the hypothesis is accepted (Table 9). Thus the statistical evidence indicates that the current fee areas cannot be used for new base fee areas. This would substantiate the hypothesis that factors which were used to determine the original base fees have changed to the extent that they no longer represent values of Forest Service grazing, when compared to private lease rates.

The final attempt at grouping was undertaken with the objective of a compromise between cost differentials and geographic location. That is to say, forests were grouped by looking at geographic location first and then cost differentials. In this manner forests were grouped into 19 market areas in such a manner that they conform reasonably close geographically and still have cost differentials that are relatively homogeneous. Because of careful attempts to insure that each group have differentials which are fairly homogeneous, when the hypothesis $\mu_1 = \mu_2 = \ldots = \mu_{19}$ is subjected to the analysis of variance, the results are highly significant (Table 10). This grouping results

Table 8. Market areas for cattle as determined by average grazing fee

Forest	Average fee	Differential between rancher costs of operating on private leased range and National Forest
Area A:	$.32	
Santa Fe		-$1.19
Area B:	.33	
Carson		- .05
Area C:	.34	
Lincoln		- .28
Gila		.34
Area D:	.35	
Kaibab		1.58
Cibola		-2.63
Area E:	.37	
Siskiyou		-2.12
Apache		.98
Area F:	.38	
Kootenai		- .22
Flathead		1.99
Prescott		.78
Sitgreaves		.20
Area G:	.39	
Tonto		2.32
Area H:	.40	
Coronado		.77
Area I:	.41	
Coconino		1.96
Area J:	.42	
Clearwater		-1.06
Salmon		2.34
Area K:	.46	
St. Joe		-3.38
Humboldt		.78
Area L:	.47	
Bitterroot		.67

Table 8. Continued

Forest	Average fee	Differential between rancher costs of operating on private leased range and National Forest
Area M:	$.48	
Boise		-$ .95
Six Rivers		2.65
Challis		4.07
Area N:	.49	
Deschutes		-1.16
Area O:	.50	
Couer d'Alene		-1.14
Colville		.78
Lolo		2.45
Black Hills		.70
Area P:	.51	
Payette		- .56
Nezperce		2.38
Kaniksu		.05
Teton		3.43
Area Q:	.52	
Tioyabe		.93
Area R:	.53	
Manti-Lasal		.66
Willamette		- .72
Mt. Hood		-1.90
Ochoco		.99
Umpqua		.66
Area S:	.54	
Targhee		.81
Bridger		2.64
Ashley		3.76
Area T:	.55	
Wasatch		.90
Area U:	.56	
Wenatchee		-1.42
Medicine Bow		2.18

Table 8. Continued

Forest	Average fee	Differential between rancher costs of operating on private leased range and National Forest
Area V:	$.57	
Rogue River		$ .71
Klamath		-1.42
Shasta-Trinity		1.02
Mendocino		1.50
Inyo		.15
Modoc		1.08
Malheur		3.37
Okanogan		- .79
Mt. Baker		4.61
Gifford Pinchot		.45
Snoqualmie		- .04
Siuslaw		.29
Sawtooth		1.71
Fishlake		.03
Gunnison		1.78
Grand Mesa		1.66
Area W:	.58	
Wallowa-Whitman		1.18
Dixie		1.46
Area X:	.61	
Umatilla		.36
Lassen		1.79
Angeles		-5.00
Cleveland		-5.92
San Bernardino		-4.98
Tahoe		-1.22
Eldorado		- .98
Stanislaus		- .93
Sierra		-1.87
Sequoia		2.38
Los Padres		1.79
Plumas		1.51
Custer		1.64
Uinta		1.01
Area Y:	.62	
Fremont		1.94
Area Z:	.63	
Deerlodge		1.62
Beaverhead		1.29
Gallatin		.27

Table 8. Continued

Forest	Average fee	Differential between rancher costs of operating on private leased range and National Forest
Area AA:	$.64	
Caribou		$1.30
Cache		.84
Rio Grande		2.47
Pike		3.49
Arapaho		3.57
Area AB:	.67	
Lewis & Clark		4.75
Shoshone		2.62
San Juan		.81
White River		.04
Routt		2.12
Area AC:	.69	
Helena		1.80
Area AD:	.70	
Bighorn		- .45
Area AE:	.71	
Nebraska		3.16
Area AF:	.82	
Roosevelt		1.27
Area AG:	.98	
Winema		.92

Table 9. Analysis of variance for 33 market areas defined by using average grazing fees

Source of variation	Degrees of freedom	Mean squares	F
Total	95	--	
Treatment	32	3.3718	.8985*
Experimental Error	63	3.7529	

*Not significant at the 5 percent level.

Table 10. Analysis of variance for 19 market areas defined by using geographic location

Source of variation	Degrees of freedom	Mean squares	F
Total	95	--	
Treatment	18	17.5313	46.9128**
Experimental Error	77	.3736	

**Significant at the 1 percent level.

in areas which have similar characteristics when differential between rancher costs of operating on private leased range and National Forests are compared and at the same time the areas lie within a definite definable geographic area. Table 11 shows these market areas.

Table 11. Market areas for cattle as determined using geographic location

Forest	Differential between rancher costs of operating on private leased range and National Forests
Area A:	
Cleveland	-$5.92
Angeles	-5.00
San Bernardino	-4.98
Average	-5.30
Range	-4.98 - -5.92
Area B:	
St. Joe	-3.38
Siskiyou	-2.12
Mt. Hood	-1.90
Wenatchee	-1.42
Deschutes	-1.16
Couer d'Alene	-1.14
Clearwater	-1.06
Okanogan	- .79
Willamette	- .72
Klamath	-1.42
Stanislaus	- .93
Eldorado	- .98
Tahoe	-1.22
Sierra	-1.87
Average	-1.44
Range	- .72 - -3.38
Area C:	
Boise	- .95
Payette	- .56
Average	- .76
Range	- .56 - - .95
Area D:	
Cibola	-2.63
Santa Fe	-1.19
Lincoln	- .28
Carson	- .05
Sitgreaves	.20
Gila	.34
Average	- .60
Range	-2.63 - .34

Table 11. Continued

Forest	Differential between rancher costs of operating on private leased range and National Forests
Area E:	
Big Horn	-$ .45
Area F:	
White River	.04
Fishlake	.03
Average	.035
Range	.03 - .04
Area G:	
Kootenai	- .22
Gallatin	.27
Bitterroot	.67
Colville	.78
Targhee	.81
Kaniksu	.05
Average	.39
Range	- .22 - .81
Area H:	
Inyo	.15
Humboldt	.78
Tioyabe	.93
Modoc	1.08
Shasta-Trinity	1.02
Gifford Pinchot	.45
Umatilla	.36
Siuslaw	.29
Umpqua	.66
Rogue River	.71
Winema	.92
Ochoco	.99
Wallowa-Whitman	1.18
Snoqualmie	- .04
Average	.68
Range	- .04 - 1.18
Area I:	
Manti-Lasal	.66
Cache	.84
Wasatch	.90
Uinta	1.01
Caribou	1.30

Table 11. Continued

Forest	Differential between rancher costs of operating on private leased range and National Forests
Area I: (continued)	
San Juan	$ .81
San Isabel	1.20
Roosevelt	1.27
Grand Mesa	1.66
Gunnison	1.78
Average	1.14
Range	.66 - 1.78
Area J:	
Black Hills	.70
Area K:	
Coronado	.77
Prescott	.78
Apache	.98
Average	.84
Range	.77 - .98
Area L:	
Beaverhead	1.29
Deerlodge	1.62
Custer	1.64
Helena	1.80
Flathead	1.99
Sawtooth	1.71
Average	1.68
Range	1.29 - 1.99
Area M:	
Dixie	1.46
Kaibab	1.58
Coconino	1.96
Tonto	2.32
Average	1.83
Range	1.46 - 2.32
Area N:	
Mendocino	1.50
Plumas	1.51
Lassen	1.79
Los Padres	1.79

Table 11. Continued

Forest	Differential between rancher costs of operating on private leased range and National Forests
Area N: (continued)	
Fremont	$1.94
Sequoia	2.38
Six Rivers	2.65
Average	1.94
Range	1.50 - 2.65
Area O:	
Pike	3.49
Arapaho	3.57
Ashley	3.76
Rio Grande	2.47
Nebraska	3.16
Routt	2.12
Medicine Bow	2.18
Average	2.96
Range	2.12 - 3.76
Area P:	
Salmon	2.34
Nezperce	2.38
Lolo	2.45
Challis	4.07
Lewis & Clark	4.75
Average	3.20
Range	2.34 - 4.75
Area Q:	
Shoshone	2.62
Bridger	2.64
Teton	3.43
Average	2.90
Range	2.62 - 3.43
Area R:	
Malheur	3.37
Area S:	
Mt. Baker	4.61

MARKET AREAS FOR SHEEP

In an attempt to define market areas for sheep, the same process was used as for cattle. The same geographic areas for permits and private leased range land would hold equally as well for sheep as for cattle.

Public costs were made available by the Forest Service. Private costs were obtained in the same manner as those of cattle. By subtracting rancher costs of operating on Forest Service lands from costs of operating on private leased range, differentials were determined. Table 12 summarizes rancher costs for grazing sheep on each of the National Forests.

It should be noted that in examining the cost differentials for sheep that an even wider variation exists than does for cattle. Also a large number of the cost differentials are negative. Much of this variation can be explained by the small number of observations for obtaining private costs. In some of the counties surveyed there was no private leased range for grazing sheep. As a result the private cost data for a given area may be taken from only a few observations. In several cases cost figures were available for less than half of the counties in a given area. The Forest Service in attempting to define market areas for sheep by using the total cost method were unable to obtain satisfactory results. They cite insufficient cost data on many

Table 12. Summary of rancher costs for grazing sheep on National Forests and private leased range[a]

Forest	Rancher non-fee costs of operating on National Forests	Rancher cost of operating on private leased range	Differential between rancher costs of operating on private leased range and National Forests	Permit value
Forest Region 1:				
Beaverhead	$3.79	$5.41	$1.62	$16.57
Bitterroot	b	4.37	b	b
Clearwater	6.90	4.74	-2.16	c
Couer d'Alene	c	4.29	c	c
Colville	6.33	4.18	-2.15	c
Custer	3.09	3.55	.46	
Deerlodge	b	2.85	b	b
Flathead	b	4.37	b	b
Gallatin	7.43	4.29	-3.14	13.68
Helena	4.54	4.67	.13	c
Kaniksu	c	4.02	c	c
Kootenai	b	c	b	b
Lewis & Clark	9.41	4.46	-4.95	c
Lolo	c	4.37	c	c
Nezperce	3.58	9.70	6.12	.68
St. Joe	4.65	c	c	c
Average	5.52	4.74	- .51	10.31
Range	3.09-9.41	2.85-9.70	-4.95-6.12	.68-16.57
Forest Region 2:				
Arapaho	4.64	4.91	.27	19.69
Bighorn	3.25	5.12	1.87	22.50
Black Hills	5.14	3.53	-1.61	15.93
Grand Mesa	3.87	4.26	.39	6.75
Gunnison	6.07	5.65	- .42	28.67
Medicine Bow	5.15	5.43	.28	c
Nebraska	b	11.23	b	b
Pike	4.85	7.15	2.66	13.93
Rio Grande	5.66	8.64	2.98	9.63
Roosevelt	3.62	4.01	.39	c
Routt	4.50	4.15	- .35	27.71
San Isabel	4.00	6.42	2.42	20.41
San Juan	4.63	4.37	- .26	18.58
Shoshone	4.75	4.98	.23	c
White River	6.52	3.73	-2.79	23.69
Average	4.76	5.57	.43	18.86
Range	3.25-6.52	3.53-11.23	-2.79-2.98	6.75-28.67

Table 12. Continued

Forest	Rancher non-fee costs of operating on National Forests	Rancher cost of operating on private leased range	Differential between rancher costs of operating on private leased range and National Forests	Permit value
Forest Region 3:				
Apache	$5.53	$5.31	-$ .22	c
Carson	5.40	6.24	.84	$17.77
Cibola	2.57	3.36	.79	c
Coconino	5.58	5.31	- .27	c
Coronado	b	5.31	b	b
Gila	b	6.45	b	b
Kaibab	5.21	6.51	1.30	c
Lincoln	5.24	6.32	1.08	c
Prescott	c	6.24	c	c
Santa Fe	4.30	14.51	10.21	c
Sitgreaves	3.03	5.31	2.28	17.92
Tonto	3.59	5.31	1.72	c
Average	4.49	6.35	1.97	17.85
Range	2.57-5.58	3.36-14.51	-.27-10.21	17.77-17.92
Forest Region 4:				
Ashley	4.19	5.39	1.20	16.55
Boise	3.84	5.54	1.70	c
Bridger	3.41	6.02	2.61	c
Cache	5.76	4.89	- .87	17.76
Caribou	3.65	6.00	2.35	18.21
Challis	4.76	6.31	1.55	12.00
Dixie	4.42	5.20	.78	c
Fishlake	6.26	4.54	-1.72	37.41
Humboldt	3.39	6.15	2.76	18.11
Manti-Lasal	4.49	5.10	.61	19.65
Payette	4.23	5.07	.84	10.34
Salmon	3.75	6.17	2.42	c
Sawtooth	3.94	5.52	1.58	25.62
Targhee	5.34	6.81	1.47	14.29
Teton	9.26	6.24	-3.02	c
Tioyabe	6.23	5.88	- .35	c
Uinta	5.50	5.05	- .45	23.89
Wasatch	5.69	5.58	- .11	41.63
Average	4.90	5.64	.74	21.29
Range	3.39-9.26	4.54-6.81	-3.02-2.76	10.34-41.63

Table 12. Continued

Forest	Rancher non-fee costs of operating on National Forests	Rancher cost of operating on private leased range	Differential between rancher costs of operating on private leased range and National Forests	Permit value
Forest Region 5:				
Angeles	$4.34	$6.64	$2.30	c
Cleveland	4.34	6.59	2.25	c
Eldorado	c	5.32	c	c
Inyo	4.95	6.26	1.31	c
Klamath	c	5.70	c	c
Lassen	6.93	6.62	- .31	c
Los Padres	b	6.34	b	b
Mendocino	b	7.84	b	b
Modoc	5.63	6.15	.52	c
Six Rivers	b	16.06	b	b
Plumas	4.01	6.23	2.22	c
San Bernardino	4.34	6.23	1.89	c
Sequoia	b	6.41	b	b
Shasta-Trinity	6.37	6.66	.29	c
Sierra	b	6.77	b	b
Stanislaus	c	5.16	c	c
Tahoe	6.66	3.28	-3.38	c
Average	5.29	6.72	.80	c
Range	4.01-6.93	3.28-16.06	-3.38-2.30	c
Forest Region 6:				
Deschutes	5.84	5.22	- .62	c
Fremont	6.64	6.43	- .21	c
Gifford Pinchot	5.05	4.32	- .73	10.90
Malheur	5.19	4.99	- .20	c
Mt. Baker	5.05	c	c	10.90
Mt. Hood	b	6.62	b	b
Ochoco	4.37	2.41	-1.96	c
Okanogan	6.19	4.75	-1.44	c
Olympic	c	4.02	c	c
Rogue River	b	4.80	b	b
Siskiyou	b	4.93	b	b
Siuslaw	1.60	5.19	3.59	c
Snoqualmie	5.05	4.44	- .61	10.90
Umatilla	2.58	5.09	2.51	c
Umpqua	b	c	b	b
Wallowa-Whitman	4.12	4.38	.26	c
Wenatchee	6.59	4.97	-1.62	2.94
Willamette	b	7.78	b	b
Winema	4.36	6.45	2.09	c

Table 12. Continued

Forest	Rancher non-fee costs of operating on National Forests	Rancher cost of operating on private leased range	Differential between rancher costs of operating on private leased range and National Forests	Permit value
Average	$4.82	$5.11	$ .09	$ 8.91
Range	1.60-6.64	2.41-7.78	-1.96-3.59	2.94-10.90

[a]All values are computed on an AUM basis.

[b]No sheep permits.

[c]Data not available.

forests as the major problem.[19] It would appear then, that the available public cost figures are also somewhat unreliable.

Because of the uncertainty of the cost figures no attempt was made to define market areas for sheep. Although market areas could be defined using the available differentials, it is apparent that the results would not be statistically sound due to the limited data available. Additional data will be required if meaningful market areas are to be defined for sheep using a cost differential approach.

[19]U. S. Forest Service, "Forest Service Grazing Fees Program."

SUMMARY AND CONCLUSIONS

Because of pressures by the Federal Government and as a result of an increasing population, many of whom use National Forests for recreation purposes, livestock grazing is coming under careful study by those who administer these lands.

Grazing fees are one of many problems confronting Forest Service personnel. Factors which were originally used to set base fees have changed. Adjustments to grazing fees have not kept pace with supply and demand conditions. Generally, the price of private grazing has increased more rapidly than comparable Forest Service grazing. This increase in the price of private leased range has resulted in a widening of differentials between rancher costs of operating on private leased range and National Forests. Considerable up-dating of fees must be undertaken to bring present fees in line with conditions as they exist today. If grazing fees are to capture for society the full value of the forage, it follows that these fees should be adjusted so that the cost of using public lands is the same as that of comparable private leased range. It will not be enough to bring fees in line with present day private range costs. Supply and demand conditions affecting private range will continue to change from year to year, causing private lease costs to fluctuate. It becomes necessary to have a policy of annually adjusting grazing fees to reflect these changes.

By comparing areas of private leased range with National Forests, market areas for livestock grazing can be defined. A uniform fee could

then be justified for all National Forests within the same market area. Each National Forest has a definite market area for permits. Each National Forest has an associated area of private leased range. Market areas for livestock grazing can be determined by grouping those areas which have a uniform differential between the rancher cost of operating on private leased range and National Forests.

Several market areas can be defined which are statistically significant. A grouping of forests which presently have the same average grazing fee does not, however, produce market areas which are statistically different. It can thus be concluded that factors which were originally used to establish base fees have changed to the extent that original base fees no longer represent conditions as they exist today.

Although several methods were used to group forests into market areas which have reasonably uniform cost differentials, the method of grouping the forests such that they conform reasonably close geographically appears to be the most fruitful for establishing grazing fees. With forests thus grouped we have the advantage of a uniform grazing fee being charged on forests within a given geographic area. This allows for ease of administration and at the same time a uniform fee would be charged on forests which have similar characteristics geographically. The fee can thus be justified from a geographic standpoint as well as being based on a uniform differential between rancher costs of operating on private leased range and National Forests.

Present available data is not conclusive enough to attempt to define market areas for sheep. Perhaps a more exhaustive sample procedure will be required before enough information will be obtained to accurately calculate the cost of grazing sheep on private leased range.

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APPENDIX

Location of permittees for individual National Forests; and area of associated private leased range

FOREST REGION 1

Beaverhead National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
Idaho	Fremont	Idaho	Fremont
	Lemhi		Lemhi
Montana	Beaverhead	Montana	Beaverhead
	Chouteau		Chouteau
	Deer Lodge		Dawson
	Jefferson		Deer Lodge
	Madison		Jefferson
	Park		Madison
	Silver Bow		Park
	Yellowstone		Silver Bow
			Yellowstone

Bitterroot National Forest

Idaho	Gem	Idaho	Gem
			Valley
Montana	Missoula	Montana	Missoula
	Ravalli		Park
			Ravalli

Clearwater National Forest

Idaho	Clearwater	Idaho	Benewah
	Idaho		Clearwater
	Lewis		Idaho
	Nez Perce		Kootenai
			Latah
Montana	Missoula		Lewis
			Nez Perce
Washington	Asotin		Shoshone
	Grant		
		Montana	Missoula
		Oregon	Wallowa
			Wasco

Clearwater National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
		Washington	Asotin
			Ferry
			Grant

Couer d 'Alene National Forest

Idaho	Kootenai	Idaho	Benewah
	Shoshone		Kootenai
			Latah
Montana	Mineral		Shoshone
	Sanders		
		Montana	Mineral
			Sanders
		Washington	Franklin

Colville National Forest

Washington	Ferry	Washington	Chelan
	Grant		Ferry
	King		Grant
	Okanogan		King
	Pend Orille		Lincoln
	Spokane		Okanogan
	Stevens		Pend Orille
	Yakima		Spokane
			Stevens
			Yakima
		Idaho	Kootenai

Custer National Forest

Montana	Big Horn	Montana	Big Horn
	Carbon		Carbon
	Carter		Carter
	Custer		Custer
	Dawson		Dawson
	Fallon		Fallon
	Powder River		Powder River
	Richland		Richland
	Rosebud		Rosebud
	Stillwater		Stillwater
	Yellowstone		Yellowstone

Custer National Forest

Public Range

State:	Counties:
North Dakota	Adams
	Billings
	Bowman
	Cass
	Dunn
	Golden Valley
	McKenzie
	Mountrail
	Ransom
	Richland
	Sargent
	Slope
	Stark
South Dakota	Corson
	Harding
	Lawrence
	Meade
	Pennington
Wyoming	Big Horn
	Sheridan

Private Leased Range

State:	Counties:
North Dakota	Adams
	Billings
	Bowman
	Cass
	Dunn
	Golden Valley
	Hettinger
	McKenzie
	Mountrail
	Ransom
	Richland
	Sargent
	Slope
	Stark
South Dakota	Butte
	Corson
	Day
	Harding
	Lawrence
	Meade
	Pennington
	Perkins
	Shannon
	Ziebach
Wyoming	Big Horn
	Crook
	Park
	Sheridan
	Washakie

Deer Lodge National Forest

Montana	Broadwater
	Deer Lodge
	Fallon
	Granite
	Jefferson
	Madison
	Missoula
	Powell
	Silver Bow

Montana	Broadwater
	Carter
	Deer Lodge
	Fallon
	Granite
	Jefferson
	Madison
	Missoula
	Park
	Powell
	Silver Bow

Flathead National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
Montana	Flathead	Montana	Flathead
	Lake		Lake
	Lincoln		Lincoln
	Missoula		Missoula
	Sanders		Park
			Sanders

Gallatin National Forest

Idaho	Bonneville	Idaho	Bingham
	Jefferson		Bonneville
	Madison		Clark
			Fremont
Montana	Beaverhead		Jefferson
	Daniels		Madison
	Fergus		Teton
	Gallatin		
	Jefferson	Montana	Beaverhead
	Lewis & Clark		Daniels
	Madison		Dawson
	Park		Fergus
	Stillwater		Gallatin
	Sweet Grass		Jefferson
			Judith Basin
			Lewis & Clark
			Madison
			Park
			Stillwater

Helens National Forest

Montana	Broadwater	Montana	Broadwater
	Cascade		Cascade
	Custer		Custer
	Deer Lodge		Deer Lodge
	Gallatin		Gallatin
	Jefferson		Jefferson
	Lewis & Clark		Lewis & Clark
	Meagher		Meagher
	Powell		Powell

Kaniksu National Forest

Idaho	Bonner	Idaho	Benewah
	Boundary		Bonner
	Kootenai		Boundary
	Latah		Kootenai
			Latah
Montana	Sanders		Shoshone

Kaniksu National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
Washington	Grant Pend Orille	Montana	Sanders
		Washington	Ferry Franklin Grant Pend Orille

Kootenai National Forest

Montana	Flathead Lincoln Sanders	Montana	Flathead Lincoln Sanders

Lewis & Clark National Forest

Montana	Broadwater Cascade Chouteau Fergus Glacier Golden Valley Judith Basin Lewis & Clark Liberty Meagher Musselshell Pondera Sweet Grass Teton Wheatland Yellowstone	Montana	Broadwater Cascade Chouteau Fergus Glacier Golden Valley Judith Basin Lewis & Clark Liberty Meagher Musselshell Pondera Sweet Grass Teton Wheatland Yellowstone

Lolo National Forest

Montana	Flathead Granite Lake Mineral Missoula Powell Sanders	Montana	Flathead Granite Lake Mineral Missoula Park Powell Sanders

Nez Perce National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
Idaho	Adams	Idaho	Adams
	Idaho		Bear Lake
	Lewis		Clearwater
	Valley		Idaho
			Lewis
			Nez Perce
			Valley

St. Joe National Forest

Idaho	Benewah	Idaho	Benewah
	Clearwater		Clearwater
	Latah		Latah
	Shoshone		Shoshone

FOREST REGION 2

Arapaho National Forest

Colorado	Clear Creek	Colorado	Dolores
	Denver		Douglas
	Douglas		Eagle
	Eagle		Elbert
	Gilpin		Garfield
	Grand		Gilpin
	Jackson		Grand
	Jefferson		Gunnison
	Logan		Jackson
	Mesa		Jefferson
	Rio Blanco		Larimer
	Saguache		Logan
	Summit		Mesa
			Moffat
			Park
			Rio Blanco
			Rio Grande
			Routt
			Saguache
			Summit
Wyoming	Carbon	Wyoming	Carbon
			Fremont
		Utah	Grand

Big Horn National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
Montana	Big Horn	Montana	Big Horn
Nebraska	Douglas	Wyoming	Big Horn
Wyoming	Big Horn		Campbell
	Johnson		Converse
	Natrona		Johnson
	Sheridan		Natrona
	Washakie		Park
			Sheridan
			Washakie

Black Hills National Forest

Colorado	Kiowa	Colorado	Kiowa
Nebraska	Dawes	Kansas	Sherman
	Sheridan	Montana	Carter
	Sioux		Silver
South Dakota	Butte	Nebraska	Dawes
	Custer		Sheridan
	Edmunds	South Dakota	Butte
	Fall River		Corson
	Haakon		Custer
	Hughes		Edmunds
	Jackson		Fall River
	Jones		Haakon
	Lawrence		Jackson
	Lyman		Jones
	Meade		Lawrence
	Miner		Lyman
	Pennington		Meade
	Stanley		Pennington
	Walworth		Shannon
	Washabaugh		Stanley
	Yankton		Washabaugh
Wyoming	Crook		Ziebach
	Natrona	Wyoming	Campbell
	Weston		Converse
			Crook
			Goshen
			Natrona
			Niobrara
			Weston

Grand Mesa National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
Colorado	Alamosa	Colorado	Alamosa
	Boulder		Boulder
	Delta		Delta
	Denver		Eagle
	El Paso		El Paso
	Gunnison		Fremont
	Kiowa		Garfield
	Mesa		Gunnison
	Montrose		Jackson
	Ouray		Kiowa
	San Miguel		Larimer
			Mesa
Kansas	Sedgwick		Moffat
			Montezuma
Utah	San Juan		Montrose
			Ouray
			Park
			Pitkin
			San Miguel
			Teller
		Kansas	Sherman
			Neosho
		Utah	Grand
			San Juan

Gunnison National Forest

Colorado	Chaffee	Colorado	Chaffee
	Delta		Custer
	Denver		Delta
	Eagle		Eagle
	Garfield		Fremont
	Gunnison		Garfield
	Jefferson		Gilpin
	Mesa		Gunnison
	Montrose		Jackson
	Pueblo		Jefferson
	Rio Grande		Larimer
	Saguache		Mesa
			Moffat
Kansas	Sumner		Montrose
			Ouray
Texas	Midland		Park
	Tarrant		Pitkin

Gunnison National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
Utah	Carbon	Colorado	Pueblo
			Rio Grande
			Routt
			Saguache
		Texas	Tarrant
		Utah	Carbon
			Duchesne
			Grand

Medicine Bow National Forest

Colorado	Jackson	Colorado	Jackson
	Moffat		Moffat
			Weld
South Dakota	Fall River		
	Pennington	Montana	Big Horn
			Silver Bow
Utah	Davis		
		Nebraska	Kimball
Wyoming	Albany		Sioux
	Campbell		
	Carbon	South Dakota	Custer
	Converse		Fall River
	Crook		Lawrence
	Laramie		Pennington
	Natrona		Shannon
	Platte		
	Sheridan	Utah	Box Elder
	Uinta		Davis
	Weston		Salt Lake
			Summit
			Tooele
		Wyoming	Albany
			Campbell
			Carbon
			Converse
			Crook
			Fremont
			Laramie
			Natrona
			Niobrara
			Platte
			Sheridan
			Uinta
			Weston

Nebraska National Forest

Public Range

State:	Counties:
Nebraska	Blaine
	Cherry
	Dases
	Sioux
	Thomas
South Dakota	Brule
	Fall River

Private Leased Range

State:	Counties:
Nebraska	Blaine
	Brown
	Cherry
	Custer
	Dawes
	Kearney
	Keya Paha
	Sioux
	Thomas
South Dakota	Custer
	Fall River
	Todd
Wyoming	Niobrara
	Goshen

Pike National Forest

Colorado	Boulder
	Chaffee
	Denver
	Douglas
	El Paso
	Fremont
	Jefferson
	Lincoln
	Mesa
	Park
	Prowers
	Teller
Texas	Harris

Colorado	Baca
	Boulder
	Chaffee
	Douglas
	Eagle
	Elbert
	El Paso
	Fremont
	Garfield
	Gilpin
	Gunnison
	Jackson
	Jefferson
	Larimer
	Lincoln
	Mesa
	Moffat
	Park
	Prowers
	Teller
Utah	Grand

Rio Grande National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
Colorado	Alamosa	Colorado	Adams
	Arapaho		Alamosa
	Chaffee		Arapaho
	Conejos		Chaffee
	Costilla		Conejos
	Custer		Costilla
	Denver		Custer
	Mineral		Eagle
	Montrose		Gunnison
	Pueblo		Jackson
	Rio Grande		Larimer
	Saguache		Mineral
			Montrose
Oklahoma	Garfield		Park
			Pueblo
Texas	Castro		Rio Grande
	Comal		Saguache
	Hutchinson		
		New Mexico	Rio Arriba
		Texas	Castro

Roosevelt National Forest

Colorado	Boulder	Colorado	Boulder
	Denver		Dolores
	Jackson		Eagle
	Jefferson		Gilpin
	Larimer		Grand
	Logan		Jackson
	Phillips		Jefferson
	Weld		Larimer
			Logan
Nebraska	Kimball		Park
	Cheyenne		Phillips
			Weld
Wyoming	Albany		
	Crook	Nebraska	Cheyenne
	Platte		Kimball
			Morrill
			Sioux
		Wyoming	Albany
			Carbon
			Converse
			Crook
			Platte

Routt National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
Colorado	Eagle	Colorado	Eagle
	Grand		Garfield
	Jackson		Grand
	Mesa		Gunnison
	Moffat		Jackson
	Routt		Mesa
			Moffat
Utah	Uintah		Rio Blanco
			Routt
Wyoming	Carbon		Weld
		Utah	Duchesne
			Grand
			Uintah
		Wyoming	Carbon
			Fremont

San Isabel National Forest

Colorado	Baca	Colorado	Baca
	Bent		Bent
	Chaffee		Chaffee
	Custer		Custer
	Eagle		Eagle
	El Paso		El Paso
	Fremont		Fremont
	Garfield		Garfield
	Huerfano		Gunnison
	Lake		Huerfano
	Las Animas		Lake
	Mesa		Las Animas
	Montrose		Mesa
	Otero		Moffat
	Prowers		Montrose
	Pueblo		Otero
			Park
Kansas	Morten		Prowers
	Stanton		Pueblo
			Routt
Oklahoma	Cimarron		Teller
	Cleveland		
		Kansas	Morten
Texas	Dawson		
	Gray	New Mexico	Lincoln
	Hood		Union

San Isabel National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
		Oklahoma	Cimarron
		Texas	Dallas
			Gaines
			Gray
		Utah	Grand

San Juan National Forest

Colorado	Alamosa	Colorado	Alamosa
	Archuleta		Archuleta
	Conejos		Cheyenne
	Dolores		Conejos
	Garfield		Costilla
	Jackson		Dolores
	La Plata		Eagle
	Larimer		Elbert
	Montezuma		Garfield
	Montrose		Gunnison
	Rio Blanco		Hinsdale
	Routt		Jackson
	San Miguel		La Plata
			Larrmer
New Mexico	Bernalillo		Mesa
	Rio Arriba		Moffat
	San Juan		Montezuma
	Valencia		Montrose
			Ouray
Utah	San Juan		Rio Blanco
			Routt
			San Miguel
		New Mexico	Bernalillo
			Catron
			Grant
			Quay
			Rio Arriba
			Sandoval
			San Juan
			Valencia
		Utah	San Juan

Shoshone National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
Montana	Carbon	Montana	Big Horn
			Carbon
Nebraska	Lancaster		
		Wyoming	Big Horn
Wyoming	Big Horn		Fremont
	Fremont		Hot Springs
	Hot Springs		Lincoln
	Park		Natrona
	Sweetwater		Park
	Washakie		Sweetwater
			Washakie

White River National Forest

Colorado	Delta	Colorado	Delta
	Denver		Eagle
	Eagle		Garfield
	Garfield		Gilpin
	Gilpin		Grand
	Grand		Gunnison
	Mesa		Jackson
	Moffat		Larimer
	Pitkin		Logan
	Rio Blanco		Mesa
	Routt		Moffat
			Ouray
Oklahoma	Jackson		Park
			Pitkin
Utah	Uintah		Rio Blanco
			Routt
			Weld
		Utah	Duchesne
			Grand
			Uintah

FOREST REGION 3

Apache National Forest

Arizona	Apache	Airzona	Apache
	Graham		Coconino
	Greenlee		Graham
	Maricopa		Greenlee
	Navajo		Maricopa
	Pinal		Navajo
	Yuma		Pima
			Santa Cruz

Apache National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
New Mexico	Bernalillo	Arizona	Yuma
	Catron	New Mexico	Bernalillo
			Catron
			Sandoval

Carson National Forest

Arizona	Apache	Arizona	Apache
	Cochise		Cochise
	Pima		Pima
			Santa Cruz
Colorado	Alamosa	Colorado	Alamosa
	Archuleta		Archuleta
	Conejos		Cheyenne
	Pueblo		Conejos
			Costilla
New Mexico	Bernalillo		Custer
	Catron		Elbert
	Colfax		Pueblo
	Los Alamos		
	Mora	New Mexico	Bernalillo
	Rio Arriba		Catron
	San Juan		Colfax
	San Miguel		Grant
	Santa Fe		Mora
	Taos		Rio Arriba
	Torrance		Sandoval
	Valencia		San Juan
			San Miguel
			Santa Fe
			Taos
			Torrance
			Valencia

Cibola National Forest

New Mexico	Bernalillo	Arizona	Greenlee
	Catron		
	Grant	Colorado	Huerfano
	Lincoln		
	McKinley	New Mexico	Bernalillo
	Rio Arriba		Catron
	Sandoval		Grant

Cibola National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
New Mexico	Sierra	New Mexico	Hidalgo
	Socorro		Lincoln
	Taos		McKinley
	Torrance		Rio Arriba
	Valencia		Sandoval
			Socorro
Texas	Brewster		Taos
	Dallas		Torrance
	El Paso		Valencia
		Taxas	Sherman
			Dallas

Coconino National Forest

Arizona	Coconino	Arizona	Coconino
	Gila		Gila
	Pinal		Maricopa
	Yavapai		Yavapai

Coronado National Forest

Arizona	Cochise	Arizona	Cochise
	Coconino		Coconino
	Graham		Graham
	Maricopa		Greenlee
	Navajo		Maricopa
	Pima		Navajo
	Pinal		Pima
	Santa Cruz		Santa Cruz
New Mexico	Grant	New Mexico	Hidalgo
	Hidalgo		Sandoval

Gila National Forest

Arizona	Apache	Airzona	Apache
	Graham		Coconino
	Greenlee		Graham
	Maricopa		Greenlee
	Pima		Maricopa
			Pima
California	Los Angeles		Santa Cruz
	San Diego		

Gila National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
New Mexico	Catron	California	Kern
	Chaves		Los Angeles
	Dona Ana		San Diego
	Grant		Ventura
	Hidalgo		
	Luna	Colorado	Moffat
	Otero		Huerfano
	Sierra		
	Socorro	New Mexico	Catron
			Chaves
			De Baca
			Dona Ana
			Grant
			Hidalgo
			Luna
			Mora
			Otero
			Sandoval
			Socorro
			Valencia

Kaibab National Forest

Arizona	Coconino	Arizona	Coconino
	Maricopa		Maricopa
	Navajo		Navajo
	Pima		Pima
	Pinal		Santa Cruz
	Yavapai		Yavapai
	Yuma		Yuma
Utah	Iron	Nevada	Clark
	Kane		
	Washington	Utah	Emery
			Iron
			Kane
			Washington

Lincoln National Forest

New Mexico	Bernalillo	Arizona	Greenlee
	Chaves		
	Dona Ana	Colorado	Huerfano
	Eddy		Moffat
	Lincoln		
	Otero	New Mexico	Bernalillo

Lincoln National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
Texas	Dawson	New Mexico	Catron
	El Paso		Chaves
	Erath		De Baca
	Lynn		Dona Ana
	Midland		Eddy
			Lincoln
			Luna
			Otero
			Sandoval
			Valencia
		Texas	Gaines

Prescott National Forest

Arizona	Maricopa	Airzona	Coconino
	Yavapai		Maricopa
	Yuma		Yavapai
			Yuma
California	Imperial		
	Los Angeles	California	Imperial
			Kern
			Mono
			Los Angeles
			Ventura

Santa Fe National Forest

New Mexico	Bernalillo	New Mexico	Bernalillo
	Mora		Catron
	Rio Arriba		Grant
	Sandoval		Mora
	San Miguel		Rio Arriba
	Santa Fe		Sandoval
			San Miguel
			Santa Fe

Sitgreaves National Forest

Arizona	Apache	Airzona	Apache
	Coconino		Coconino
	Navajo		Maricop
			Navajo

Tonto National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
Arizona	Gila	Airzona	Coconino
	Maricopa		Gila
	Pinal		Maricopa
	Yavapai		Yavapai

FOREST REGION 4

Ashley National Forest

Utah	Carbon	Colorado	Rio Blanco
	Daggett		
	Duchesne	Nevada	White River
	Salt Lake		
	Uintah	Utah	Box Elder
	Weber		Carbon
			Daggett
Wyoming	Fremont		Duchesne
	Sweetwater		Garfield
	Uinta		Morgan
			Salt Lake
			Sevier
			Summit
			Utah
			Uintah
			Weber
		Wyoming	Fremont
			Lincoln
			Natrona
			Sublette
			Uinta

Boise National Forest

Idaho	Ada	Idaho	Ada
	Blaine		Adams
	Boise		Blaine
	Canyon		Boise
	Elmore		Camas
	Gem		Canyon
	Gooding		Elmore
	Owyhee		Gem
	Payette		Gooding
	Valley		Lincoln
	Washington		Minidoka
			Owyhee

Boise National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
Oregon	Grant	Idaho	Payette
			Twin Falls
			Valley
			Washington
		Nevada	Elko
		Oregon	Baker
			Grant
			Malheur

Bridger National Forest

Utah	Cache	Idaho	Bear Lake
	Davis		Franklin
			Oneida
Wyoming	Laramie		
	Lincoln	Nebraska	Kimball
	Sublette		
	Sweetwater	Utah	Box Elder
			Cache
			Davis
			Salt Lake
			Tooele
		Wyoming	Carbon
			Laramie
			Lincoln
			Platte
			Sublette
			Sweetwater

Cache National Forest

Idaho	Bannock	California	Monterey
	Bear Lake		
	Caribou	Idaho	Bannock
	Cassia		Bear Lake
	Franklin		Bingham
	Lemhi		Caribou
	Oneida		Cassia
			Franklin
Nevada	Humboldt		Lemhi
			Oneida
Utah	Box Elder		Twin Falls
	Cache		

Cache National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
Utah	Davis	Nevada	White Pine
	Rich		
	Salt Lake	Utah	Box Elder
	Summit		Cache
	Utah		Carbon
	Weber		Davis
			Duchesne
Wyoming	Lincoln		Garfield
			Morgan
			Rich
			Salt Lake
			Sevier
			Summit
			Tooele
			Utah
		Wyoming	Lincoln
			Sublette

Caribou National Forest

Idaho	Ada	Idaho	Ada
	Bannock		Bannock
	Bear Lake		Bear Lake
	Bonneville		Bingham
	Butte		Blaine
	Caribou		Bonneville
	Franklin		Butte
	Jefferson		Canyon
	Minidoka		Caribou
	Oneida		Cassia
	Power		Elmore
			Franklin
Montana	Ravalli		Fremont
			Jefferson
Oregon	Hood River		Minidoka
	Multnomah		Oneida
			Owyhee
Utah	Box Elder		Power
	Cache		Teton
	Davis		Valley
	Weber		Washington
Wyoming	Lincoln	Montana	Gallatin
			Ravalli

Caribou National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
		Oregon	Harney
			Multnomah
		Utah	Morgan
			Salt Lake
			Sevier
			Tooele
		Wyoming	Lincoln
			Sublette

Challis National Forest

Idaho	Ada	Idaho	Ada
	Bannock		Bannock
	Bingham		Bear Lake
	Blaine		Bingham
	Bonneville		Blaine
	Butte		Bonneville
	Canyon		Butte
	Custer		Camas
	Elmore		Canyon
	Gooding		Clearwater
	Jefferson		Custer
	Jerome		Elmore
	Lemhi		Franklin
	Lincoln		Fremont
	Nez Perce		Gooding
			Jefferson
Utah	Cache		Jerome
			Latah
Wyoming	Sublette		Lemhi
			Minidoka
			Nez Perce
			Oneida
			Owyhee
			Teton
			Twin Falls
			Valley
			Washington
		Montana	Gallatin
		Nevada	Elko
		Utah	Cache

Challis National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
		Wyoming	Carbon
			Lincoln
			Sublette
			Sweetwater

Dixie National Forest

Utah	Cache	Arizona	Coconino
	Garfield		Maricopa
	Iron		
	Kane	Idaho	Bear Lake
	Millard		Franklin
	Piute		Oneida
	Salt Lake		
	Sevier	Nevada	White Pine
	Utah		
	Washington	Utah	Cache
	Wayne		Carbon
			Duchesne
			Emery
			Garfield
			Iron
			Juab
			Kane
			Millard
			Piute
			Salt Lake
			Sanpete
			Sevier
			Summit
			Utah
			Washington
			Wayne
		Wyoming	Lincoln

Fishlake National Forest

Colorado	Montrose	Colorado	Gunnison
			Montezuma
Nevada	Nye		Montrose
			Rio Blanco
Utah	Beaver		San Miguel
	Carbon		
	Davis	Nevada	Nye
	Emery		White Pine
	Garfield		

Fishlake National Forest

Public Range

State:	Counties:
Utah	Juab
	Millard
	Piute
	Salt Lake
	San Juan
	Sanpete
	Sevier
	Tooele
	Uintah
	Utah
	Wayne

Private Leased Range

State:	Counties:
Utah	Beaver
	Box Elder
	Carbon
	Davis
	Duchesne
	Emery
	Garfield
	Juab
	Kane
	Millard
	Piute
	Utah
	San Juan
	Sanpete
	Sevier
	Summit
	Tooele
	Uintah
	Wayne
Wyoming	Lincoln

Humboldt National Forest

Arizona	Maricopa
California	Kern
	Los Angeles
	Sacramento
	Sutter
Idaho	Gooding
	Owyhee
	Twin Falls
Nevada	Churchill
	Clark
	Elko
	Humboldt
	Lander
	Lincoln
	Nye
	Pershing
	Washoe
	White Pine

Airzona	Coconino
	Maricopa
California	El Dorado
	Kern
	Los Angeles
	Modoc
	Mono
	Monterey
	Sacramento
	San Bernardino
	Sutter
	Trinity
	Ventura
	Yolo
Idaho	Blaine
	Boise
	Bonneville
	Camas
	Gooding
	Lincoln

Humboldt National Forest

Public Range

State:	Counties:
Oregon	Multnomah

Private Leased Range

State:	Counties:
Idaho	Owyhee
	Twin Falls
Nevada	Churchill
	Clark
	Elko
	Eureka
	Humboldt
	Lander
	Lincoln
	Nye
	Pershing
	Washoe
	White Pine
Oregon	Harney
	Multnomah
Utah	Juab
	Millard
	Sevier

Manti-Lasal National Forest

Colorado	Mesa
	Montezuma
	Montrose
Utah	Carbon
	Emery
	Grand
	Iron
	Salt Lake
	San Juan
	Sanpete
	Summit
	Utah
Colorado	Dolores
	Garfield
	Gunnison
	La Plata
	Mesa
	Moffat
	Montezuma
	Montrose
	Ouray
	San Miguel
Nevada	White Pine
Utah	Carbon
	Duchesne
	Emery
	Garfield
	Grand
	Iron
	Morgan
	Salt Lake

Manti-Lasal National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
		Utah	San Juan
			Sanpete
			Summit
			Utah
		Wyoming	Lincoln

Payette National Forest

Idaho	Ada	Idaho	Ada
	Adams		Adams
	Fremont		Bear Lake
	Idaho		Bingham
	Washington		Canyon
			Caribou
Oregon	Malheur		Elmore
			Fremont
Washington	Franklin		Idaho
			Minidoka
			Owyhee
			Valley
			Washington
		Oregon	Malheur
			Wallowa
		Washington	Franklin

Salmon National Forest

Idaho	Ada	Idaho	Ada
	Butte		Blaine
	Custer		Bonneville
	Idaho		Butte
	Lemhi		Canyon
	Madison		Clark
	Oneida		Custer
	Twin Falls		Elmore
			Idaho
Montana	Beaverhead		Jefferson
			Lemhi
			Madison
			Minidoka
			Oneida
			Owyhee
			Twin Falls

Salmon National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
		Idaho	Valley
			Washington
		Montana	Beaverhead
			Madison
		Nevada	Elko
		Utah	Box Elder

Sawtooth National Forest

Idaho	Ada	California	Modoc
	Adams		
	Bannock	Idaho	Ada
	Bear Lake		Adams
	Blaine		Bannock
	Camas		Bear Lake
	Cassia		Bingham
	Custer		Blaine
	Elmore		Bonneville
	Gooding		Camas
	Jerome		Canyon
	Lincoln		Caribou
	Minidoka		Cassia
	Power		Custer
	Twin Falls		Elmore
			Franklin
Nevada	Churchill		Gooding
			Jerome
Utah	Box Elder		Minidoka
			Oneida
			Owyhee
			Power
			Twin Falls
			Valley
			Washington

Targhee National Forest

Idaho	Bannock	Idaho	Bannock
	Bingham		Bingham
	Blaine		Blaine
	Boise		Boise
	Bonneville		Bonneville

Targhee National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
Idaho	Butte	Idaho	Butte
	Clark		Clark
	Fremont		Fremont
	Jefferson		Jefferson
	Lemhi		Lemhi
	Madison		Madison
	Teton		Teton
Montana	Beaverhead	Montana	Beaverhead
			Gallatin
Utah	Salt Lake		Madison
		Nevada	White Pine
		Utah	Duchesne
			Garfield
			Salt Lake
			Summit
			Utah
		Wyoming	Lincoln

Teton National Forest

Nebraska	Jefferson	Idaho	Fremont
Wyoming	Fremont	Wyoming	Carbon
	Lincoln		Fremont
	Sublette		Lincoln
	Sweetwater		Natrona
	Teton		Sublette
			Sweetwater
			Teton

Toiyabe National Forest

Arizona	Navajo	Arizona	Navajo
California	Alpine	California	Alpine
	Amador		Amador
	El Dorado		El Dorado
	Inyo		Inyo
	Los Angeles		Kern
	Mono		Los Angeles
	Placer		Modoc
	Yuba		Mono
			Nevada

Toiyabe National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
Nevada	Churchill	California	Placer
	Clark		Sacramento
	Douglas		Ventura
	Eureka		
	Lander	Nevada	Churchill
	Lyon		Clark
	Nye		Douglas
	Ormsby		Eureka
	Washoe		Lander
			Lyon
			Nye
			Ormsby
			Washoe

Uinta National Forest

Utah	Box Elder	Idaho	Caribou
	Carbon		Cassia
	Duchesne		Franklin
	Juab		Oneida
	Morgan		
	Salt Lake	Utah	Box Elder
	Sanpete		Carbon
	Summit		Duchesne
	Tooele		Emery
	Utah		Garfield
	Wasatch		Juab
			Morgan
			Salt Lake
			Sanpete
			Summit
			Tooele
			Utah
			Wasatch
			Weber
		Nevada	White Pine
		Wyoming	Lincoln

Wasatch National Forest

Utah	Daggett	Idaho	Caribou
	Davis		Cassia
	Juab		Franklin
	Millard		Oneida
	Morgan		

Wasatch National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
Utah	Salt Lake	Utah	Box Elder
	Sevier		Carbon
	Summit		Duchesne
	Tooele		Emery
	Uintah		Garfield
	Utah		Juab
			Morgan
Wyoming	Sweetwater		Salt Lake
	Uinta		Sanpete
			Summit
			Tooele
			Utah
			Wasatch
			Weber
		Nevada	White Pine
		Wyoming	Lincoln

FOREST REGION 5

Angeles National Forest

California	Los Angeles	California	Kern
			Los Angeles
			Mono
			Ventura

Cleveland National Forest

California	Imperial	California	Imperial
	Los Angeles		Inyo
	Orange		Kern
	San Diego		Los Angeles
			Mono
			Orange
			San Bernardino
			San Diego

Eldorado National Forest

California	Amador	California	Alpine
	Calaveras		Amador
	Colusa		Calaveras
	El Dorado		Colusa

Eldorado National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
California	Placer	California	El Dorado
	Sacramento		Lassen
	San Joaquin		Mono
	Yolo		Nevada
			Placer
Nevada	Douglas		Sacramento
			San Joaquin
			Stanislaus
			Yolo
		Nevada	Douglas

Inyo National Forest

California	Inyo	Arizona	Mohave
	Kern		
	Los Angeles	California	Alpine
	Marin		Inyo
	Mono		Kern
	Orange		Kings
	San Bernardino		Los Angeles
	San Diego		Marin
	Ventura		Mono
			Orange
Nevada	Esmeralda		Riverside
	Lyon		San Bernardino
	Nye		San Diego
			Sonoma
			Ventura
		Nevada	Lyon
			Hye

Klamath National Forest

California	Los Angeles	California	Kern
	Santa Clara		Los Angeles
	Siskiyou		Modoc
	Yolo		Mono
			Santa Clara
Oregon	Josephine		Siskiyou
			Ventura
			Yolo
		Oregon	Josephine
			Wallowa

Lassen National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
California	Butte	California	Butte
	Colusa		Colusa
	Lassen		Glenn
	Modoc		Lassen
	Plumas		Modoc
	Shasta		Plumas
			Shasta
			Siskiyou
			Tehama
		Nevada	Pershing

Los Padres National Forest

California	Alameda	California	Alameda
	Kern		Kern
	Los Angeles		Kings
	Monterey		Los Angeles
	San Francisco		Mono
	San Luis Obispo		Monterey
	Santa Barbara		San Benito
	Ventura		San Bernardino
			San Luis Obispo
			Santa Barbara
			Santa Clara
			Ventura
		Nevada	Lander

Mendocino National Forest

California	Colusa	California	Butte
	El Dorado		Colusa
	Glenn		El Dorado
	Lake		Glenn
	Marin		Lake
	Mendocino		Marin
	San Francisco		Sacramento
	Tehama		San Luis Obispo
			Shasta
			Sonoma
			Tehama
		Nevada	Lander

Modoc National Forest

Public Range

State:	Counties:
California	Kern
	Lassen
	Los Angeles
	Madera
	Modoc
	Napa
	Santa Clara
	Siskiyou
	Tehama
	Yolo
Nevada	Humboldt
Oregon	Douglas
	Klamath
	Lake
	Tillamook

Private Leased Range

State:	Counties:
California	Butte
	Glenn
	Kern
	Lassen
	Los Angeles
	Madera
	Mariposa
	Modoc
	Mono
	Monterey
	Napa
	Plumas
	San Bernardino
	Santa Clara
	Shasta
	Siskiyou
	Tehama
	Ventura
	Yolo
Nevada	Elko
	Humboldt
	Pershing
Oregon	Douglas
	Klamath
	Lake
	Tillamook
	Wallowa

Six Rivers National Forest

California	Humboldt	California	Humboldt
	Mendocino		Mendocino
	Trinity		Shasta
			Trinity

Plumas National Forest

California	Butte	California	Butte
	Colusa		Colusa
	Lassen		El Dorado
	Placer		Glenn
	Plumas		Lassen
	Sacramento		Modoc
	San Francisco		Nevada

Plumas National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
California	Santa Clara	California	Placer
	Sierra		Plumas
	Sutter		Sacramento
	Tehama		San Luis Obispo
	Yuba		Santa Clara
			Shasta
Nevada	Ormsby		Sierra
	Washoe		Sutter
			Tehama
			Trinity
			Yolo
			Yuba
		Nevada	Lander
			Ormsby
			Washoe

San Bernardino National Forest

California	Los Angeles	Arizona	Mohave
	Riverside		
	San Bernardino	California	Alpine
			Kern
			Los Angeles
			Mono
			Riverside
			San Bernardino
			San Diego
			Ventura

Sequoia National Forest

California	Fresno	Arizona	Mohave
	Kern		
	Los Angeles	California	Alpine
	San Bernardino		Fresno
	San Luis Obispo		Kern
	Tulare		Lassen
			Los Angeles
			Madera
			Mono
			Riverside
			San Bernardino
			San Diego
			San Luis Obispo
			Tulare
			Ventura

Shasta-Trinity National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
California	Glenn	California	Butte
	Siskiyou		Glenn
	Shasta		Lassen
	Tehama		Mendocino
	Trinity		Modoc
			Shasta
			Siskiyou
			Tehama
			Trinity

Sierra National Forest

California	Fresno	California	Butte
	Madera		Fresno
	Mariposa		Madera
			Mariposa
			Merced
			San Joaquin
		Oregon	Klamath

Stanislaus National Forest

California	Calaveras	California	Alpine
	Mariposa		Butte
	Merced		Calaveras
	San Joaquin		Fresno
	Stanislaus		Mariposa
	Tuolumne		Merced
			Modoc
Nevada	Douglas		Mono
			Sacramento
			San Joaquin
			Stanislaus
			Tuolumne
		Nevada	Douglas

Tahoe National Forest

California	El Dorado	California	Butte
	Nevada		El Dorado
	Placer		Nevada
	Sacramento		Placer
	Sierra		Sacramento
	Sutter		Sierra
	Yuba		Sutter

Tahoe National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
		California	Trinity
			Yolo
			Yuba

FOREST REGION 6

Deschutes National Forest

California	San Joaquin	California	San Joaquin
Oregon	Crook	Oregon	Crook
	Deschutes		Deschutes
	Lake		Gilliam
	Lane		Harney
	Linn		Jefferson
	Multnomah		Lake
	Tillamook		Lane
	Wasco		Linn
	Wheeler		Multnomah
			Sherman
			Tillamook
			Umatilla
			Wallowa
			Wasco
			Wheeler

Fremont National Forest

California	Modoc	California	Butte
	Shasta		Glenn
	Siskiyou		Lassen
	Tehama		Modoc
			Shasta
Oregon	Klamath		Siskiyou
	Lake		Tehama
		Nevada	Pershing
		Oregon	Klamath
			Lake

Gifford Pinchot National Forest

Oregon	Wheeler	Oregon	Crook
			Gilliam

Gifford Pinchot National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
Washington	Clark	Oregon	Umatilla
	Klickitat		Wallowa
	Lewis		Wheeler
	Yakima	Washington	Clark
			Klickitat
			Lewis
			Yakima

Malheur National Forest

Idaho	Ada	Idaho	Ada
			Canyon
Oregon	Deschutes		Elmore
	Grant		Minidoka
	Harney		Owyhee
	Jefferson		Valley
	Malheur		Washington
	Morrow		
	Multnomah	Oregon	Baker
	Wheeler		Crook
			Deschutes
			Gilliam
			Grant
			Harney
			Jefferson
			Malheur
			Morrow
			Multnomah
			Umatilla
			Wallowa
			Wheeler

Mt. Baker National Forest

Washington	Skagit	Washington	Skagit

Mt. Hood National Forest

Oregon	Wasco	Oregon	Jefferson
			Sherman
			Wasco

Ochoco National Forest

Public Range	
State:	Counties:
California	Alameda
	San Francisco
Idaho	Bonner
Oregon	Crook
	Deschutes
	Grant
	Harney
	Jefferson
	Multnomah
	Wasco
	Wheeler

Private Leased Range	
State:	Counties:
California	Alameda
	Monterey
	San Luis Obispo
	Santa Clara
Idaho	Bonner
Nevada	Lander
Oregon	Baker
	Crook
	Deschutes
	Gilliam
	Grant
	Harney
	Jefferson
	Multnomah
	Sherman
	Umatilla
	Wallowa
	Wasco
	Wheeler

Okanogan National Forest

Washington	Adams
	Asotin
	Benton
	Chelan
	Grant
	King
	Okanogan

Idaho	Benewah
	Clearwater
	Kootenai
	Latsh
	Shoshone
Oregon	Wallowa
	Wasco
Washington	Asotin
	Benton
	Chelan
	Ferry
	Grant
	King
	Okanogan

Olympic National Forest

Washington	Okanogan

Washington	Grant
	Okanogan

Rogue River National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
Oregon	Douglas	Oregon	Douglas
	Jackson		Jackson
	Josephine		Josephine
	Klamath		Klamath

Siskiyou National Forest

Oregon	Coos	Oregon	Coos
	Curry		Curry
	Josephine		Josephine
			Lake

Siuslaw National Forest

Oregon	Benton	Oregon	Benton
	Lane		Lake
	Lincoln		Lane
	Tillamook		Lincoln
			Tillamook

Snoqualmie National Forest

Washington	Lewis	Washington	Lewis
	Yakima		Yakima

Umatilla National Forest

Oregon	Baker	Idaho	Benewah
	Benton		Clearwater
	Curry		Latsh
	Gilliam		Shoshone
	Grant		
	Lane	Oregon	Baker
	Morrow		Benton
	Umatilla		Crook
	Wallowa		Curry
	Wheeler		Gilliam
			Grant
Washington	Asotin		Lake
	Columbia		Lane
	Garfield		Lincoln
	Spokane		Malheur
	Walla Walla		Morrow
			Umatilla
			Wallowa
			Wasco

Umatilla National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
		Washington	Asotin
			Columbia
			Garfield
			Pend Orille
			Spokane
			Walla Walla
			Whitman

Umpqua National Forest

Oregon	Douglas	Oregon	Douglas
	Jackson		Jackson

Wallowa-Whitman National Forest

California	Santa Clara	Claifornia	Santa Clara
Idaho	Adams	Idaho	Adams
	Nez Perce		Bear Lake
			Benewah
Oregon	Baker		Clearwater
	Crook		Latah
	Grant		Nez Perce
	Malheur		Owyhee
	Multnomah		Shoshone
	Umatilla		
	Union	Oregon	Baker
	Wallowa		Crook
			Deschutes
Washington	Asotin		Grant
			Harney
			Malheur
			Multnomah
			Umatilla
			Union
			Wallowa
			Wasco
		Washington	Asotin

Wenatchee National Forest

Washington	Asotin	Idaho	Benewah
	Chelan		Clearwater
	Grant		Kootensi
	King		Latah

Wenatchee National Forest

Public Range		Private Leased Range	
State:	Counties:	State:	Counties:
Washington	Kittitas	Idaho	Shoshone
	Okanogan		
	Yakima	Oregon	Wallowa
			Wasco
		Washington	Asotin
			Chelan
			Ferry
			Grant
			King
			Klickitat
			Kittitas
			Okanogan
			Yakima

Willamette National Forest

Oregon	Clatsop	Oregon	Clatsop
	Lane		Lane
	Linn		Linn

Winema National Forest

California	Siskiyou	California	Butte
	Tehama		Glenn
			Modoc
Oregon	Jackson		Shasta
	Klamath		Siskiyou
	Lake		Tehama
		Oregon	Jackson
			Klamath
			Lake

VITA

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Master of Science

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Major Field: Agriculture Economics

Biographical Information:

Personal Data: Born at Richfield, Utah, February 26, 1940, son of Dyle and Lu Deal Williams; married Charlotte L. Politano August 3, 1961; two children--Bradley and Kenneth.

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