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TO: Idaho State Board of Land Commissioners

FROM: Dennis Becker, Policy Analysis Group, University of Idaho

CC: Grazing Rate Review Subcommittee
Tom Schultz, Director, Idaho Department of Lands

DATE: November 13, 2017

RE: Evaluation of Final Alternatives for Deriving Fair Market Grazing Value on Idaho State Endowment Trust Lands

1.0 BACKGROUND

The Policy Analysis Group (PAG) at the University of Idaho submitted an analysis of grazing rate alternatives to the Idaho State Board of Land Commissioners (Land Board) on January 20, 2017 and February 28, 2017. This memorandum is provided to update the formulas analyzed on behalf of the Grazing Rate Review Subcommittee, to evaluate approaches used to derive fair market forage value and grazing rates for state endowment trust lands, and to comment on the underlying assumptions used in each alternative.

The approach used to calculate the base grazing rate on state endowment trust lands for any given year has changed over time producing varying rates with respects to the \$/AUM charged of lessees. From 1976 to 1985 the Land Board set the grazing rate annually by conducting a survey comparing grazing rates of surrounding states. In 1985 the Land Board set the rate using the same approach that was used in Montana at the time, which equaled six-times the 2-year rolling average price of 500lb calves. This approach yielded a contributory value of about 12% to the state for the beef cattle price received by lessees. In 1990, the Land Board adopted the formula currently used by the Idaho Department of Lands (IDL) with a base index of \$2.20, which was subsequently adjusted to \$1.70 in 1993 to reflect the value of forage in that year. The \$1.70 index is still used today. Figure 1 shows how the state endowment trust land grazing rate has changed since 1981 relative to the Idaho private lease rate, in nominal (non-inflation adjusted) and real dollars (inflation adjusted), as compared to beef cattle prices.

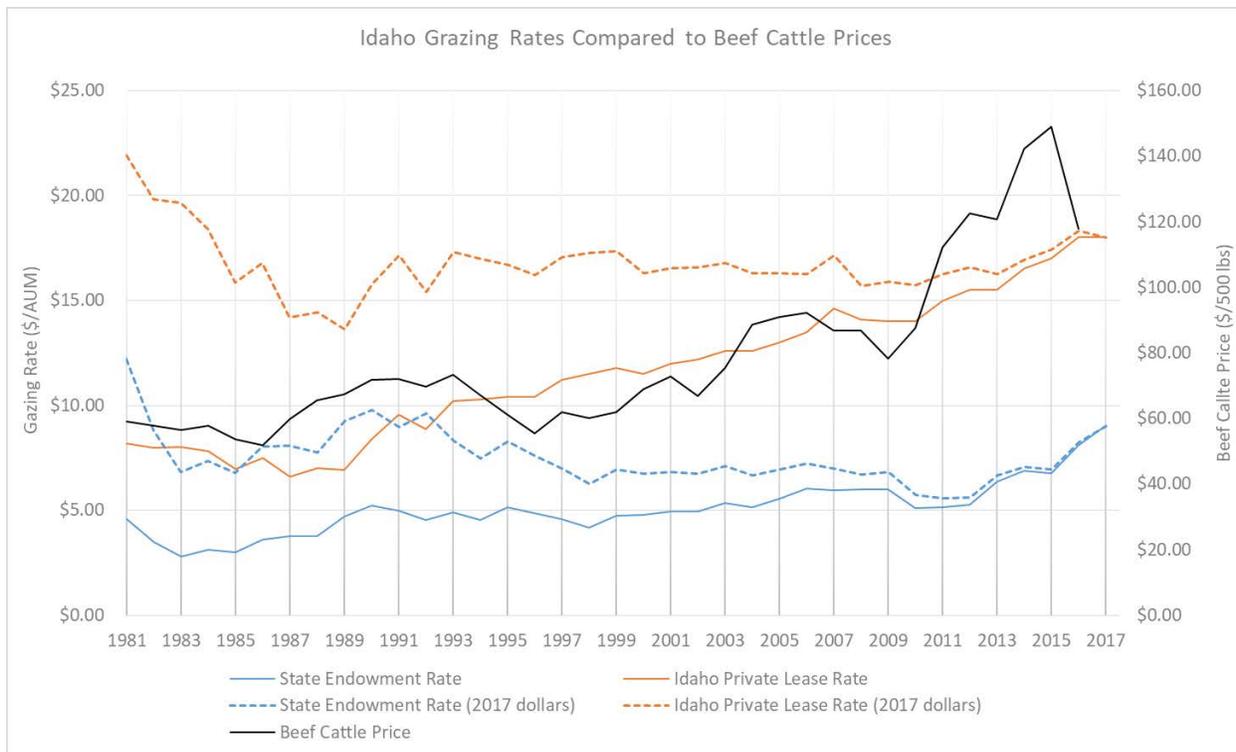


Figure 1. Idaho private and state endowment trust land grazing rates (nominal and real dollars), and beef cattle prices, 1981-2017.

State endowment trust land grazing rates averaged about 51% of the USDA National Agricultural Statistics Service (NASS) reported private lease rate up until 1993 when the current formula was adopted. Since then, state rates have averaged 42% of the private lease rate. In real dollars (adjusted to 2017), grazing rates have remained relatively stable on private lands with some drop off on state endowment trust lands as indicated in the percent difference. The average state endowment trust land grazing rate was \$8.62 from 1981 to 1993, and \$16.95 on private lands (2017 dollars). Since 1993, grazing lease rates have averaged \$7.01 on state endowment trust lands and \$16.72 on private lands. During the same time period, beef cattle prices for the 11 western states¹ tracked relatively close to the Status Quo formula up until 2010 to 2015 when cattle prices increased significantly. Prior to 2010, the state endowment trust land grazing rate averaged 7% of the annual beef cattle price; from 2010 to 2015 the state rate averaged less than 5% of the annual beef cattle price. Compared to neighboring states, the private lease rate in Idaho tracked most closely to Oregon (Figure 2). Updated rates for state trust lands in neighboring states were not available for this analysis.

¹ USDA-National Agricultural Statistics Service (NASS). 2017. Quick Stats. Available at: <https://quickstats.nass.usda.gov/>. Accessed February 27, 2017.

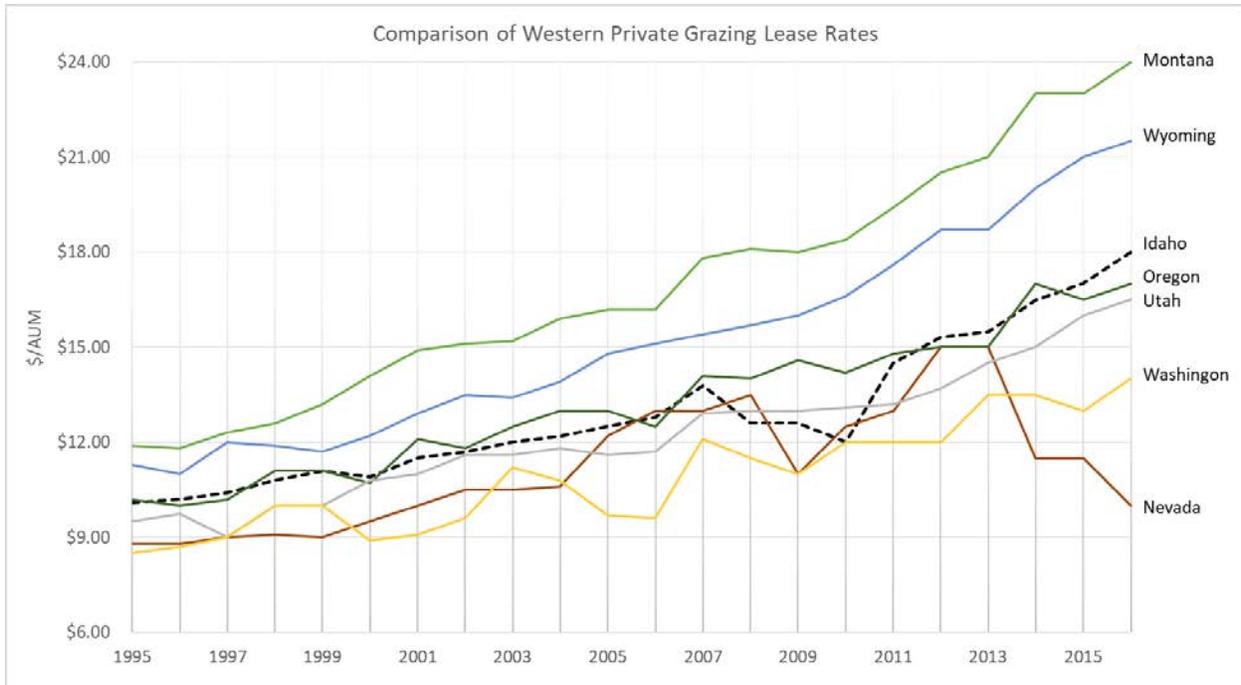


Figure 2. Comparison of select western private grazing lease rates (\$/AUM), 1995-2016.

2.0 Proposed Idaho Grazing Rate Alternatives

The Land Board Grazing Rate Review Subcommittee (Subcommittee) advanced five alternatives for 60-day public comment in July 2017. Table 1 summarizes those alternatives.

Table 1. Summary of grazing rate indices and discount factors by alternative.

Alternative	Formula type ²	Underlying factors
Status Quo	Price Index Base	- Formula is based upon the federal PRIA with an Idaho specific index of \$1.70 established in 1993 and not updated.
Revised Status Quo (\$1.70)	Price Index Base	- Formula is similar to the Status Quo with the removal of highly correlated variables (FVI, PPI) - Retains the \$1.70 index established in 1993.
Revised Status Quo (\$2.00)	Price Index Base	- Same equation as previous alternative but with an index of \$2.00 provided for sensitivity analysis. - Index is 54% of 2016 Idaho private lease rate (IDPPLR).
Calf-Crop Share	Beef Cattle Price Share (Contributory Share)	- Formula is based on the value of weight gained from forage on state lands as measured by beef cattle prices. - Underlying indices are highly static.
Montana Model	Modified Beef Cattle Price Share (Contributory Share)	- Formula is based on the value of weight gained from forage on state lands as measured by beef cattle prices, anchored at 56% of private lease rate in the base year (44% discount)

² Souder, J., and S. Fairfax. 1996. State Trust Lands: History, Management, and Sustainable Use. University Press of Kansas. 360 p.

2.1 Price Index Base Approach

Congress established grazing fees for federal lands based on a price index approach outlined in the Public Rangelands Improvement Act (PRIA) of 1984, which focuses on the lands' value in the production of livestock. The value in this case includes private pasture lease rates, cost of materials like fencing, as well as beef cattle prices. Several state formulas, including the one used currently for Idaho state endowment trust lands, were derived from the PRIA formula using state specific indices. Like PRIA, the base grazing value expressed as \$/AUM changes according to fluctuations in these underlying indices.

Status Quo

Price indices used in the current formula for Idaho state endowment trust lands includes (a) private lease rates or forage value appraised at the state level, (b) private lease rates or forage value appraised across the 11 western states, (c) price received for beef cattle, and (d) price of inputs to produce beef cattle. Data are derived from the USDA-NASS, and an index of Idaho private grazing lease rates to predict the lease rate index two years into the future.

Similar to the federal PRIA formula, which uses a base value rate of \$1.23/AUM to approximately fee and non-fee grazing costs,³ the current Idaho formula uses a base rate of \$1.70 established by the Idaho State Land Board in 1993. The \$1.70 base rate is discretionary based on an analysis of the difference between private and public lease rates and the cost of services provided.⁴ The current formula used for Idaho state endowment trust lands, referred to as the Status Quo alternative, is as follows:

$$\begin{aligned} \text{IDFVI}_{t+2} &= -6.92 + (0.13 \text{ FVI}_t) + (0.60 \text{ BCPI}_t) - (0.33 \times \text{PPI}_t) + (0.74 \text{ IDFVI}_t) \\ \$/\text{AUM} &= (\text{IDFVI}_{t+2}/100) \times \$1.70 \text{ base fee} \end{aligned} \quad (\text{Equation 1})$$

Where:

- IDFVI_{t+2} = Idaho Private Lease Index at time t + 2 (or, 2 years in the future)
- FVI_t = 11 Western State Private Lease Rate Index at time t (or, present)
- BCPI_t = US Cattle Price Index at time t
- PPI_t = Prices Paid Index (cattle inputs) at time t
- IDFVI_t = Idaho Private Lease Index at time t

³ USDI and USDA. 1997. Study of the fees for grazing livestock on federal lands: A report from the Secretary of Interior and the Secretary of Agriculture. October 21, 1977. Washington, D.C.

⁴ Rimbey, N. 2015. Idaho state land grazing lease rates: historical background. University of Idaho Extension (non-numbered report). Available online at: <http://www.idl.idaho.gov/leasing/grazing/rate/2014-rimbey-idaho-state-land-grazing-lease-rates.pdf>.

Revised Status Quo

Rimbey (2016) advised the Subcommittee to revise the Status Quo formula to remove statistical multicollinearity. PPI and FVI were highly correlated causing potential statistical error. The recommendation was to remove PPI. A related concern was that the 11 western state private lease rate index (FVI) and Idaho-specific private lease rate (IDFVI) are highly correlated. The recommendation was to remove the west-wide FVI and index of Idaho forage values (IDFVI). The \$1.70 base rate was adopted by the Land Board in 1993. The following revised status quo equation was offered by Rimbey (2016):⁵

$$\begin{aligned} \text{IDFVI}_{t+2} &= 13.85 + (0.9967 \text{ IDFVI}_t) \\ \$/\text{AUM} &= (\text{IDFVI}_{t+2}/100) \times \$1.70 \text{ base fee} && \text{(Equation 2)} \\ \$/\text{AUM} &= (\text{IDFVI}_{t+2}/100) \times \$2.00 \text{ base fee} && \text{(Equation 3)} \end{aligned}$$

Where:

IDFVI_{t+2} = Idaho Private Lease Index at time $t + 2$ (or, 2 years in the future)

IDFVI_t = Idaho Private Lease Index at time t

2.2 Contributory Share Approach—Beef Cattle Price Share

In contrast to the price-indexed base approaches used for the Status Quo and Revised Status Quo formulas, the beef cattle price share divides the value of the commodity produced between the state and the lessee. The value of weight gained from the forage taken from state endowment trust lands is determined by the price of beef. Because forage is not the only input required in producing beef, the contribution to the forage gain is factored into the split between the state and lessee.

Calf-Crop Share

This Subcommittee proposal uses a \$/AUM calculation based upon the dollars produced per cow, which is derived from the USDA published weekly nationwide average price per head of a 550 lb steer calf. This approach factors in adjustments for variables occurring in the beef production system, such as death loss and heifer devaluation. The formula is anchored by a Calf Crop Index, which is derived from an average of five cow-calf enterprise budgets developed by the University of Idaho. The formula adopts the provision authorized by the Land Board in 1993 to reduce the AUM rate for sheep by 25% if the previous annual average lamb price is less than or equal to 70% of the price for calves under 500 lbs during the same period. The following equation was offered:

⁵ Rimbey, N. 2015. Idaho state land grazing lease rates: historical background. University of Idaho Extension (non-numbered report). Available online at: <http://www.idl.idaho.gov/leasing/grazing/rate/2014-rimbey-idaho-state-land-grazing-lease-rates.pdf>.

$$\$/\text{AUM} = \frac{(((A \times B) + (A \times B \times C) \times D) / 2) \times E}{12} \quad (\text{Equation 4})$$

Where:

A = USDA 550 lb Annual Steer Average (\$/head)	\$1,062 (2016 avg. price)
B = UI Weaning Percentage Average	87.00%
C = UI Heifer Weight Average Percentage	90.45%
D = Average Heifer Discount	92.50%
E = Calf Crop Index	13.0%

$$\begin{aligned} \$/\text{AUM} &= [(\$1,062 \times 0.87) + ((\$1,062 \times 0.87 \times 0.9045) \times 0.925)] / 2 = \$848.65 \\ &= (848.65 \times 0.130) / 12 \text{ months} \\ &= \$9.19 \quad (\text{2018 grazing rate with 2-yr lag}) \end{aligned}$$

The underlying livestock enterprise budgets were estimated through a survey of Idaho operators in the state, which is conducted periodically. The USDA 550 lb steer average is updated annually in the formula based on weekly nationwide averages. All other variables remain static unless during review the determination is made that formula inputs no longer reflect market conditions. The proposed review process is that IDL would undertake an annual look-back using rolling five-year averages of: (a) AUM rate—for initial review, the rolling average is retroactively calculated as though the formula was in effect; (b) 550 lb annual steer average—rolling average of the USDA 550 lb Annual Steer Average; and (c) IDL grazing program costs—rolling average of the costs allocated to the IDL grazing program. If the calculated difference between the rolling five-year averages of the AUM Rate and the 550 lb Annual Steer Average is greater or less than 10% of the prior year’s calculated difference, the Land Board would authorize an independent review of the rate methodology.

The calf crop index is rooted in the concept that grazing leases are similar to row crop leases from the perspective of revenue generation. Assuming that growing a row crop requires 50 percent of the time required to grow a calf crop (6 versus 12 months), and multiplying this percentage difference against IDL’s row crop share rate of 25% yields an index of 12.5%; 13% was used in previous analyses and here for comparison purposes. This value is similar to the average of state pasture costs expressed as a percentage of total net return above operating costs, which were derived from the University of Idaho livestock enterprise budgets.

Montana Model

This alternative emulates the grazing rate formula currently used in Montana for state trust lands, which has two components: (a) weighted average price per pound of beef cattle on the farm for the previous year, (b) multiplied by a discount rate of 44% of the Montana private lease rate derived using the following assumptions:

- (1) 2010 Montana private lease rate (\$18.40/AUM) was multiplied by the cost differential of public versus private costs of production (30% discount) as recommended by Bioeconomics, Inc. (2011),⁶ which was divided by the beef cattle price (\$.9774/lb).

$$\$18.40 \times 70\% = \$12.88/\text{AUM}$$

$$\$12.88/\text{AUM} \div \$.9774/\text{lb} \text{ (2010 beef cattle price)} = 13.18 \text{ multiplier}$$

- (2) The resulting multiplier of 13.18 was used to start the rule making process. Public comments received indicated the increased cost of weed control for state lessees were between \$1.28 and \$2.00 per AUM. The state selected an average cost of \$1.50/AUM to adjust the base multiplier.

$$\$1.50/\text{AUM} \div \$.9774/\text{lb.} = 1.53 \text{ (multiplier adjustment)}$$

$$13.18 - 1.53 = 11.65 \text{ adjusted multiplier}$$

- (3) The multiplier of 11.65 was further adjusted to account for periodic non-use due to weather conditions or from a rotational grazing system, which was determined to be 1 year of a 10-year lease term. The cost associated with the non-use was calculated by taking the 11.65 multiplier times the beef cattle price divided by 10. Grazing lands subject to the rate reduction must be intermingled with cropland or otherwise possess characteristics prohibiting livestock use.

$$11.65 \times \$.9774/\text{lb.} \div 10 = \$1.14/\text{AUM}$$

$$\$1.14/\text{AUM} \div \$.9774/\text{lb.} = 1.17 \text{ (multiplier adjustment)}$$

$$11.65 - 1.17 = 10.48 \text{ final multiplier}$$

Based on these features, the following is the comparable equation for Idaho state endowment trust lands:

$$\$/\text{AUM} = \text{BCP}_t \times \text{IDPLR multiplier} \quad (\text{Equation 5})$$

Where:

$$\text{BCP}_t = 11 \text{ Western States Beef Cattle Price at time } t$$

$$\text{IDPLR multiplier} = 56\% \text{ of the Idaho private land lease rate (IDPLLR) indexed at time } t, \text{ or}$$

$$= \frac{0.56 \times \text{IDPLR}_t}{\text{BCP}_t} = \frac{0.56 \times \$18.00 \text{ (2016 IDPLLR)}}{\$1.1778 \text{ (2016 W11 BCP)}} = 8.56 \text{ (example)}$$

$$\text{BCP}_t \quad \$1.1778 \text{ (2016 W11 BCP)}$$

⁶ Bioeconomics, Inc. 2011. Montana trust land: Grazing lease rate valuation analysis. Report prepared for the State of Montana Department of Natural Resources & Conservation, Trust Management Division, Missoula, MT. 69 p.

In Montana, the estimated average price per pound of beef cattle is determined by collecting proprietary annually by the Montana Agricultural Statistics Service of the USDA-NASS. Because state specific data are not available for Idaho, the 11 Western States annual beef cattle price was used in this analysis (<https://quickstats.nass.usda.gov/>).

3.0 Grazing Rate Analysis

Table 2 provides updated rate calculations using the latest price data and two-year lag back-calculated to 2008. The following sensitively analyses show how the underlying index, share, or private land discount would affect the grazing rate for each alternative:

- Status quo using the 1993 index of \$1.70
- Revised Status Quo (RSQ)
 - 1966 federal PRIA index of \$1.23
 - 1993 index of \$1.70
 - 54% discount from the 2016 IDPPLR having an index of \$2.00
 - 1990 Land Board index of \$2.20
 - 30% discount from the 2016 IDPLLR having an index of \$2.58
 - 60% change in Western 11 state BCP from 1993 to 2016 having an index of \$2.73
 - 65% change in IDFVI from 1993 to 2016 having an index of \$2.80
- Calf Crop Share using the 2016 calf-crop index of 13%
- Montana Model
 - 44% discount from the 2016 IDPLLR
 - 30% discount from the 2016 IDPLLR

Figure 2 compares the results for each alternative. The Montana Model using a 30% discount yields among the highest base grazing fees for each of the years assessed. The Revised Status Quo (RSQ) using indices derived from the percent change in BCP or IDFVI, and RSQ 30% discount of the 2016 IDPLLR, yield the next highest rates. The Status Quo and RSQ formulas using the 1993 index of \$1.70 were among the lowest rates. Had the 1993 index, which was derived from the value of forage in that year, changed at the same rate as the IDFVI up until 2016, the state endowment trust land grazing rate would have approximated the \$2.80 index calculated in Table 2. This provides a comparison to broader market trends, as does the percent change in the western 11 states BCP. The Montana Model using a 44% discount yields the next highest rate for most years assessed. The RSQ alternative using an index of \$2.20 based on the 1990 Land Board decision is next, followed by the 54% discount of the IDPPLR and Calf Crop Share alternatives. The lowest grazing rate is derived from the 1966 federal PRIA index of \$1.23 as applied to the RSQ alternative. An RSQ index based on a 44% discount of the 2016 IDPLLR was not assessed because it was nearly the same as the 1990 Land Board index (\$2.21).

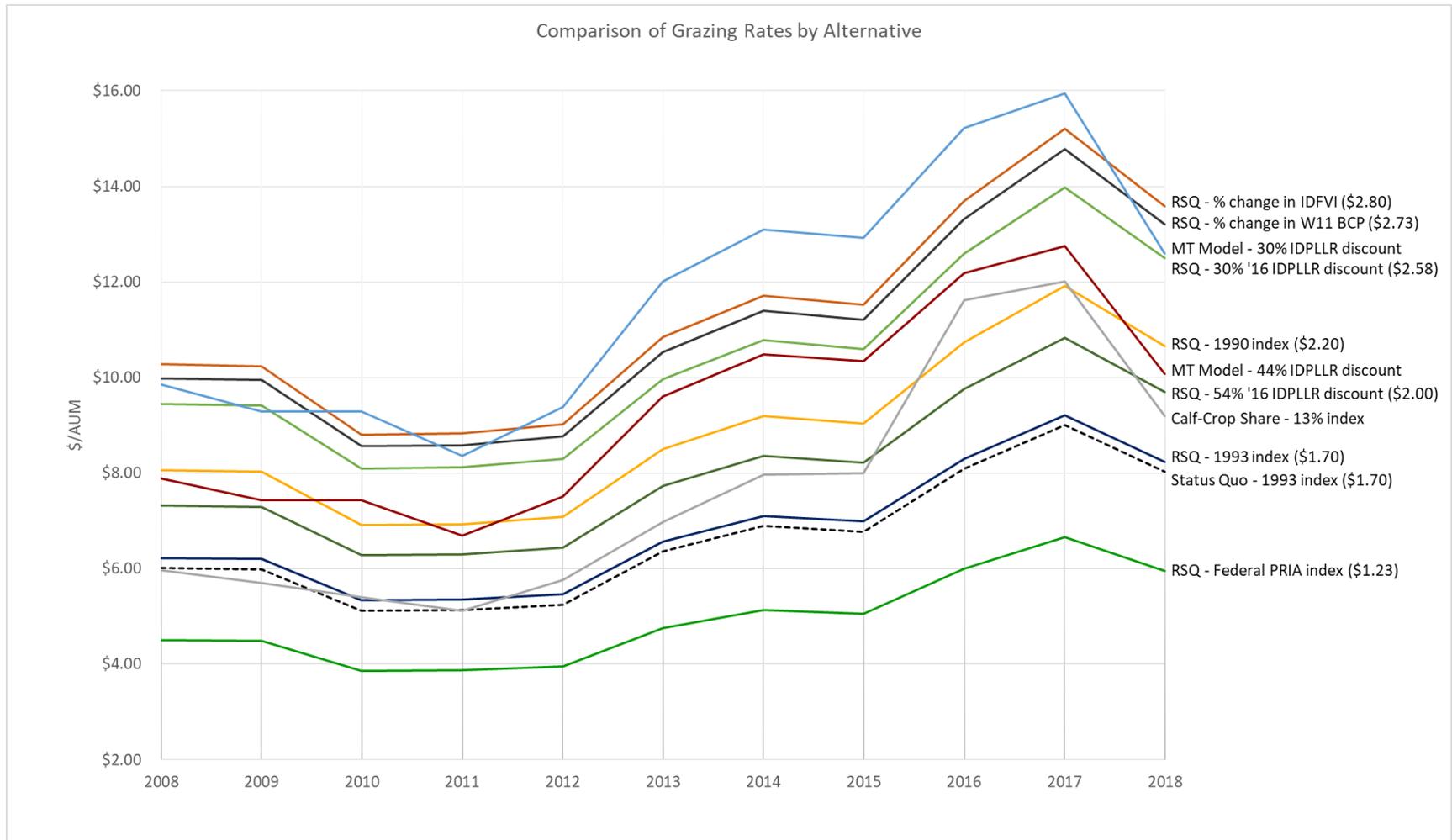


Figure 2. Comparison of grazing rates by alternative (\$/AUM) with 2-year price lag, 2008-2018.

Table 2. Historic grazing rates as calculated by alternative (2008-2018).¹

	----- Rev Status Quo (RSQ) -----										
	Status Quo 1993 Index (\$1.70)	Federal PRIA Index (\$1.23)	1993 Index (\$1.70)	54% IDPLLR discount (\$2.00)	1990 Index (\$2.20)	30% IDPLLR discount (\$2.58)	% change BCP '93-16 (\$2.73)	% change IDFVI '93-16 (\$2.80)	Calf-Crop Share (13% index)	MT Model (44% discount)	MT Model (30% discount)
2008	\$6.01	\$4.50	\$6.23	\$7.32	\$8.06	\$9.45	\$9.99	\$10.27	\$5.97	\$7.89	\$9.86
2009	\$5.99	\$4.49	\$6.20	\$7.30	\$8.03	\$9.41	\$9.95	\$10.23	\$5.69	\$7.43	\$9.29
2010	\$5.12	\$3.86	\$5.34	\$6.28	\$6.91	\$8.10	\$8.56	\$8.81	\$5.40	\$7.44	\$9.30
2011	\$5.13	\$3.87	\$5.35	\$6.29	\$6.92	\$8.12	\$8.58	\$8.83	\$5.12	\$6.69	\$8.37
2012	\$5.25	\$3.96	\$5.47	\$6.44	\$7.08	\$8.30	\$8.77	\$9.03	\$5.77	\$7.50	\$9.38
2013	\$6.36	\$4.75	\$6.57	\$7.73	\$8.50	\$9.97	\$10.54	\$10.84	\$6.97	\$9.61	\$12.01
2014	\$6.89	\$5.14	\$7.10	\$8.35	\$9.19	\$10.78	\$11.39	\$11.72	\$7.97	\$10.48	\$13.10
2015	\$6.77	\$5.05	\$6.98	\$8.22	\$9.04	\$10.60	\$11.20	\$11.52	\$8.00	\$10.34	\$12.93
2016	\$8.09	\$6.01	\$8.30	\$9.76	\$10.74	\$12.60	\$13.31	\$13.69	\$11.62	\$12.18	\$15.23
2017	\$9.01	\$6.67	\$9.21	\$10.84	\$11.92	\$13.98	\$14.78	\$15.20	\$12.02	\$12.75	\$15.94
2018	\$8.03	\$5.96	\$8.24	\$9.69	\$10.66	\$12.50	\$13.21	\$13.59	\$9.19	\$10.08	\$12.60

¹ Grazing rates reflect updated price calculations, and two-year lagged rates for implementation. These rates replace all previous estimates reported by the Policy Analysis Group.

4.0 Factors Affecting Leasing and Lease Rates

4.1 Services Provided

Numerous sources identify differences in the services provided on private compared to public and state trust lands, which results in a range of discounted rates from the private lease rate. A reduction in the public and state trust land lease rate could be justified based on the lower level of services provided for access control, lease quality, fencing, animal control, water hauling, and other factors. Table 3 presents key cost factors summarized by Rimbey and Torell (2011).⁷

Table 3. Summary of Non-fee Grazing Costs, 1992 and 2010.

Cost item	1992	1992	1992	1992	2010 Index	2010	2010
	Public Cattle	Private Cattle	Public Sheep	Private Sheep		Public Cost	Private Cost
Lost animals	\$3.65	\$2.10	\$5.39	\$2.63	1.35	\$5.21	\$2.92
Association fees	\$0.48	\$ -	\$0.04	\$ -	1.95	\$0.83	\$ -
Veterinarian	\$0.10	\$0.12	\$0.22	\$0.20	1.92	\$0.22	\$0.25
Moving livestock	\$3.35	\$1.93	\$4.74	\$2.51	1.53	\$5.36	\$3.05
Herding	\$4.31	\$2.94	\$8.89	\$3.05	1.92	\$9.33	\$5.67
Salt and feed	\$1.29	\$1.80	\$1.62	\$1.53	1.62	\$2.15	\$2.85
Travel	\$0.69	\$0.18	\$0.77	\$0.34	2.11	\$1.47	\$0.42
Water	\$0.39	\$0.11	\$0.39	\$0.16	1.95	\$0.76	\$0.23
Horse costs	\$0.31	\$0.15	\$0.47	\$0.22	2.10	\$0.69	\$0.33
Maintenance	\$3.18	\$1.84	\$2.12	\$2.22	1.80	\$5.48	\$3.38
Dev. depreciation	\$0.45	\$0.15	\$0.26	\$0.24	1.95	\$0.83	\$0.31
Other costs	\$0.34	\$0.11	\$1.36	\$0.35	1.95	\$0.90	\$0.27
Total non-fee costs	\$18.54	\$11.43	\$26.27	\$13.45		\$33.23	\$19.68

Limited research exists for updating fee and non-fee grazing costs. Unknown is the degree that the underlying market structure has changed such that the distribution of costs have changed. Table 4 summarizes the literature and the origin of discount rates commonly applied to public and state trust lands.

⁷ Rimbey, N., L.A. Torell. 2011. Grazing costs: What's the current situation? Agricultural Economics Extension Series No. 2011-02. University of Idaho, College of Agricultural and Life Sciences.

Table 4. Summary of literature on discounted public and state trust land lease rates.

Discount	Source	Key considerations
12-14%	Resource Dimensions, Inc. 2010 ⁸ Rimbey et al., 2014 ⁹	<ul style="list-style-type: none"> - Primary data collected in 2012 phone survey; 127 non-irrigated leases (32.7% response rate) - Discount rate represents lessor control and daily management of livestock, which was the only statistically significant variable; results in \$2.21/AUM premium averaged across regions, or 13.8% of \$16.04/AUM private lease rate. - Regional differences were observed having \$1.87 and \$1.43 premiums in the Payette and Eastern regions, respectively. - Authors expected other variables to play a role in lease prices, but lack of adequate responses may have limited findings (e.g., lack of complete information on lease size, too few observations to assess cost of weed control, water hauling, utilities, and travel distance).
20-30%	Bioeconomics Inc., 2011 ¹⁰	<ul style="list-style-type: none"> - Discount based on review by Duffield and Anderson (1993),¹¹ New Mexico analysis (Torell, Ghosh, Fowler 1988), competitively bid trust lands in Montana, and other state and BIA rates¹² - Set discount equal to 70% the annual USDA-NASS private lease rate to allow for market adjustment; 75-80% if after review it does not have a negative effect on vacant leases.
30%	Torell et al., 1988 ¹³	<ul style="list-style-type: none"> - New Mexico trust land grazing analysis where the service value comprised 29% of the \$5.18/AUM average market rental rate. - Study analyzed how different indices could be used to establish fair market value of trust land forage. - Similar indices are included in contemporary analyses, but unknown is the degree to which past and current market structures are similar enough for comparison.

⁸ Resource Dimensions, Inc. 2010. Idaho Department of Lands Grazing Market Rent Study. Gig Harbor, WA: Resource Dimensions, Inc. Consulting report prepared for Idaho Department of Lands. 136 p.

⁹ Rimbey, N., L.A. Torell, S. Kane, J. Gustanski, J. Kennedy, D. Scarsella. 2014. Idaho Private Rangeland Grazing—Lease Arrangements. Research Bulletin 185, College of Agriculture and Life Sciences, University of Idaho. 25 p.

¹⁰ Biometrics Inc. 2011. Montana Trust Land Grazing Lease Rate Valuation Analysis. Report prepared for State of MT Dept. of Nat. Res. and Cons., Trust Management Division. Missoula, MT: Bioeconomics, Inc. 69 p.

¹¹ Duffield, J., and B Anderson. Economic Analysis of the Values of Surface Uses of State Lands. Helena: Montana Department of State Lands, 1993.

¹² General Accounting Office. 2005. Livestock Grazing: Federal Expenditures and Receipts Vary, Depending on the Agency and the Purpose of the Fee Charged. September 2005. GAO-05-869: 109 pp.

¹³ Torell, L.A., S. Ghosh, and J.M. Fowler. Economic Considerations for Setting Grazing Fees on New Mexico State Trust Lands. Special Report 81, New Mexico State University Agricultural Experiment Station, 1988.

Table 4 (continued).

Discount	Source	Key considerations
30%	LaFrance and Watts, 1995 ¹⁴	- Average real rate of return on private grazing lands estimated at 3.37% per year, which was similar to analysis by Torell and Doll ¹⁵ on a cross-section of New Mexico leases suggesting a reasonable estimate of the equilibrium opportunity cost of landlord services is 30% of the private grazing fee across the eleven western state region.
36-39%	Rimbey et al., 1992 ¹⁶	- Found the service component of Idaho leases to average 36% to 39% of lease price, which included an adjustment for lease price pre-payment that was not considered in the New Mexico studies. - Substantial variability was noted.
44%	Montana Board of Land Commissioners, 2011 ¹⁷	- Rate multiplier reflects 30% base discount recommended by Bioeconomics, Inc. (2011) ¹⁸ and an additional 14% discount for noxious weed control and rest-rotation grazing. - Final discounted lease rate of 56% (44% discount) was approved by the Montana Board of Land Commissioners in 2011.

4.2 Contested Leases—Access and Range Condition

The IDL reports that over the past ten years about 5% of state endowment trust leases (60 leases) and 7% of an estimated 257,950 AUMs (18,190 AUMs) were let by competitive bid as mandated by Idaho Code § 58-310. The other 95% of leases were issued through reapplication by the current leaseholder at the minimum rate per AUM established annually by the state.

The ten-year average AUM value for contested leases, including annual base rent and premium bid amount, was \$16.03/AUM. In comparison during 2017, 7% of the 82 grazing leases offered were contested for an average of \$17.50/AUM. Adjusting the total number of 1,085 contested AUMs against the total high bid amount paid of \$224,100 yields a weighted value of \$25.95 per contested AUM paid during 2017. Table 5 and Figure 3 compare lease rates for competitively bid state leases and private grazing leases in Idaho. Competitively bid lease rates over the past ten years were on average 1.04% of the private lease rate reported by USDA-NASS.

¹⁴ LaFrance, J.T., M.J. Watts. 1995. Public Grazing in the West and Rangeland Reform '94. *American Journal of Agricultural Economics*, 77:447-461.

¹⁵ Torell, L.A., J.R. Doll. 1991. Public Land Policy and the Value of Grazing Permits. *Western Journal of Agricultural Economics*, 16:174-184.

¹⁶ Rimbey, N. R., R. Krebill-Prather, and J. E. Carlson. 1992. Range and pasture forage: what's it worth? Moscow, ID: University of Idaho Agricultural Experiment Station Research Service, No. 92-3. 10 p.

¹⁷ Montana Board of Land Commissioners. 2011. Administrative rule adoption: Grate rate. Meeting minutes and public comment review, November 21, 2011. Helena, MT. 22 p.

¹⁸ Biometrics Inc. 2011. Montana Trust Land Grazing Lease Rate Valuation Analysis: A Report Prepared for State of Montana Department of Natural Resources and Conservation, Trust Management Division. Missoula, MT: Bioeconomics, Inc. 69 p.

Table 5. Competitively bid Idaho endowment trust land grazing rates and private grazing rates.

Year	State leases contested	Total AUMs	Premium bid rate	Average \$/AUM	Private lease rate	% avg. state premium rate to private rate
2008	3	981	\$54,001	\$12.74	\$13.03	98%
2009	8	2786	\$89,982	\$8.65	\$13.70	63%
2010	6	3538	\$460,100	\$15.25	\$14.07	1.08%
2011	1	225	\$28,750	\$11.64	\$14.50	80%
2012	17	4633	\$548,700	\$16.10	\$15.20	1.06%
2013	4	510	\$127,610	\$16.17	\$15.50	1.04%
2014	6	2265	\$414,752	\$14.81	\$16.50	90%
2015	6	1468	\$311,751	\$18.34	\$17.00	1.08%
2016	3	699	\$114,000	\$34.20	\$18.00	1.90%
2017	6	1085	\$224,100	\$17.50	\$18.00 ¹	97% ¹

¹ Used 2016 USDA-NASS reported private lease rate for comparison purposes as 2017 data not available until January, 2018.

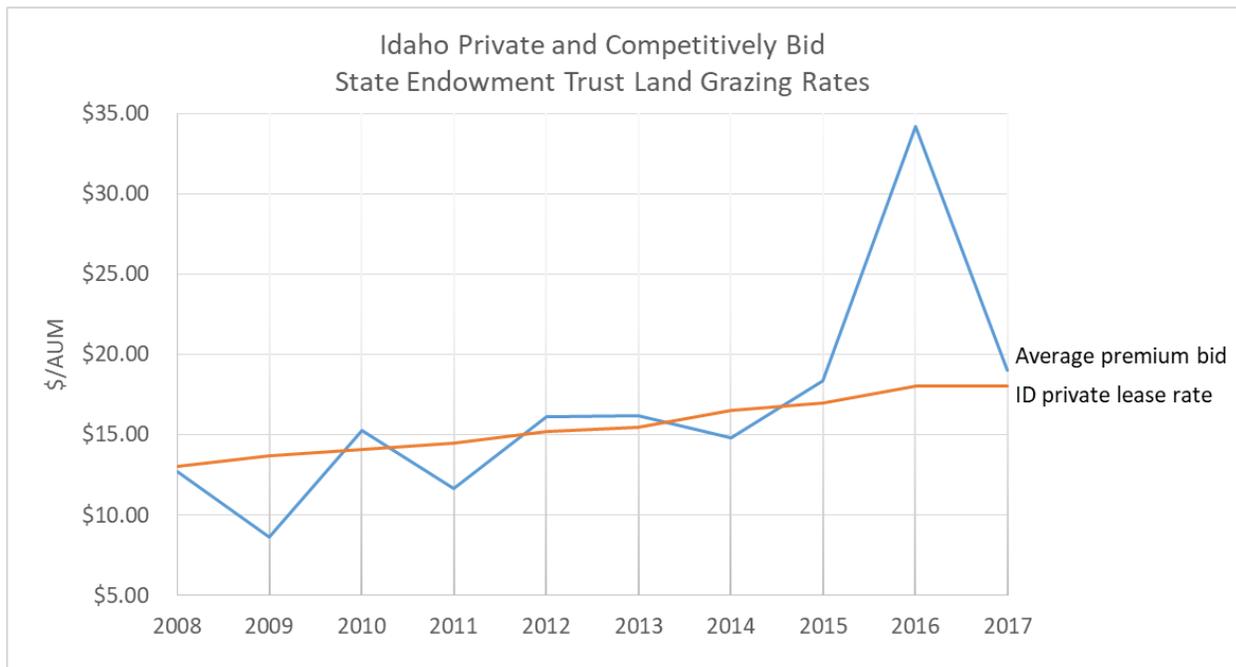


Figure 3. Comparison of Idaho private lease rates and competitively bid state endowment trust land grazing rates, 2008-2017.

There likely exists several reasons why more leases were not contested over the past ten years. One reason may be management access. While no data is available about why producers chose not to contest certain leases, it is reasonable to assume they have less incentive to bid on parcels where their access is restricted. IDL analysis indicates that of the 1,139 state grazing leases, about 44% (504 leases) are inholdings with restricted or no legal management access, and another 19% (219 leases) have mixed access rights meaning part of the lands have unrestricted, legal management access and parts do not. The remaining 37% (424 leases) have unrestricted, full management access. Of the 60 contested leases over the past ten years, 27% (16 leases) had restricted or no legal management access, and 10% (6 leases) were multiple parcels with a mix of full management access and restricted or no legal management access. The remaining 63% of contested leases (38 leases) had unrestricted, full management access. Differences in access between contested and non-contested leases indicates that other factors likely are contributing to why and where state endowment trust land leases are contested.

Range condition likely also affects producer willingness to bid on endowment trust land leases. IDL recognizes that not all state parcels are equal and in the 2015 Grazing Program Business Plan¹⁹ provided a framework to distinguish primary, or potentially more desirable, grazing parcels from secondary, or less desirable, grazing parcels. Tier 1 classification is given to those parcels providing the highest opportunity and potential for generating revenue. Tier 1 parcels are characterized by excellent natural and ownership qualities, require little management oversight or inspection, and provide excellent opportunities of cost-effective parcel management strategies for revenue generation. In essence, these parcels are 'most like' a private grazing lease arrangement with comparable services. To be classified as a Tier 1 grazing parcel the state endowment trust parcel must meet or exceed all five of the following criteria:

- 1) Located wholly within the primary Rangeland Asset classification
- 2) Blocked ownership of 2,500 acres or more
- 3) Above average availability of forage resources; minimum of 400 AUMs and 8 ac/AUM
- 4) Management access with no known restrictions
- 5) Suitable infrastructure (e.g., fencing, water) to operate lease independently of adjacent lands

Of the 1,443,471 primary Rangeland Asset acres, about 9% (131,322 acres) of state endowment trust lands were identified under the Tier 1 management classification. IDL identified 12 large blocks of state parcels containing 29 grazing leases falling within the Tier 1 classification, of which conflict auctions occurred on 3 of the 12 blocks over the past ten years (3% of Tier 1

¹⁹ Idaho Department of Lands. 2015. Grazing program business plan. Lands and Waterways Division, Idaho Department of Lands, Boise, ID. 50 p.

grazing leases). Too few observations exist to draw conclusions, but these findings suggest that other factors besides range conditions are likely affecting contested lease rates.

5.0 Summary Observations

Two general approaches were evaluated for determining the fair market value of forage and grazing rates on state endowment trust lands—Price Index Base, and Beef Cattle Price Share. Five total alternatives were compared with additional sensitivity analysis where appropriate. The following summary observations are provided to assist in establishing a minimum lease rate per AUM established annually by the state. These observations have no relationship to or implication for the competitive bid process mandated by Idaho Code § 58-310.

- The Status Quo alternative has (a) statistical problems with multicollinearity that could cause the formula to calculate rates higher or lower than they otherwise would be; and (b) the \$1.70 index established in 1993 results in a calculation that consistently underperforms and fails to track market trends identified by the Subcommittee.
- The Revised Status Quo formula is a suitable approach for calculating grazing fees, but the \$1.70 index established in 1993 consistently underperforms and fails to track market trends identified by the Subcommittee. The index could be made to track with desired market trends or other appropriate benchmarks.
- The Calf Crop Share formula is anchored by a set of indices derived from an average of five cow-calf enterprise budgets collected via a survey of Idaho operations. This provides a data-driven approach to establishing grazing rates, but ongoing and intensive data collection are necessary to maintain representative budgets. The 12.5% calf crop index assumes half the IDL row crop share (25%) based on the assumption that growing a row crop requires 50 percent of the time required to grow a calf crop (6 versus 12 months); 13% was used in previous analyses and here for comparison purposes. The resulting grazing rate is highly responsive to beef cattle prices, but also highly sensitive to small changes in the calf crop index.
- The Montana Model formula is highly responsive to beef cattle prices, indexed at a discount from the private lease rate. Establishing an appropriate discount rate would need to accommodate the diversity of endowment trust land leases existing throughout the state. The suitability of discount rates offered in the literature is discussed below.

Numerous sources identify differences in the services provided on private compared to public and state trust lands, which results in a range of discounted rates from the private lease rate. Based on these studies, the following summary observations are provided:

- The preference is to use in-state data empirically derived in recent years. The IDL Grazing Market Rent Study²⁰ is such an analysis. But the finding of 12% to 14% discount from the private grazing lease rate is confounded by the lack of sufficient sample and variability in the underlying data. Evidence from other studies suggest that additional cost factors are likely relevant to the difference in services provided on private as compared to state endowment trust lands. An appropriate discount rate for state endowment trust lands may be at least 12% of the private lease rate, but likely greater.
- The 30% discount rate cited in the New Mexico studies have been widely used, but the degree to which market structures existing in the 1980's and 1990's reflect current market structures is unknown. Another consideration is the degree to which market structures in New Mexico or another state emulate market structures in Idaho. No new data are available to validate the 30% rate; more recent analyses like the Bioeconomics, Inc. (2011) study uses these older estimates combined with western state comparisons as justification for the 20-30% discount.
- The discount of 44% adopted in Montana uses (a) a base discount factor of 30% cited in studies summarized in Table 4, (b) the increased costs of noxious weed control (\$1.50/AUM), and (c) where appropriate for rotational grazing to mitigate drought and wildfire impacts (\$1.14/AUM). If adopted, it would be necessary to determine the applicability of these underlying costs (e.g., weed control) for different regions of Idaho. An appropriate discount rate for state endowment trust lands could be as much as 44% of the private lease rate, but likely lower for many Idaho lessees given items (b) and (c).
- In 1985 the Land Board set the grazing rate using a contributory share value of 12% to the state for the beef cattle price received by the lessee. This resulted in an average of 51% (49% discount) of the private lease rate up until 1993. For comparison, state endowment trust land rates have averaged 42% (58% discount) of the private lease rate over the past 24 years. The 12% share adopted in 1985 is similar to the 13% share used in the Calf Crop Share alternative. If past trends hold, the Calf Crop Share alternative could yield grazing rates in the range of 51% of the private lease rate.

In conclusion, 2018 state endowment trust land grazing rates ranging from \$9.19 (Calf Crop Share with 13% index) to \$12.60 (Montana Model with 30% discount) seem appropriate given previous studies and analysis of proposed alternatives. To the degree it is appropriate for the Revised Status Quo to track with the historic value of forage (% change in IDPLLR 1993-2016), which was used to anchor the 1993 Status Quo index, a rate of \$13.59 would be realized on a \$/AUM basis. The Status Quo and Revised Status Quo index of \$1.70 fails to track market trends identified by the Subcommittee. The federal PRIA index of \$1.23 also fails to track market

²⁰ Resource Dimensions, Inc. 2010. Idaho Department of Lands grazing market rent study. Gig Harbor, WA: Resource Dimensions, Inc. Consulting report prepared for Idaho Department of Lands. 136 p.

trends, and was established to support local economies and ranching communities by keeping grazing fees low, not recovery of expenditures or to meet fiduciary obligations.²¹ The Calf Crop Share alternative is derived independently of discount rates and discrepancies in services provided on private as compared to state endowment trust lands across different regions. The contributory value of 13% is similar to historic values, though small changes in this value results in significant changes in grazing fees upward or downward. Anchoring the calf crop index to a percent share of the value of beef cattle creates a stable fee environment that then changes predominately as the price of beef changes.

Whichever approach taken, it is recommended that an annual look-back process be adopted to review the state endowment trust land grazing rate relative to corresponding market conditions and model sensitivities. An in-depth review of the formula and underlying data would be appropriate every five to ten years.

²¹ Government Accountability Office. 2005. Livestock grazing: Federal expenditures and receipts vary, depending on the agency and the purpose of the fee charged. GAO-05-869. Washington, D.C. 110 p.