

# Idaho State Land Grazing Lease Rates: Historical Background

Dr. Neil Rimbey, University of Idaho, Extension Range Economist

With the recent announcement that Idaho Department of Lands (IDL) is reviewing the state's grazing program, there has been quite a bit of interest in the formula and resulting fee levels for grazing on lands administered by the department. This interest has been heightened by recent public information gathering sessions held by IDL throughout the state. This document will serve as an attempt to provide background information on the existing fee formula and other aspects of state land grazing to ranchers, policy makers and others.

The existing formula was enacted by the Idaho Land Board in 1993. This followed months of work and review by a subcommittee which included 3 Board members, IDL staff and representatives of the livestock industry. It also built upon 2 studies of private grazing leases, conducted by the University of Idaho and partially funded by IDL.

## Lease Rate Formula: Background

The formula built upon data developed and used in the Public Rangeland Improvement Act (PRIA) federal grazing fee formula. This data goes back to 1964 and could be utilized to develop a statistically valid model designed to predict changes in the private lease market. This was done using regression techniques. The federal formula utilizes indices of changes in cattle prices, prices paid to produce livestock and private grazing lease rates in the 11 western states. All of these indices are developed and published annually by USDA-National Agricultural Statistics Service (NASS). The Idaho formula uses the 3 PRIA indices and an index of Idaho private grazing lease rates to predict what the Idaho lease rate index will be 2 years into the future. Predicting 2 years into the future was necessary due to IDL requirements of at least a 6 month period for notification to lessees of changes in the lease rate. This was coupled with the fact that NASS data to calculate the indices was not available until late January each year. Table 1 presents the NASS price and input data and the various indices over time.

The goal of the Subcommittee was to utilize this dataset to estimate the functional relationship:

$$\text{IDFVI}_{t+2} = f(\text{FVI}_t, \text{BCPI}_t, \text{PPI}_t, \text{IDFVI}_t)$$

Where:

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

$\text{FVI}_t$  = 11 Western State Private Lease Rate Index at time  $t$  (or, present)

$\text{BCPI}_t$  = US Cattle Price Index at time  $t$

$\text{PPI}_t$  = Prices Paid Index (cattle inputs) at time  $t$

$\text{IDFVI}_t$  = Idaho Private Lease Index at time  $t$

For the period from 1966 through 1989, the following regression equation was estimated for the above function:

$$\text{IDFVI}_{t+2} = -6.92 + .13 \text{FVI}_t + .6 \text{BCPI}_t - .33 \text{PPI}_t + .74 \text{IDFVI}_t \quad [1]$$

(-0.63) (0.46) (7.87) (-4.01) (4.32)

$$R^2 = 0.96$$

$$F = 146.97$$

The Subcommittee was apprised of problems with the equation (multicollinearity, or relationships between the independent variables (e.g. FVI and IDFVI); insignificant variables and others), as well as positive factors (very high correlation coefficient,  $R^2$ , and significance of the equation, as indicated by the F statistic) but chose to recommend this equation to the full Land Board. The primary reasons for this were the inclusion of livestock prices, prices paid and indices of private grazing lease rates in the equation. No recommendation was made by the Subcommittee in terms of a base forage value that would be needed to "drive" the model. In other

words, the equation is used to predict the index of Idaho private grazing lease rates 2 years ahead. This predicted value (IDFVI<sub>t+2</sub>) would then be divided by 100 and multiplied by the base value (or the estimate of net forage value for the base period of 1964-68) to derive the lease rate for state lands 2 years ahead. In a political decision, the Land Board set \$1.70/Animal Unit Month (AUM) as the base forage value and installed the formula for 1993 and subsequent years. Interesting to note the way that the \$1.70 value was derived by the Land Board. One member determined that \$5/AUM was his bottom line on what forage was worth in 1992-3. The Land Board worked backwards through the regression equation to determine that a base value of \$1.70 would result in a fee of \$4.90/AUM. The vote to approve this was 4-1 in favor of the formula and base value, with the “\$5 bottom line” member voting against the measure. Table 2 presents the lease rates calculated under the formula from 1993 through 2015. Figure 1 shows the variation in Idaho private grazing lease rates, IDL lease rates and federal grazing fees over time. Although the graph depicts IDL rates prior to 1993, these are calculated rates designed to show what the state fee levels would have been, had the formula been in place in the earlier years.

### Recent Developments

During 2005-2006, IDL organized an IDL/Livestock Work Group, which met regularly and addressed numerous issues relative to the IDL grazing program. This group met approximately 12 times between December, 2005 and May, 2007. One of the requests that came out of this group was for an update on the regression analysis behind the existing lease rate formula, including the “new” data through 2007. This was done and resulted in the following updated equation.

$$\text{IDFVI}_{t+2} = -26.44 + (0.54678 \text{ FVI}_t) + (0.34163 \text{ BCPI}_t) - (0.25416 \text{ PPI}_t) + (0.73536 \text{ IDFVI}_t) \quad [2]$$

$$R^2 = 0.9609$$

With the new data and updated analysis, the equation changes, as one would expect. We see a larger negative intercept, larger coefficient on FVI, smaller coefficient on PPI and about the same on FVI and BCPI. Again, all variables except FVI are statistically significant at the 0.10 level.

There are several issues and concerns related to the models and their application to calculating annual lease rates. The first issue relates to a technical term known as “multicollinearity” which was covered in the earlier discussion on the existing formula. It is apparent that PPI and the FVI indices are highly correlated, as they both consistently went up over time whereas beef prices had ups and downs. Statistical tests completed during the analysis revealed that multicollinearity existed between these two variables. The easiest way to handle this problem is to get rid of one of the variables in the model. My suggestion would be to exclude PPI. Similar concerns arise in relation to the westwide FVI and the Idaho-specific IDFVI. Theoretically, Idaho private lease rates are included in the calculation or determination of the west-wide private lease rates. Thus, there should be some degree of correlation between those two variables. Torell, et al. (2003) reported all three of the federal formula indices (FVI, BCPI and PPI) were highly correlated. Similar to the findings and recommendations of Torell, et al. (2003) on the federal formula, my suggestion would be to exclude all of the westwide figures and index Idaho forage values solely on what they were in previous years. There is a high degree of correlation between years and you do not have the problems of multicollinearity between independent variables in this sort of equation. The recommended model would be:

$$\text{IDFVI}_{t+2} = 13.85 + (0.9967 \text{ IDFVI}_t) \quad [3]$$

The correlation coefficient for this model is 0.943 and the independent variable and intercept are both statistically significant (p=0.10).

### Grazing Market Rent Study

In 2011, IDL contracted with a consulting group for a review of the IDL Grazing Program. This report was completed in August, 2012 (Gustanski, et al. 2012) and provides a comprehensive review of the department’s grazing program. The report provides an in-depth look at each of the IDL regions, factors affecting demand for rangeland forage, state land grazing programs and fee systems in other states, alternative business models, and a

summary of private grazing leases in Idaho. A critical component of this study was a detailed survey of private grazing leases in Idaho. This survey was able to detail leasing arrangements for rangeland forage from both the lessee and lessor perspectives, lease rates and the impact of services, forage type, location and class of livestock had on the level of lease rates.

A publication through the University of Idaho (Rimbey, et al. 2014) summarizes the private grazing lease arrangements for Idaho rangeland forage resulting from the survey. In addition to the basic information on lease type, animal type, forage base and other factors associated with Idaho grazing leases, this publication includes several critical elements that have bearing on the IDL lease rates. Similar to two other studies on Idaho private grazing lease rates, this study concluded that there was no difference between NASS-published rates and those indicated in this survey. The NASS grazing lease rate for 2011 was \$15/AUM. The average lease rate from this study was \$16.04, which was not statistically different from the NASS rate. In addition, the analysis was able to value factors associated with leases, which will move the debate more towards a net forage value basis rather than the current gross values as embodied in NASS and coffee shop rates. Critical factors valued in this analysis were items such as daily livestock care/management, livestock type/class, regions of the state and percent of the lease that was irrigated. Table 3 presents the estimated values of these factors. A lease which includes daily livestock care/management adds \$2.20/AUM to the total lease price. Similarly, if a lease does not include daily livestock care, one would expect the lease rate to decline by \$2.20/AUM. If yearling cattle are run on the lease, the rate increases by \$3.52/AUM. If sheep are run on the lease, the rate declines by \$2.59/AUM. For each percentage of the lease that is irrigated, the lease rate increases by \$0.022/AUM. Although the study dealt strictly with rangeland forage, there were some leases that were for whole farms or ranches, in which cases, irrigated lands came into play. The statistical analysis revealed that % of irrigated land was a significant variable in the model. Regional differences were also apparent for the Payette Lakes region (roughly the McCall/New Meadows area of Idaho) and the Eastern Idaho region (southeastern Idaho). Leases in the Payette Lakes region were \$1.87/AUM higher than other areas of the state and Eastern area leases were \$1.43/AUM higher.

The market rent study also included recommendations in relation to the development of a new fee formula or updating the existing formula as are included here. Similar concerns about the federal grazing fee system have also been raised in the past (Torell, et al. 2003).

### **Where To From Here?**

With the ongoing review of the fee issue and the grazing program over the next year, there would be numerous opportunities for input on these critical components of the state's grazing program. The existing fee system is not perfect as the gap between private lease rates and IDL rates continues to widen. This is primarily due to the large negative impact of the Prices Paid Index that is included in the formula. The strong year-to-year relationship of private lease rates can be used to advantage in a predictive model. The NASS-published private grazing lease rates are not without fault, but they are the best information available and have been shown to estimate market transactions in the state. Livestock producers generally appreciate having a two-year window of knowing what the rates will be in the future. Based upon state policy on notification of lease rate changes, it does not appear to be possible to shorten this window.

When this issue arose the last time (1992), the Land Board made a political decision and determined what fair market value for state land grazing at that point in time. The same opportunity exists at this time. If this were done, a simple formula to index and update the fee from year to year, utilizing the regression analysis already undertaken. The indexing formula would be based upon NASS private lease information for Idaho. It would not include unnecessary indices for cattle prices, prices paid and west-wide private grazing lease rates. The format would be similar to that included in equation [3]. It should also be stressed that the formula and rates need to be reviewed more frequently than once in 21 years! As noted in the changes in equations [1] and [2], the lease market is dynamic and reflects numerous factors that require frequent review and updating.

**Table 1.** Private grazing lease rates, cattle prices and prices paid, 1964-2013.

Year	PGLLR	FVI	IDPLLR	IDFVI	BCP	BCPI	PPI
1964	\$3.50	92	\$3.33	95	\$19.17	71	95
1965	\$3.58	94	\$3.25	93	\$20.72	77	97
1966	\$3.72	97	\$3.40	97	\$22.92	85	99
1967	\$3.72	97	\$3.47	99	\$23.14	86	103
1968	\$3.72	97	\$3.48	99	\$24.02	89	107
1969	\$3.82	100	\$3.50	100	\$27.00	100	113
1970	\$4.05	106	\$3.71	106	\$29.50	109	118
1971	\$4.06	106	\$3.79	108	\$29.50	109	124
1972	\$4.17	109	\$3.99	114	\$36.80	136	130
1973	\$4.57	120	\$4.41	126	\$43.00	159	140
1974	\$5.82	152	\$5.43	155	\$39.20	145	168
1975	\$5.75	151	\$6.55	187	\$35.20	130	198
1976	\$6.37	167	\$6.14	175	\$36.10	134	215
1977	\$7.06	185	\$6.20	177	\$36.00	133	230
1978	\$7.11	186	\$6.43	184	\$47.60	176	246
1979	\$7.53	197	\$6.47	185	\$64.90	240	275
1980	\$7.88	206	\$6.61	189	\$64.20	238	319
1981	\$8.83	231	\$8.20	234	\$59.10	219	359
1982	\$8.36	219	\$7.98	228	\$57.70	214	378
1983	\$8.85	232	\$8.02	229	\$56.40	209	387
1984	\$8.86	232	\$7.83	224	\$57.79	214	395
1985	\$8.40	220	\$6.97	199	\$53.65	199	397
1986	\$8.10	212	\$7.51	215	\$51.78	192	388
1987	\$8.54	224	\$6.60	189	\$59.95	222	381
1988	\$8.75	229	\$6.99	200	\$65.46	242	386
1989	\$8.87	232	\$6.93	198	\$67.47	250	402
1990	\$9.22	241	\$8.40	240	\$71.81	266	419
1991	\$9.66	253	\$9.55	273	\$72.15	267	436
1992	\$10.03	263	\$8.85	253	\$69.60	258	440
1993	\$10.20	267	\$10.20	291	\$73.43	272	451
1994	\$10.30	270	\$10.30	294	\$67.07	248	455
1995	\$11.00	288	\$10.40	297	\$61.15	226	473

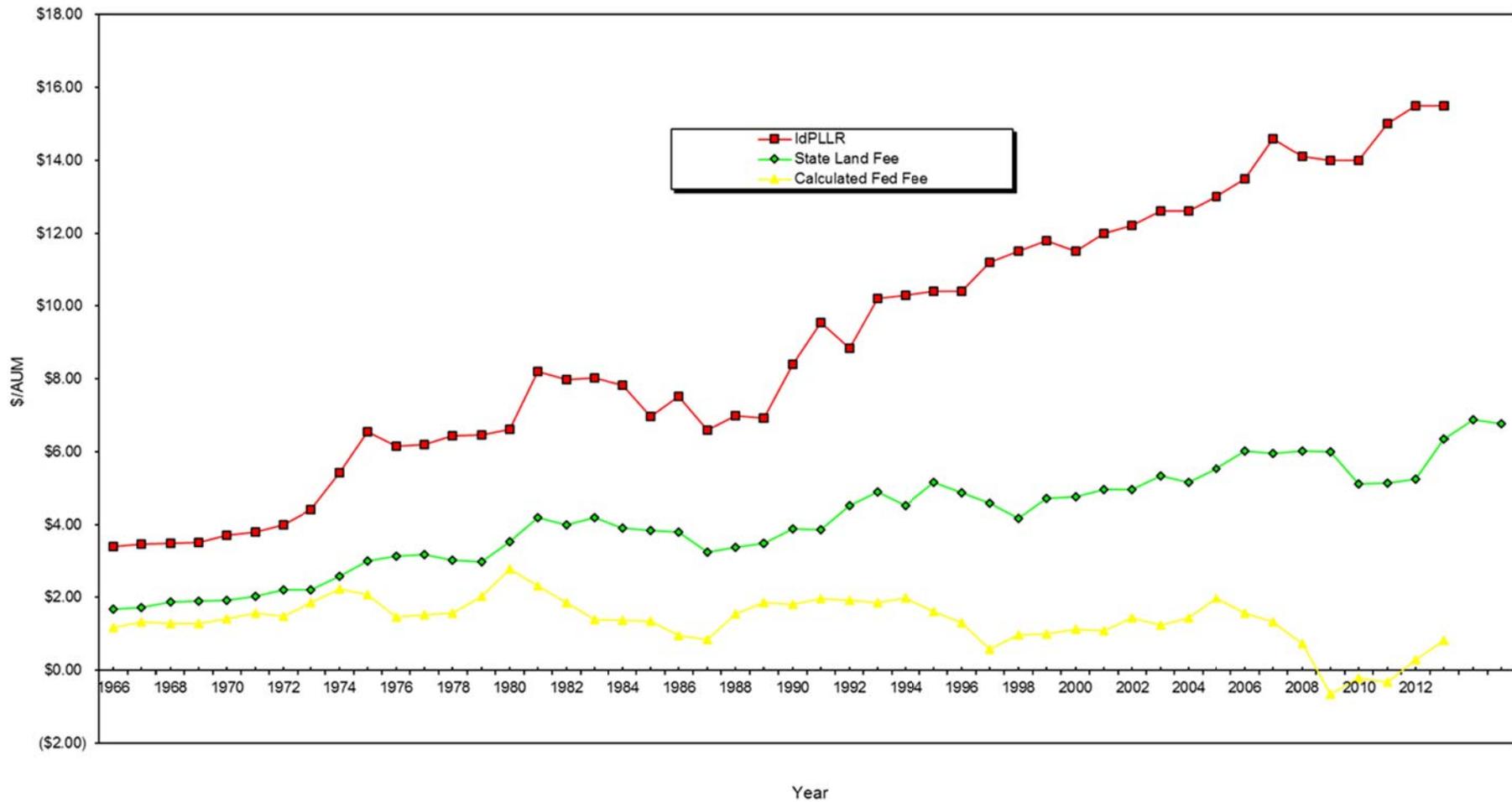
1996	\$10.70	280	\$10.40	297	\$55.49	206	499
1997	\$11.30	296	\$11.20	320	\$61.90	229	512
1998	\$11.80	309	\$11.50	329	\$60.01	222	514
1999	\$11.90	312	\$11.80	337	\$61.89	229	516
2000	\$12.00	314	\$11.50	329	\$68.88	255	554
2001	\$12.60	330	\$12.00	343	\$72.80	270	559
2002	\$13.00	340	\$12.20	349	\$66.76	247	559
2003	\$13.40	351	\$12.60	360	\$75.33	279	593
2004	\$13.80	361	\$12.60	360	\$88.53	328	618
2005	\$14.60	382	\$13.00	371	\$91.04	337	686
2006	\$15.10	395	\$13.50	386	\$92.17	341	724
2007	\$15.60	408	\$14.60	417	\$86.80	321	762
2008	\$16.20	424	\$14.10	403	\$86.89	322	891
2009	\$15.80	414	\$14.00	400	\$78.21	290	806
2010	\$16.10	421	\$14.00	400	\$87.69	325	866
2011	\$16.80	440	\$15.00	429	\$112.29	416	946
2012	\$17.90	469	\$15.50	443	\$122.48	454	980
2013	\$18.50	484	\$15.50	443	\$120.85	448	994

**Table 2.** Idaho State Land Indices and Lease Rates, 1993-2015.

<b>Year</b>	<b>IDFVI</b>	<b>Lease Rate</b>
1993	288.49	\$4.90
1994	266.26	\$4.53
1995	303.13	\$5.15
1996	287.04	\$4.88
1997	269.66	\$4.58
1998	244.60	\$4.16
1999	277.36	\$4.72
2000	279.89	\$4.76
2001	291.25	\$4.95
2002	291.55	\$4.96
2003	313.62	\$5.33
2004	302.97	\$5.15
2005	325.23	\$5.53
2006	354.34	\$6.02
2007	350.32	\$5.96
2008	353.55	\$6.01
2009	352.18	\$5.99
2010	301.08	\$5.12
2011	301.89	\$5.13
2012	308.97	\$5.25
2013	373.86	\$6.36
2014	405.21	\$6.89
2015	398.29	\$6.77

**Table 3.** The value of services, regional differences and livestock class. 2011.\$/AUM

<b>Variable</b>	<b>Value</b>
Intercept	14.03544
Daily Livestock Management	2.20824
Payette Region	1.86688
Eastern Region	1.42954
Yearlings on the lease	3.52751
Sheep on the lease	-2.58727
% of land Irrigated	0.02161



## References

- Gustanski, J., S. Kane, J. Kennedy, N. Rimbey, D. Scarsella, K. Toal, L.A. Torell. 2012. Idaho Department of Lands Grazing Market Rent Study. Resource Dimensions. Gig Harbor, WA. Available online at: <http://www.idl.idaho.gov/leasing/grazing/rate/idl-grazing-mkt-rent-study-reduced.pdf>
- Rimbey, N.R., L.A. Torell and J.A. Tanaka. 2007. Why grazing permits have economic value. *J. of Ag. and Resource Econ.* 32(1):20-40.
- Rimbey, N., L.A. Torell, S. Kane, J. Gustanski, J. Kennedy, D. Scarcella. 2014. Idaho Private Rangeland Grazing—Lease Arrangements. University of Idaho Ag. Exp. Sta. Bulletin 185. August 2014. Moscow, ID.  
<http://www.cals.uidaho.edu/edcomm/pdf/RES/RES185.pdf>
- Torell, L.A., N.R. Rimbey, L.W. VanTassel, J.A. Tanaka and E.T. Bartlett. 2003. An evaluation of the federal grazing fee formula. *J. Range Manage.* 56:577-584.
- Torell, L.A., N.R. Rimbey, O.A. Ramirez and D.W. McCollum. 2005. Income earning potential versus consumptive amenities in determining ranchland values. *J. of Ag. and Resource Econ.* 30(3):537-560.