

**Sensitivity analysis of different grazing rates
(Return on grazing rate income only)**

Statistics and Performance Indicators (nominal)	Alternative #1: Status Quo	Alternative #2: WY Model	Alternative #3: Calf Share Rate	Alternative #4: Market Rate	Alternative #5: Revised Rimby	Alternative #6: MT Model
Net Income Calculation: 2016 Actual Values (\$/AUM)						
(a) Grazing fee	\$ 8.09	\$ 7.27	\$ 9.19		\$ 8.30	\$ 12.14
(b) IDL cash expenditures (\$/AUM)	\$ 4.59	\$ 4.59	\$ 4.59	\$ 4.59	\$ 4.59	\$ 4.59
(c) Net income from grazing (\$/AUM)	\$ 3.50	\$ 2.69	\$ 4.61	\$ (4.59)	\$ 3.71	\$ 7.55
Net Income Calculation: 2011-2016 Actual Values (\$/AUM)						
(d) Grazing fee	\$ 6.42	\$ 6.50	\$ 9.30	\$ -	\$ 6.63	\$ 11.30
(e) IDL cash expenditures (\$/AUM)	\$ 4.92	\$ 4.92	\$ 4.92	\$ 4.92	\$ 4.92	\$ 4.92
(f) Net income from grazing (\$/AUM)	\$ 1.50	\$ 1.58	\$ 4.38	\$ (4.92)	\$ 1.71	\$ 6.38
Land Expectation Value (LEV) Calculation: 2011-2016 Net Income Average Values (\$/Acre)						
(g) LEV @ 2% discount interest rate	\$ 10.92	\$ 11.55	\$ 31.94	\$ (35.88)	\$ 12.49	\$ 46.54
(h) LEV @ 3% discount interest rate	\$ 7.28	\$ 7.70	\$ 21.29	\$ (23.92)	\$ 8.32	\$ 31.03
(i) LEV @ 4% discount interest rate	\$ 5.46	\$ 5.77	\$ 15.97	\$ (17.94)	\$ 6.24	\$ 23.27
(j) LEV @ 5% discount interest rate	\$ 4.37	\$ 4.62	\$ 12.77	\$ (14.35)	\$ 4.99	\$ 18.62
(k) LEV @ 6% discount interest rate	\$ 3.64	\$ 3.85	\$ 10.65	\$ (11.96)	\$ 4.16	\$ 15.51
Return on Assets (ROA) Calculation: 2016 Grazing Net Income / Fair Market Value (LEV)						
(l) ROA with LEV @ 2% interest rate	0.9%	0.7%	1.2%	-1.2%	1.0%	2.0%
(m) ROA with LEV @ 3% interest rate	1.4%	1.1%	1.8%	-1.8%	1.5%	3.0%
(n) ROA with LEV @ 4% interest rate	1.9%	1.4%	2.4%	-2.4%	2.0%	4.0%
(o) ROA with LEV @ 5% interest rate	2.3%	1.8%	3.1%	-3.0%	2.5%	5.0%
(p) ROA with LEV @ 6% interest rate	2.8%	2.1%	3.7%	-3.6%	3.0%	6.0%

Summary statistics and financial performance indicators, Idaho endowment rangeland, FY 2006-2015 (2015 dollars)

Alternative 1 - Status Quo

Statistics and Performance Indicators (2015 \$)	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY11-FY16 Average
(a) Acres leased for grazing	1,765,301	1,765,301	1,789,596	1,785,843	1,793,615	1,732,501	1,772,026
(b) Animal unit months (AUMs) authorized	256,886	260,000	258,324	258,946	259,157	257,950	258,544
(c) Grazing fee, Idaho endowment land (\$/AUM)	\$ 5.13	\$ 5.25	\$ 6.36	\$ 6.89	\$ 6.77	\$ 8.09	\$ 6.42
(d) Cash income from grazing (nominal)	\$ 1,878,863	\$ 1,439,217	\$ 1,932,652	\$ 2,160,442	\$ 2,265,606	\$ 2,376,856	\$ 2,008,939
Direct income from grazing (no bonus bid) (nominal)	\$ 1,317,825	\$ 1,365,000	\$ 1,642,941	\$ 1,784,138	\$ 1,754,493	\$ 2,086,816	\$ 1,658,535
(e) Cash expenditures for management (nominal)	\$ 959,029	\$ 1,260,790	1,253,309	\$ 1,385,401	\$ 1,454,532	\$ 1,182,999	\$ 1,249,343
(f) Net income (nominal)	\$ 919,834	\$ 178,427	\$ 679,343	\$ 775,041	\$ 811,074	\$ 1,193,857	\$ 759,596
(d) Cash income from grazing	\$ 1,986,605	\$ 1,409,895	\$ 1,973,146	\$ 2,170,499	\$ 2,265,606	\$ 2,376,856	\$ 2,030,435
(e) Cash expenditures for management	\$ 1,014,024	\$ 1,306,061	\$ 1,279,569	\$ 1,391,850	\$ 1,454,532	\$ 1,182,999	\$ 1,271,506
(f) Net income	\$ 972,581	\$ 103,834	\$ 693,577	\$ 778,649	\$ 811,074	\$ 1,193,857	\$ 758,929
(g) Net income per AUM	\$ 3.79	\$ 0.40	\$ 2.68	\$ 3.01	\$ 3.13	\$ 4.63	\$ 2.94
(h) Net income per acre	\$ 0.55	\$ 0.06	\$ 0.39	\$ 0.44	\$ 0.45	\$ 0.69	\$ 0.43
(i) Idaho private land grazing fee (\$/AUM) (nominal)	\$ 15.00	\$ 15.50	\$ 15.50	\$ 16.50	\$ 17.00	\$ 17.34	\$ 16.14
(i) Idaho private land grazing fee (\$/AUM)	\$ 15.86	\$ 16.06	\$ 15.82	\$ 16.58	\$ 17.00	\$ 17.34	\$ 16.44
(j) Fee adjustment factor, private to public	0.7	0.7	0.7	0.7	0.7	0.7	0.7
(k) Fair market value public land grazing fee (\$/AUM)	\$ 11.10	\$ 11.24	\$ 11.07	\$ 11.61	\$ 11.90	\$ 12.14	\$ 11.51
(l) Attainable net income from grazing ¹	\$ 1,837,924	\$ 1,616,859	\$ 1,581,111	\$ 1,613,477	\$ 1,629,436	\$ 1,947,998	\$ 1,704,468
(m) Land expectation value (LEV) @ 4% ²	\$ 45,948,109	\$ 40,421,475	\$ 39,527,774	\$ 40,336,932	\$ 40,735,908	\$ 48,699,953	\$ 42,611,692
(n) LEV per acre @ 4%	\$ 26.03	\$ 22.90	\$ 22.09	\$ 22.59	\$ 22.71	\$ 28.11	\$ 24.07
(o) Return on assets, grazing income (ROA _G) ³	2.6%	0.2%	1.7%	2.0%	2.0%	2.9%	1.9%
(p) Return on assets, land value (ROA _L) ⁴	21.5%	-12.0%	-2.2%	2.0%	1.0%	19.6%	5.0%
(q) Total return on assets (ROA _{G+L})	24.1%	-11.8%	-0.5%	4.0%	3.0%	22.5%	6.9%
(r) Land expectation value (LEV) @ 6% ²	\$ 30,632,073	\$ 26,947,650	\$ 26,351,850	\$ 26,891,288	\$ 27,157,272	\$ 32,466,635	\$ 28,407,795
(s) LEV per acre @ 6%	\$ 17.35	\$ 15.27	\$ 14.73	\$ 15.06	\$ 15.14	\$ 18.74	\$ 16.05
(t) Return on assets, grazing income (ROA _G) ³	3.9%	0.3%	2.6%	3.0%	3.0%	4.4%	2.9%
(u) Return on assets, land value (ROA _L) ⁴	21.5%	-12.0%	-2.2%	2.0%	1.0%	19.6%	5.0%
(v) Total return on assets (ROA _{G+L})	25.4%	-11.7%	0.4%	5.0%	4.0%	23.9%	7.8%

¹ ((b) x (k)) - (e)

² (l) / "discount rate"

³ ((f) / (m)_{t-1} from previous year) x 100

⁴ ((m) - (m)_{t-1} for previous year) / ((m)_{t-1} for previous year) x 100

Grazing rate adjustment factor:

0.7

Grazing Rate Review

Land Board Subcommittee

UPDATED DRAFT (December 16, 2015)

Policy Analysis Group

University of Idaho

Summary statistics and financial performance indicators, Idaho endowment rangeland, FY 2006-2015 (2015 dollars)

Notes:

- FY2001-FY2005 data on IDL expenditures and income includes ag lands
- FY2006 State Controllers office changed how AUMs calculated in budget analysis
- IDL is most comfortable with post-2006 data; AUMs and acres are estimates only for some years
- introduced bonus bidding in FY2010 for 20-yr leases, which translated to higher revenue in those years, but will drop-off in later years around 2020

Alternative 2 - Wyoming Model

Year	100% Base Model	110% Adjusted Model	Historical IDL State Fees	Idaho Private Fees	Prices Paid Index (PPI)	Price Index (BCPI)	BCPR	Calc \$/AUM
1992	\$5.03	\$5.53	\$4.53	\$9.49	436	\$69.60		
1993	\$5.21	\$5.73	\$4.90	\$9.25	440	\$73.43		
1994	\$5.33	\$5.86	\$4.53	\$9.70	451	\$67.07		
1995	\$5.16	\$5.67	\$5.15	\$10.10	455	\$61.15		
1996	\$4.75	\$5.23	\$4.88	\$10.20	473	\$55.49		
1997	\$4.54	\$5.00	\$4.58	\$10.40	499	\$61.90		
1998	\$4.37	\$4.81	\$4.16	\$10.80	512	\$60.01		
1999	\$4.35	\$4.79	\$4.72	\$11.10	514	\$61.89		
2000	\$4.42	\$4.87	\$4.76	\$10.90	516	\$68.88		
2001	\$4.66	\$5.13	\$4.95	\$11.50	554	\$72.80		
2002	\$4.77	\$5.25	\$4.96	\$11.70	559	\$66.76		
2003	\$5.11	\$5.62	\$5.33	\$12.00	559	\$75.33		
2004	\$5.42	\$5.96	\$5.15	\$12.20	593	\$88.53		
2005	\$5.71	\$6.28	\$5.53	\$12.50	618	\$91.04		
2006	\$5.83	\$6.41	\$6.02	\$12.80	686	\$92.17		
2007	\$6.01	\$6.61	\$5.96	\$13.80	724	\$86.80		
2008	\$5.71	\$6.28	\$6.01	\$12.60	762	\$86.89		
2009	\$5.33	\$5.86	\$5.99	\$12.60	891	\$78.21		
2010	\$4.96	\$5.46	\$5.12	\$12.00	806	\$87.69		
2011	\$5.03	\$5.53	\$5.13	\$14.50	866	\$112.29	41.50%	\$5.44
2012	\$5.16	\$5.67	\$5.25	\$15.30	946	\$122.48	42.42%	\$5.68
2013	\$5.58	\$6.14	\$6.36	\$15.50	980	\$120.85	43.00%	\$6.01
2014	\$6.34	\$6.98	\$6.89	\$16.50	994	\$142.34	49.08%	\$7.24
2015	\$7.05	\$7.76	\$6.77	\$17.00	1015	\$148.98	46.67%	\$7.36
2016				\$17.34			44.53%	\$7.27
2017								

* Idaho Private Fees, PPI, and BCPI based on USDA-NASS

Beef Cattle Price Ratio data obtained from NASS Quick Stats

"CATTLE, GE 500 LBS - PRICE RECEIVED, MEASURED IN PCT OF PARITY"

https://quickstats.nass.usda.gov/?long_desc__LIKE=beef+cattle+parity+price#70806056-0500-39C4-9995-09C729DE5096

Alternative 3 - Calf-Crop Share

[[[(A x B) + (A x B x C)*D] divided by 2] x E] divided by 12 months

A = USDA 5.5 CWT annual steer rate average

B = UI Weaning percentage average

C = UI Heifer weight average percentage

D = average heifer discount

E = calf crop index (based on UI average pasture costs)

average pasture cost

	Rate		
	\$ 1,200	example	\$ 1,044
	0.87		\$ 873.48
	0.9045		
	0.925		
	\$ 958.74		
	0.13		
\$/AUM	\$10.39		

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Cattlefax Annual Avg 5.5cwt Steer \$/cwt	\$ 99.65	\$ 100.40	\$ 91.58	\$ 99.51	\$ 118.47	\$ 127.93	\$ 125.48	\$ 119.62	\$ 113.46	\$ 107.45	\$ 121.24	\$ 146.46	\$ 167.41	\$ 168.12	\$ 244.06	\$ 252.42	\$ 193.13
Cattlefax Annual Avg 5.5cwt Steer \$/head (A)	\$ 549.08	\$ 552.18	\$ 503.67	\$ 547.29	\$ 651.57	\$ 703.59	\$ 690.13	\$ 657.90	\$ 624.05	\$ 590.97	\$ 666.80	\$ 805.62	\$ 920.73	\$ 924.68	\$ 1,342.32	\$ 1,388.31	\$ 1,062.21
UI Weaning percentage 87% (A*B)	\$ 477.70	\$ 480.40	\$ 438.19	\$ 476.14	\$ 566.87	\$ 612.12	\$ 600.41	\$ 572.37	\$ 542.92	\$ 514.14	\$ 580.12	\$ 700.89	\$ 801.04	\$ 804.47	\$ 1,167.82	\$ 1,207.83	\$ 924.12
UI Heifer weight and price discount 90.45%, 92.5% ((A*B*C)*D)	\$ 399.67	\$ 401.93	\$ 366.62	\$ 398.37	\$ 474.28	\$ 512.14	\$ 502.34	\$ 478.88	\$ 454.24	\$ 430.16	\$ 485.36	\$ 586.41	\$ 670.20	\$ 673.07	\$ 977.07	\$ 1,010.55	\$ 773.18
Calf Crop Index (E)	\$ 438.69	\$ 441.16	\$ 402.41	\$ 437.26	\$ 520.57	\$ 562.13	\$ 551.38	\$ 525.63	\$ 498.58	\$ 472.15	\$ 532.74	\$ 643.65	\$ 735.62	\$ 738.77	\$ 1,072.44	\$ 1,109.19	\$ 848.65
\$/AUM	\$ 4.75	\$ 4.78	\$ 4.36	\$ 4.74	\$ 5.64	\$ 6.09	\$ 5.97	\$ 5.69	\$ 5.40	\$ 5.12	\$ 5.77	\$ 6.97	\$ 7.97	\$ 8.00	\$ 11.62	\$ 12.02	\$ 9.19

Idaho Department of Lands
Grazing Conflict Auction Results 2008 - 2014

Alternative 4 - Market Rate

Year Conflicted	Area	County	Lease Number	Tier	Lease Term	Authorized AUMs	Grazing Acres	Improvement Value	High Bid	Premium AUM Rate/Year	Total Rate (bonus plus base)
2008	Southwest	Owyhee	G600045	2	10	61	640	\$0	\$5,501	\$9.02	
2008	Southwest	Owyhee	G600046	2	10	425	3,651	\$6,330	\$42,500	\$10.00	
2008	Eastern	Bingham	G800044	2	10	495	3,809	\$25,610	\$6,000	\$1.21	
2009	Craig Mountain	Idaho	G430003	2	10	100	1,392	\$0	\$320	\$0.32	
2009	Craig Mountain	Idaho	G430004	2	10	45	155	\$6,914	\$252	\$0.56	
2009	Craig Mountain	Idaho	G430005	2	10	803	9,268	\$5,803	\$49,000	\$6.10	
2009	Eastern	Bannock	G800038	2	10	131	1,348	\$1,880	\$910	\$0.69	
2009	Eastern	Bingham	G800039	2	10	51	571	\$5,100	\$6,200	\$12.16	
2009	Eastern	Bingham	G800039	2	10	212	1,709	\$33,835	\$800	\$0.38	
2009	Eastern	Bingham	G800040	2	10	364	2,488	\$49,200	\$27,500	\$7.55	
2009	Eastern	Bingham	G800041	2	10	1,080	4,431	\$69,980	\$5,000	\$0.46	
2010	Eastern	Bingham	G800094	1	20	8	26	\$1,320	\$5,600	\$35.00	
2010	Eastern	Bingham	G800052	2	20	734	2,647	\$32,830	\$70,200	\$4.78	
2010	Eastern	Bonneville	G800060	2	20	343	1,084	\$17,870	\$60,000	\$8.75	
2010	Eastern	Bonneville	G800061	2	20	400	1,544	\$38,190	\$1,300	\$0.16	
2010	Eastern	Bonneville	G800064	2	20	170	804	\$7,430	\$13,000	\$3.82	
2010	Eastern	Bingham	G800084	2	20	1883	6,255	\$57,780	\$310,000	\$8.23	
2012	Southwest	Elmore	G600103	1	20	720	2,301	\$16,134	\$66,000	\$4.58	\$9.83
2012	Eastern	Bingham	G800148	1	20	79	320	\$7,140	\$15,100	\$9.56	\$14.81
2012	Eastern	Bingham	G800148-a	1	20	504	2,232	\$36,330	\$91,100	\$9.04	\$14.29
2012	Eastern	Bingham	G800148-b	1	20	82	307	\$6,670	\$2,100	\$1.28	\$6.53
2012	Eastern	Bingham	G800164	1	20	64	171	\$5,560	\$17,350	\$13.55	\$18.80
2012	Eastern	Bingham	G800169	1	20	38	150	\$4,110	\$700	\$0.92	\$6.17
2012	Eastern	Bingham	G800171	1	20	1,232	3,080	\$171,040	\$25,050	\$1.02	\$6.27
2012	Southwest	Owyhee	G600104	2	20	307	2,319	\$34,317	\$2,000	\$0.33	\$5.58
2012	Southwest	Ada	G600116	2	20	181	1,241	\$0	\$109,000	\$30.11	\$35.36
2012	South Central	Owyhee	G700129	2	20	45	320	\$0	\$6,000	\$6.67	\$11.92
2012	Eastern	Bonneville	G800139	2	20	80	280	\$5,010	\$26,500	\$16.56	\$21.81
2012	Eastern	Bingham	G800140-a	2	20	283	725	\$10,760	\$82,000	\$14.49	\$19.74
2012	Eastern	Bingham	G800140-b	2	20	73	195	\$1,710	\$1,750	\$1.20	\$6.45
2012	Eastern	Fremont	G800150	2	20	40	160	\$0	\$22,000	\$27.50	\$32.75
2012	Eastern	Bingham	G800154	2	5	624	1,524	\$0	\$49,250	\$15.79	\$21.04
2012	Eastern	Fremont	G800165	2	20	86	320	\$17,760	\$18,500	\$10.76	\$16.01
2012	Eastern	Bonneville	G800167	2	20	112	360	\$11,330	\$17,100	\$7.63	\$12.88
2012	Eastern	Fremont	G800173	2	20	128	640	\$0	\$3,200	\$1.25	\$6.50
2013	Eastern	Gooding	G700173	2	20	4	40	\$1,550	\$300	\$3.75	\$10.11
2013	Eastern	Madison	G800217	2	20	215	1,398	\$21,140	\$70,310	\$16.35	\$22.71
2013	Eastern	Madison	G800230	2	20	246	1,107	\$20,140	\$51,000	\$10.37	\$16.73
2014	Southwest	Elmore	G600130	2	10	755	7,998	\$43,370	\$99,001	\$13.11	\$20.00
2014	Eastern	Clark	G800264	2	20	134	612	\$5,350	\$22,250	\$8.30	\$15.19
2014	Eastern	Power	G800280	2	20	94	640	\$10,090	\$2,500	\$1.33	\$8.22
2014	Eastern	Clark	G800287	2	20	23	26	\$880	\$1,000	\$2.17	\$9.06

**Idaho Department of Lands
Grazing Conflict Auction Results 2008 - 2014**

2014	Eastern	Clark	G800290	2	20	884	3,497	\$134,910	\$200,001	\$11.31	\$18.20
2014	Eastern	Freemont	G800343	2	20	375	800	\$19,240	\$90,000	\$12.00	\$18.89
2015	Eastern	Bingham	G800339		20	81	320	\$1,870	\$30,000	\$18.52	\$25.29
2015	Eastern	Freemont	G800328		20	557	600	\$32,050	\$75,000	\$6.73	\$13.50
2015	Eastern	Freemont	G800341		20	450	958	\$20,530	\$150,000	\$16.67	\$23.44
2015	Eastern	Butte	G800315		20	167	759	\$19,320	\$1,501	\$0.45	\$7.22
2015	Eastern	Camas	G700223		20	29	320	\$0	\$250	\$0.43	\$7.20
2015	Eastern	Cassia	G700237		16	184	1,333	\$8,200	\$55,000	\$18.68	\$25.45
2016			G430027		10	560	5,172	\$7,370	\$80,000	\$14.29	\$22.38
2016			G430017		10	106	764	\$5,300	\$20,000	\$18.87	\$26.96

Alternative 5 - Revised Status Quo

$$\text{IDFVI}_{t+2} = 13.85 + (0.9967 * \text{IDFVI}_t)$$

Year	IDFVI		w/o base ajustment	with base adjustment (1.7)
2011	301.890	314.744	\$ 3.15	\$ 5.35
2012	308.970	321.800	\$ 3.22	\$ 5.47
2013	373.860	386.476	\$ 3.86	\$ 6.57
2014	405.210	417.723	\$ 4.18	\$ 7.10
2015	398.290	410.826	\$ 4.11	\$ 6.98
2016	475.970	488.249	\$ 4.88	\$ 8.30
2017	529.790	541.892	\$ 5.42	\$ 9.21

Alternative 6 - Montana Model

Beef cattle price								nominal	nominal	nominal
Year	MT \$/lb	multiplier	\$/AUM	Year	US\$/lb	W11 \$/lb	multiplier	IDPLLR (\$/AUM)	ID \$/AUM (30% IDPLLR)	ID \$/AUM (calculated)
2011	\$ 0.9720	7.54	\$ 7.33	2011	\$ 1.1325	\$ 1.1229		\$ 15.00	\$ 10.50	\$ -
2012	\$ 0.9720	8.13	\$ 7.90	2012	\$ 1.2150	\$ 1.2248		\$ 15.50	\$ 10.85	\$ -
2013	\$ 1.1400	8.72	\$ 9.94	2013	\$ 1.2467	\$ 1.2085		\$ 15.50	\$ 10.85	\$ -
2014	\$ 1.2270	9.30	\$ 11.41	2014	\$ 1.5283	\$ 1.4234		\$ 16.50	\$ 11.55	\$ -
2015	\$ 1.4574	9.89	\$ 14.41	2015	\$ 1.4792	\$ 1.4898		\$ 17.00	\$ 11.90	\$ -
2016	\$ 1.8678	10.48	\$ 19.57	2016	\$ 1.2008	\$ 1.2008	10.11	\$ 17.34	\$ 12.14	\$ 12.14
2017	\$ 1.3365	10.48	\$ 14.01	2017			10.11			

chain future rates to 2016 multiplier

Weighted average price per pound of beef cattle

Source: Montana Agricultural Statistics Service of the U.S. Department of Agriculture (USDA NASS)

US Beef Cattle Average Price Received (\$/cwt)(<http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1002>)

	2011	2012	2013	2014	2015	2016
	107	122	125	138	164	130
	108	124	123	144	159	132
	115	126	125	148	160	135
	119	122	125	148	162	131
	112	121	126	146	160	128
	107	120	122	147	155	125
	111	115	120	156	149	119
	111	117	121	158	148	117
	112	121	122	157	139	108
	117	122	127	161	128	101
	120	124	130	167	129	104
	120	124	130	164	122	111
Avg \$	\$ 1.1325	\$ 1.2150	\$ 1.2467	\$ 1.5283	\$ 1.4792	\$ 1.2008

