HOME ON THE RECLAIMED RANGE – CAN A FAMILY STILL MAKE A LIVING?[1]

Roy S. Liedtke and Wendy S. Hutchinson[2]

Abstract. Reclamation specialists have been researching and planning reclamation for over 20 years in the West, but have they been facilitating postmining land use development? An economic evaluation of a premining ranching operation compared to a reclaimed area ranching operation shows that a postmining rancher can make a living, providing all of the necessary postmining features are included in the design.

Current reclamation planning needs to focus on the economics of ranching. Pasturelands, water sources, roads, and related features must be included in the reclamation plan. If vegetation and wildlife are the only focus of reclamation planning, the land will be less economically viable; therefore, the reclaimed land will not support the postmining land uses that are currently envisioned. A ten-year cash flow analysis of three cases was conducted. Case 1 assumed premining land conditions. Case 2 assumed currently permitted and encouraged reclamation practices in Wyoming, which focus on wildlife habitat over postmining agricultural use. Case 3 provided agricultural improvements to the Case 2 reclamation plan, by increasing the acreage of reclaimed pasturelands and reconstructing agricultural water source distribution. Analysis of the cases revealed a net present value of $61/acre, $39/acre, and $89/acre respectively for the three cases. Thus focusing reclamation planning on wildlife features is economically worse than the premining situation. However, reclamation planning focused on the agricultural postmining land use can be achieved and yield better financial results than premining, while still providing wildlife habitat.

Additional Key Words: ranching, economics, cash flow, postmining land use, reclamation planning, environmental design, landscape architecture, site planning.

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Introduction

What is successful reclamation? Is it cattle grazing? Is it shrub re-establishment? Is it wildlife habitat? In an effort to determine what is successful reclamation, it helps to review the statutes and rules surrounding requirements for reclamation in the hopes of understanding what Congress, the State Legislature, and therefore the American Public view as successful reclamation. A review of the rules shows the following:

- Surface Mine Control and Reclamation Act (SMCRA) Section 515(b)(2) states "…restore the land affected to a condition capable of supporting the uses which it was capable of supporting prior to any mining, or higher or better uses…" (United States, 1993)
- Office of Surface Mining (OSM) Rules Section 816.133 states "All disturbed areas shall be restored in a timely manner to conditions that are capable of supporting - (1) The uses they were capable of supporting before any mining; or (2) Higher or better uses." (OSM, 2001)
- Wyoming Department of Environmental Quality (WDEQ) Land Quality Division Rules and Regulations Chapter 4, Section 2(a)(i) states, "Reclamation shall restore the land to a condition equal to or greater than the 'highest previous use.' The land, after reclamation, must be suitable for the previous use which was of the greatest economic or social value to the community area…." Section 2(a)(ii) goes on to state, "Operators are required to restore wildlife habitat… unless the land is private and the proposed use is for a residential or agricultural purpose which may preclude its use as wildlife habitat."(Wyoming, 2002)

It is interesting to note that Wyoming rules require consideration of the economic and social value to the community in reclamation planning, especially if the land is held privately. However, in practice if the private landowner is the mineral company, the government tends to give less consideration to the land development wishes of that private interest (Diamond and Noonan, 1996). The WDEQ regulations certainly imply that agricultural and residential considerations have priority over wildlife considerations. Although everyone wants (expects??) wildlife usage, creating wildlife habitat is not always required. The land can be made more

valuable after mining than it was before mining. (See the excellent overview by Burley (2001), and the Schellie citations within).

If agriculture is a postmining land use, then one should consider the current plight of agriculture during reclamation planning. The Powder River Basin (PRB) mine in this study is located in northeast Wyoming, near the town of Wright in Campbell County. Figure 1 shows the total personal income for Campbell County, Wyoming for various business sectors over the last 30 years. Not unexpectedly, the mining industry has grown and contributed greatly to personal income for the residents in the past 30 years. Services and professional occupations show a similar trend. Non-labor sources, which include royalties from mineral interests, have also grown accordingly. The government sector shows a gradual increase. Construction growth spiked in the early 1980's in response to the growth in the mining sector and corresponding local community infrastructure needs. Manufacturing is very minimal in Campbell County. Farm and Agriculture was the mainstay of the local economy prior to the energy boom of the 1970's; however, total personal income from agriculture has not grown and has hovered near zero over the past 30 years.

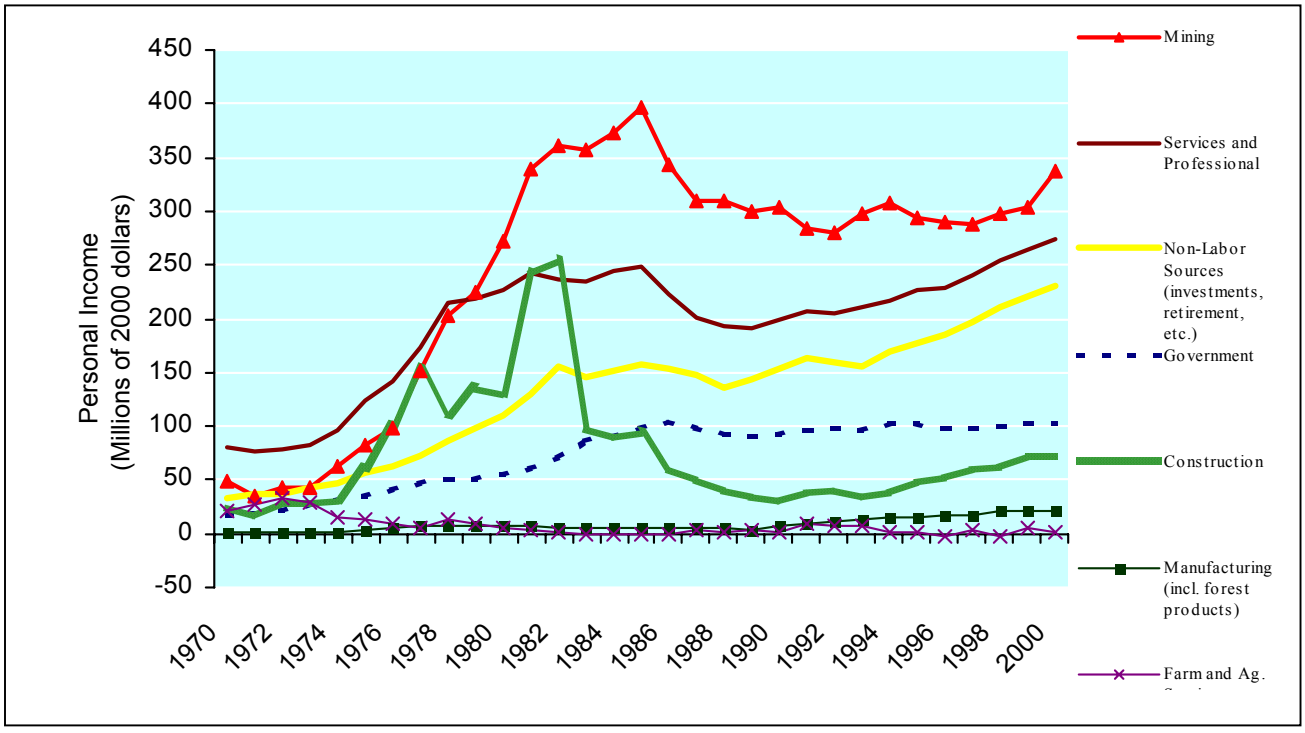

Figure 1 Total Personal Income in Campbell County, WY. (Sonoran Institute, Bozeman, MT, 2002, compiled from U.S. Department of Commerce and U.S. Department of Labor data.)

Figure 2 shows a general consolidation of the agricultural industry. The numbers of farms and ranches decreased since the 1930's, with a slight rise in the mid-1970's and has held steady since then.

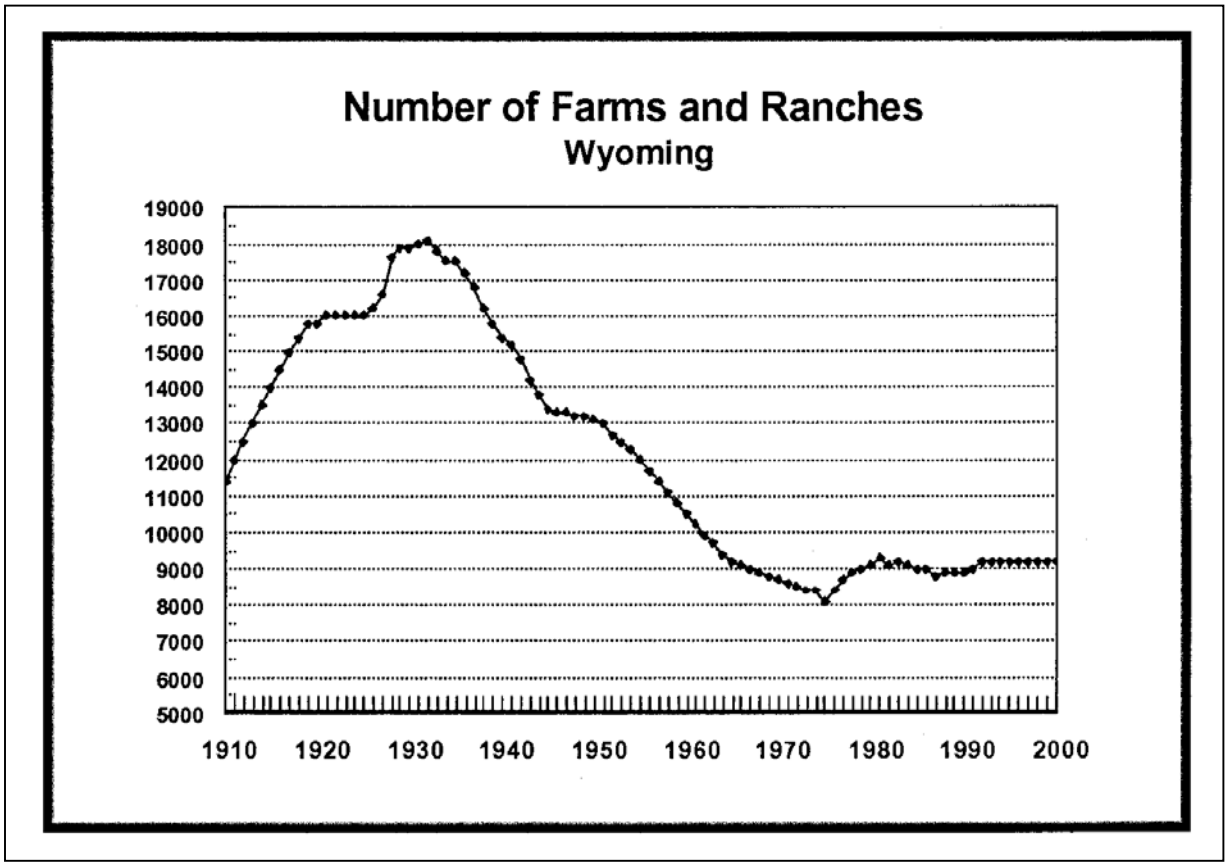

Figure 2 Number of Farms and Ranches in Wyoming from 1910 to 2000. (Wyoming Agricultural Statistics Service, 2000)

Even though the number of farms and ranches stabilized in the early 1970s, their income has continued to decline, as shown in Figure 3. Reclamation planning needs to focus on the person that will be using the land after mining is completed. If the postmining land user is stressed financially, overgrazing could occur, which would result in a negative affect on the land. If the overgrazing causes failure of the reclamation, the mining company will most likely be blamed. This look at the plight of agriculture shows why mining companies need to plan for the postmining land user.

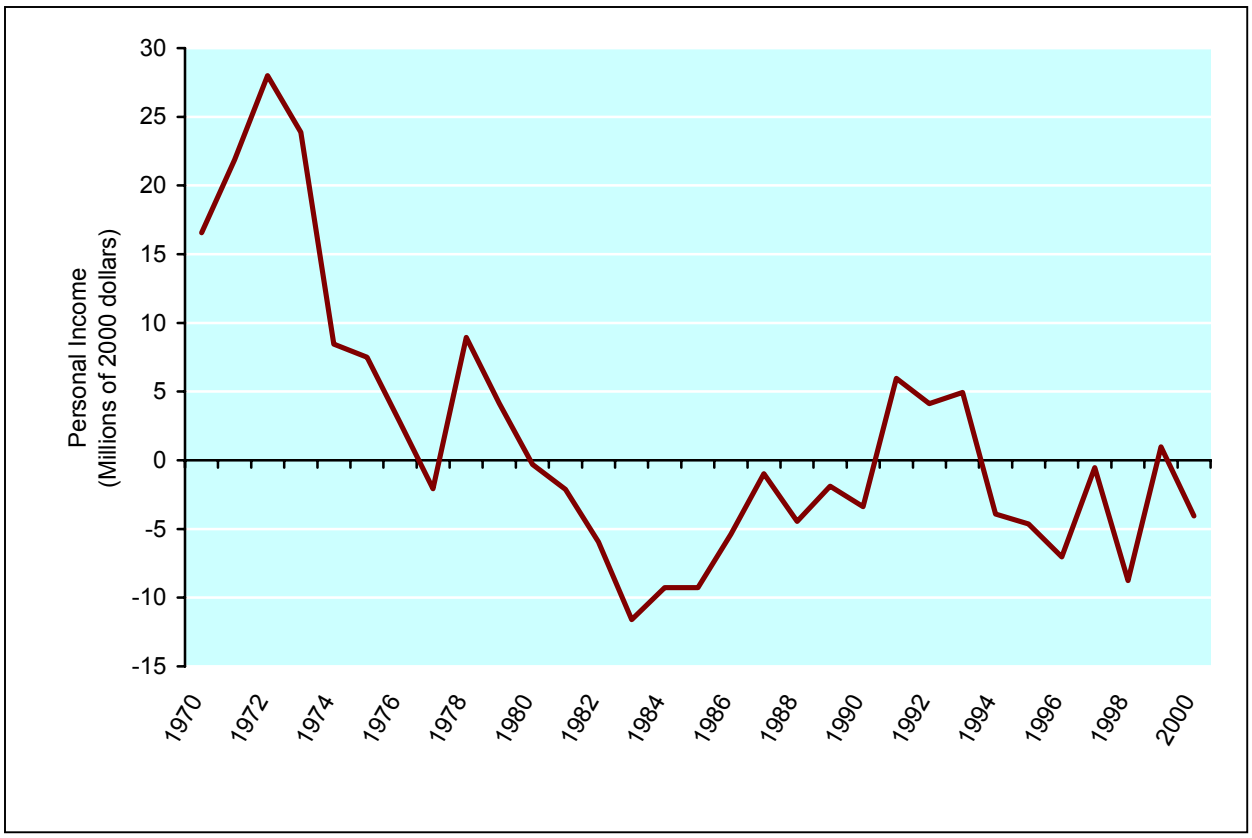

Figure 3 Total Net Income from Farming and Ranching, Campbell County, WY. (Sonoran Institute, Bozeman, MT, 2002, compiled from U.S. Department of Commerce and U.S. Department of Labor data.)

As the mines in the PRB grow and the amount of coal shipped increases, the amount of reclamation also increases. In addition, the ratio of acres needed for facilities decreases with disturbance. As an example, Figure 4 shows the cumulative reclaimed acres of the Jacobs Ranch Mine (JRM), located in southern Campbell County, Wyoming. It took JRM almost 20 years to reclaim its first 809 hectares (2000 acres). It took only an additional eight (8) years to reclaim its second 809 hectares (2000 acres). The current reclamation schedule is to reclaim the third 809 hectares (2000 acres) in the next 3 - 4 years. Because of this dramatic increase in reclaimed acres, it is imperative to think about the postmining land use in greater detail now. Failures to address postmining land use needs early in the mining process may result in difficulties in obtaining bond release (Steward, 1996).

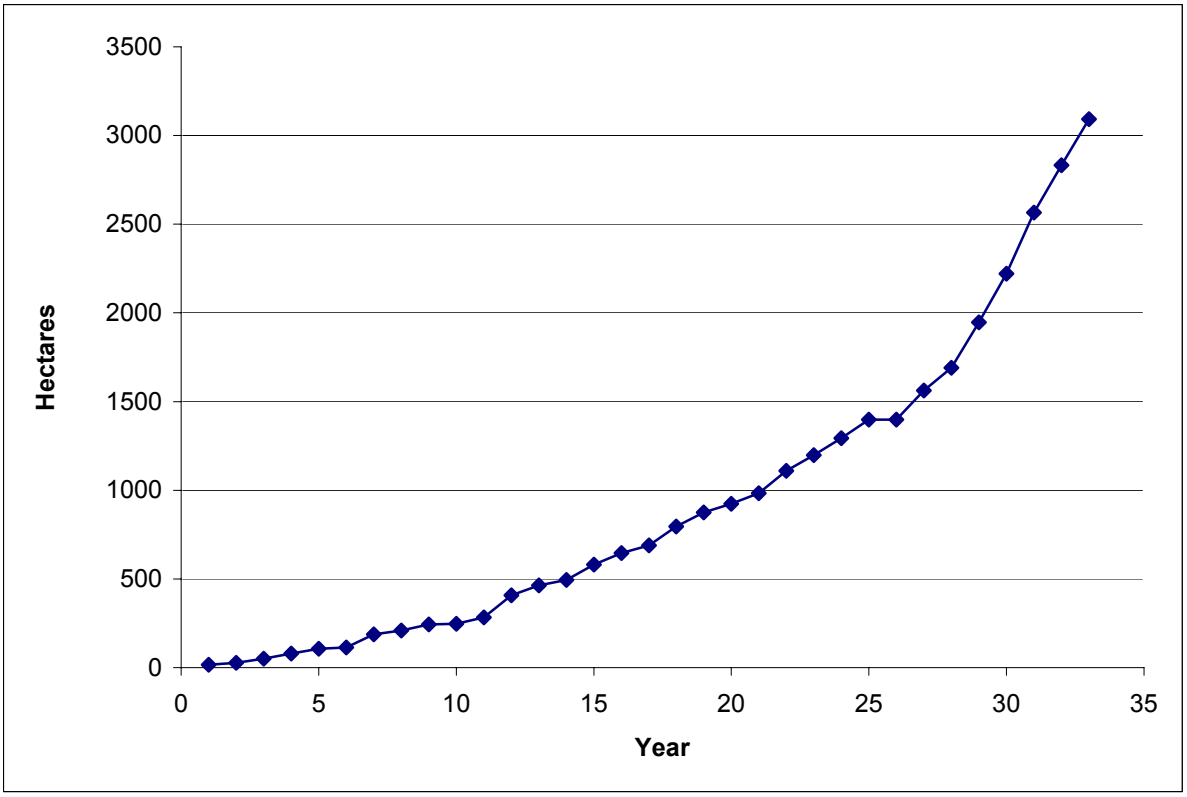

Figure 4 Cumulative Reclaimed Area at Jacobs Ranch Mine.

A study was conducted on Jacobs Ranch Mine to determine the economic viability of the postmining versus the premining lands from the perspective of the rancher. JRM is a typical PRB mine. The majority of premining acreage was owned and ranched as one unit by Mr. John Jacobs, and the land is primarily privately owned. JRM has the largest acreage of reclaimed land in the PRB, making available several years of vegetation data on reclaimed lands to utilize for the study.

Assumptions

The premining Jacobs Ranch consisted of 3,757 hectares (9,284 acres) of native grasslands and crested wheatgrass pasturelands with a fairly typical distribution of water. It was a typical cow-calf beef operation with supplemental hay fed in the winter. This type of operation was

chosen to analyze, as it is the norm in Campbell County, Wyoming (Wyoming Agriculture Statistics Service, 2000).

The analysis assumed the following:

- One water supply required per section (259 hectares (640 acres)).
- Cattle prices varied per North Dakota State University (NDSU) projections (Hughes, 2001).
- Hay prices were held constant due to their dependency on weather, not market cycles.
- One cow requires 11.3 kg (25 lbs) of forage per day.
- Fifty percent (50%) of vegetation production of grazable species was used to determine stocking rate (the stocking rate was very close to historical numbers of 12 to 16 hectares (30 to 40 acres) per cow per year on premining areas and 8 hectares (20 acres) per cow per year on reclaimed areas.
- Pasturelands were utilized for hay production with fall grazing of regrowth. Hay production was determined from county averages. Stocking rates on the pasturelands after haying assumed 25% of the total production was regrowth available for grazing.

Analysis

Economic analyses were conducted that compared 10-year cash flows for a typical cow-calf operation in the PRB. The analysis included capital costs for livestock and water system developments. Costs for the land were not included, as the analysis calculated the land value at a 5% rate of return on investment. Inflation was considered equal in all cases; therefore, it was not included. Net present value was calculated for each case.

Income was derived from livestock and hay sales. Hunting leases and other supplementary incomes were not included as they were assumed to be equal in all cases. This assumption of equivalence on game wildlife usage may not be valid, as reclaimed area wildlife studies have shown increased usage on the reclaimed areas. However, most reclaimed areas in the PRB have limited hunting pressure, which may influence this usage. Expenses included equipment, fuel, feed, trucking, insurance, property taxes, utilities, maintenance and veterinary costs.

Case 1 modeled the premining situation. This assumed Jacobs Ranch was never mined. Pre-mine baseline vegetation data was used to determine stocking rates and acres of pastureland (See Table 1).

Table 1. Case 1 Premining Jacobs Ranch – Calculation of Number of Animals the Ranch Will Support

Vegetation Community	Hectares	Acres	gm/m2	lbs/acre	Total kg	Total lbs	Grazable kg	Grazable lbs
Big Sage	2,002	4,947	50	443	994,067	2,191,521	497,034	1,095,761
Grassland	869	2,148	88	787	766,795	1,690,476	383,397	845,238
Bottomland	20	49	106	946	21,026	46,354	10,513	23,177
Wheatgrass	268	663	108	967	145,405	320,561	72,703	160,280
Other	563	1,391	50	443	279,512	616,213	139,756	308,107
	3,722	9,198					1,103,403	2,432,562

Assume 14 hectares (35 acres)/cow/year	# of cows =	263
Assume 11 kg (25 lbs)/day/animal	# of cows =	**267**

NOTE: Acreages may vary slightly from other tables due to minor differences in accounting for ponds, facilities, oil and gas disturbances.

The total pounds available for grazing from the wheatgrass community (haylands) were halved to account for cutting for hay. Generally haylands are grazed lightly very early in year, then allowed to grow for hay, then the regrowth and stubble is grazed again heavier in the fall and winter. The grazable pounds were considered to be 50% of the total pounds since the gathering of vegetation production data requires clipping the vegetation to ground level, which is considerably shorter than a cow would normally graze.

The Jacobs Ranch area (i.e. southern Campbell County, Wyoming) generally assumes 12 – 16 hectares (30 - 40 acres) per cow per year. This was used to do a gross check of the calculations from the baseline numbers. Since the numbers were comparable, the baseline vegetation monitoring number of 267 cows was utilized.

Case 2 modeled the postmining situation (See Table 2). This case assumes that Jacobs Ranch has been completely mined and reclaimed according to the currently approved reclamation plan.

Table 2. Case 2 Postmining Jacobs Ranch – Calculation of Number of Animals the Ranch Will Support

Vegetation Community	Hectares	Acres	gm/m2	Lbs/acre	Total kg	Total lbs	Grazable kg	Grazable lbs
Shrub/grass	2,978	7,358	100	894	2,983,947	6,578,410	1,491,974	3,289,205
Shrub patch	744	1,840	50	443	369,656	814,943	184,828	407,471
Hayland	0	0	-	-	-	-	-	-
	3,722	9,198					1,676,801	3,696,676

Assume 8 hectares (20 acres)/cow/year # of cows = 460
Assume 11 kg (25 lbs)/day/animal # of cows = **405**

Reclaimed Area Vegetation Monitoring Production Data

Year	gm/m2	lbs/acre
2001	69.8	622.6
2000	128.6	1147.1
1997	102.1	911.0
Average	100.2	893.6

The postmining data was taken from reclaimed area interim vegetation monitoring. The grazable pounds were considered to be 50% of the total pounds, as described in the premining case. Vegetation production data is generally not gathered from shrub patch areas (20% of the reclaimed area, per Wyoming Rules & Regulations); therefore, the production of the shrub patch areas was assumed to be the same as the production of the premine big sagebrush community.

Intensive grazing of reclaimed areas since 1998 show it would generally require 8 hectares (20 acres) to support one cow for one year. This was used to do a gross check of the calculations from the reclaimed area vegetation monitoring data. Since the numbers were comparable, the conservative vegetation monitoring number of 405 cows was utilized.

According to the permit, no postmining pasturelands will be created. The basics of this reclamation plan were agreed between the mine and DEQ approximately 15 years ago. At that time, and even today, the mines are not encouraged to put back pasturelands. In fact, the mine is not allowed to establish pasturelands on the reclamation that did not exist premining without receiving approval from WDEQ for a land use change.

The comparison of the two cases showed the following results:

- The postmining case supports 52% more cattle due to higher vegetation productivity on the reclaimed areas (405 cows compared to 267 cows).
- Initial capital expenditures were higher for the postmining case due to greater livestock purchases.
- The premining case produces enough hay to feed all cows and sell surplus.
- The postmining case must purchase all hay due to no reclaimed pasturelands.

It was recognized that the postmining grasslands could be cut for hay. However, this haying would destroy the shrubs and other elements of the species diversity that the mine attempts to establish. Haying these lands defeats the purpose for which they were established; therefore, it was assumed that the postmining rancher would purchase hay if there were no reclaimed pasturelands. As shown in Figure 5, the postmining case had a greater negative cash flow in Year 1 due to the need to purchase more livestock than the premining case.

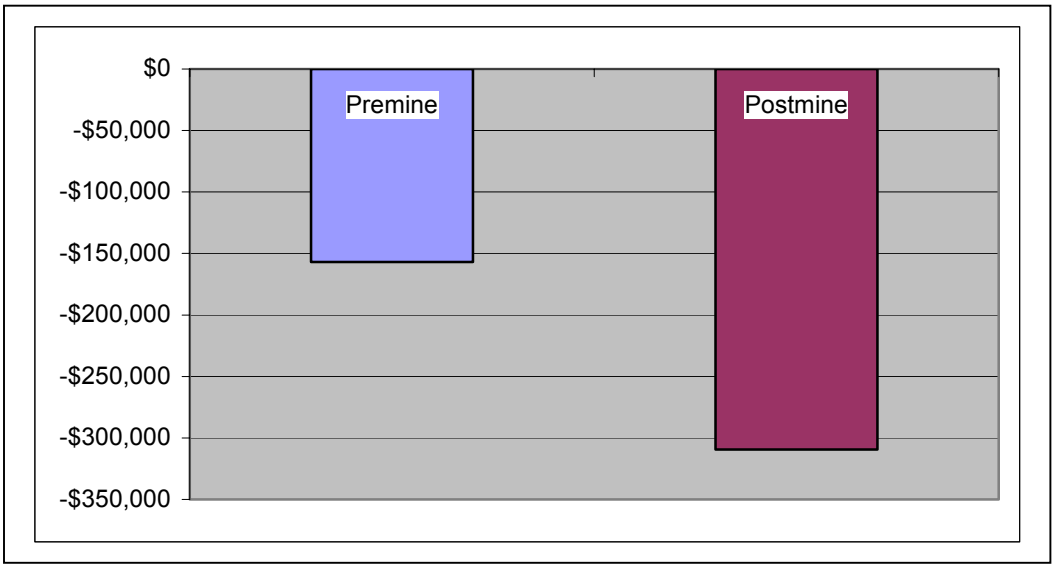

Figure 5 Cash Flow, Pre Mine vs. Post Mine - Year 1

Figure 6 shows the cash flows for Year 2 through Year 10. The dip in middle years is due to cattle cycle and lower cattle prices at that time. The figure shows the postmining case consistently having poorer cash flows than the premining case, in spite of raising 52% more cattle on the same lands. The major difference is the cost to purchase hay for the postmining rancher. Although the rancher in either case has a net income of approximately $90,000/year, it is important to remember that the land payment for purchase of the land was not included in this

economic analysis – so the rancher still needs to make a land payment of at least $150,000/year out of the income shown on this graph. Neither option is really economically viable without outside income. Again, this shows why it was decided to not include the land costs – the goal of this study was to show the difference between pre and postmining economics – not to highlight the plight of agriculture and confuse the graph with negative cash flows.

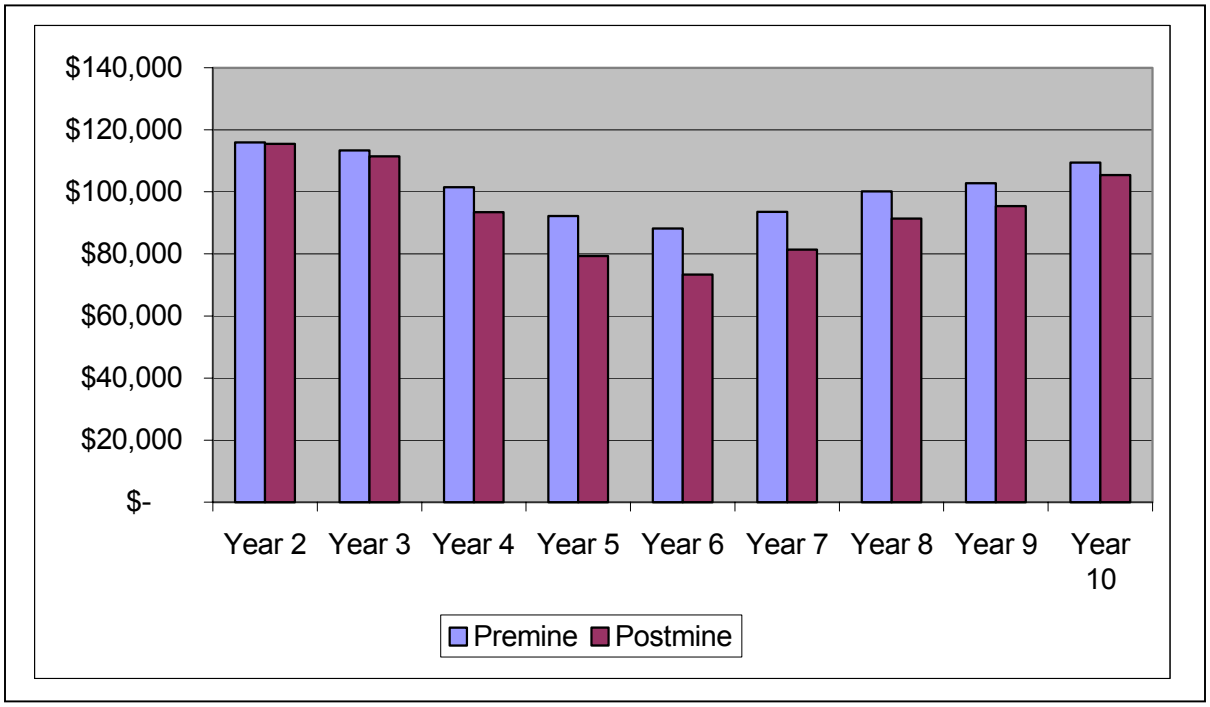

Figure 6 Cash Flow, Pre Mine vs. Post Mine – Years 2 - 10

It is generally assumed since the reclaimed land is more productive than premining, the postmining rancher will be more profitable than the premining rancher; however, much to our surprise, this was not the case. This raised the question again of what defines successful reclamation. Since Wyoming regulations specifically require that the postmining land be suitable for the previous use that was of the greatest economic or social value to the community, it was decided to analyze a third case. Case 3 required a re-evaluation of the reclamation plan (See Table 3).

Table 3. Case 3 - Postmining Improved Jacobs Ranch – Calculation of Number of Animals the Ranch Will Support

Vegetation Community	Hectares	Acres	gm/m2	Lbs/acre	Total kg	Total lbs	Grazable kg	Grazable lbs
Shrub/grass	2,650	6,548	100	894	2,655,479	5,854,270	1,327,740	2,927,135
Shrub patch	744	1,840	50	443	369,656	814,943	184,828	407,471
Hayland	328	810	108	967	177,644	391,635	88,822	195,818
	3,722	9,198					1,601,390	3,530,424

Assume 11 kg (25 lbs)/day/animal # of cows = **387**

The grazable pounds were considered to be 50% of the total pounds, as described in the premining case. Hayland acres were discounted for grazing the same as the premine wheatgrass community described in the Premine case. The Postmine Improved case increased haylands only to the point of not needing to purchase hay. It did not allow for selling any surplus hay.

Figure 7 shows a reclamation plan map for JRM of conceptual reclamation features. This map has been developed over the years with input from the regulatory agency. Although difficult to see at this scale, it describes in detail where wildlife features will be such as rockpiles, tree snags, raptor nests, brush piles, shrub patches, and other wildlife features. It does not show anything related to the primary postmining land use of agriculture. It does not show any roads, water wells, fences, or pasturelands.

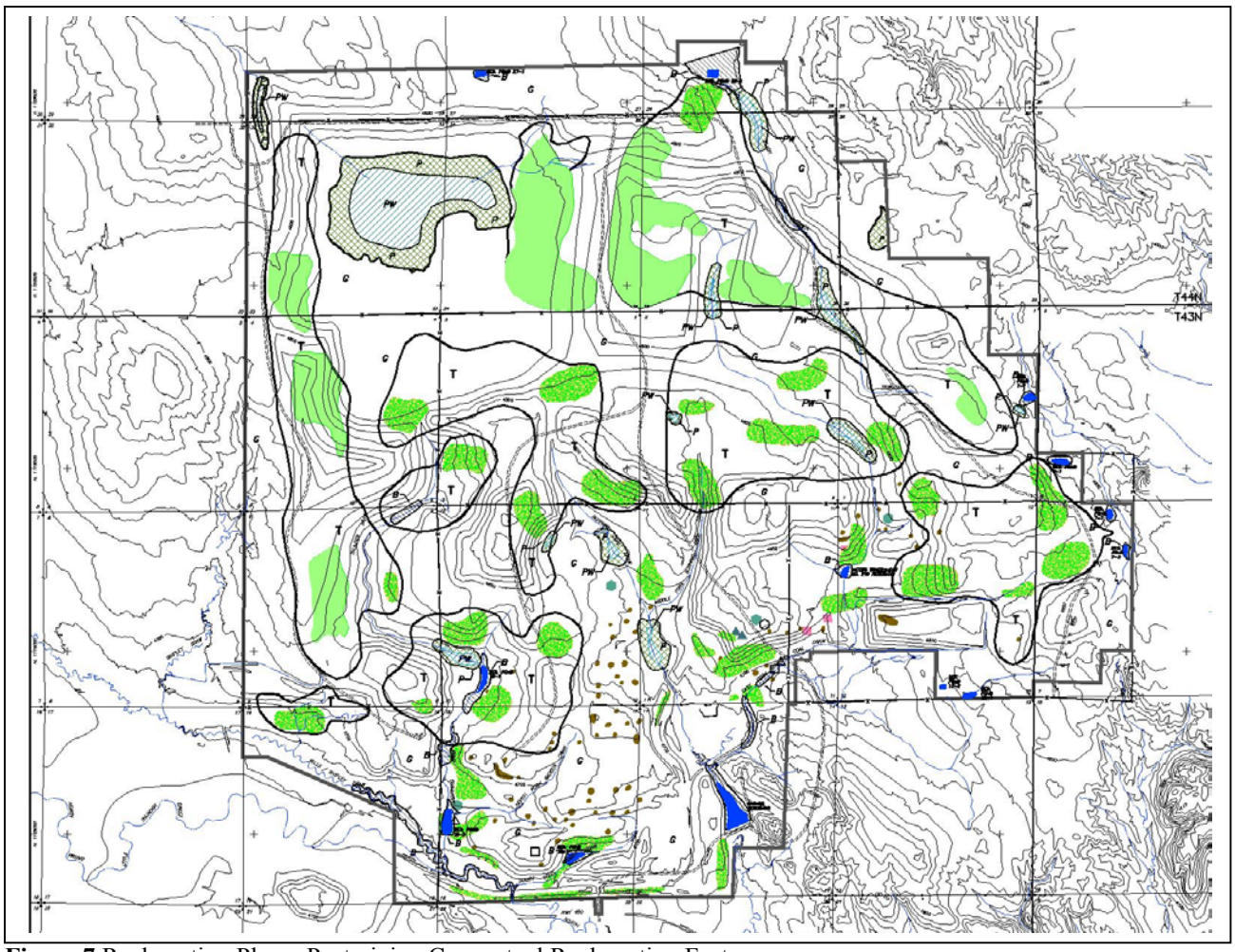

Figure 7 Reclamation Plan – Postmining Conceptual Reclamation Features

Case 3 modeled the improved postmining situation with changes to the reclamation plan, as shown below:

- The acreage of pastureland was increased from 268 hectares (663 acres) premining to 328 hectares (810 acres) postmining to avoid the need to purchase additional hay. The acreage was not increased to maximize the profitability of the ranch. This acreage was figured only to supply the amount of hay needed to support the number of cattle on the ranch; no surplus hay was available for sale.
- Initial capital costs to the rancher were reduced by having the mine install water systems.

The increased acreage of pastureland decreased the postmining stocking rate from 405 cows to 387 cows, resulting in only a 45% increase in stocking rate from premining. This reduction was a result of reducing the carrying capacity on the additional acres that would be hayed. The

reduction to water system capital costs had minimal effect on economics compared to purchasing hay.

Figure 8 shows the cash flows for Year 1 for all three cases. The postmining improved case had a smaller cash outlay than the original postmining case due to the reduction in the number of cows to be purchased.

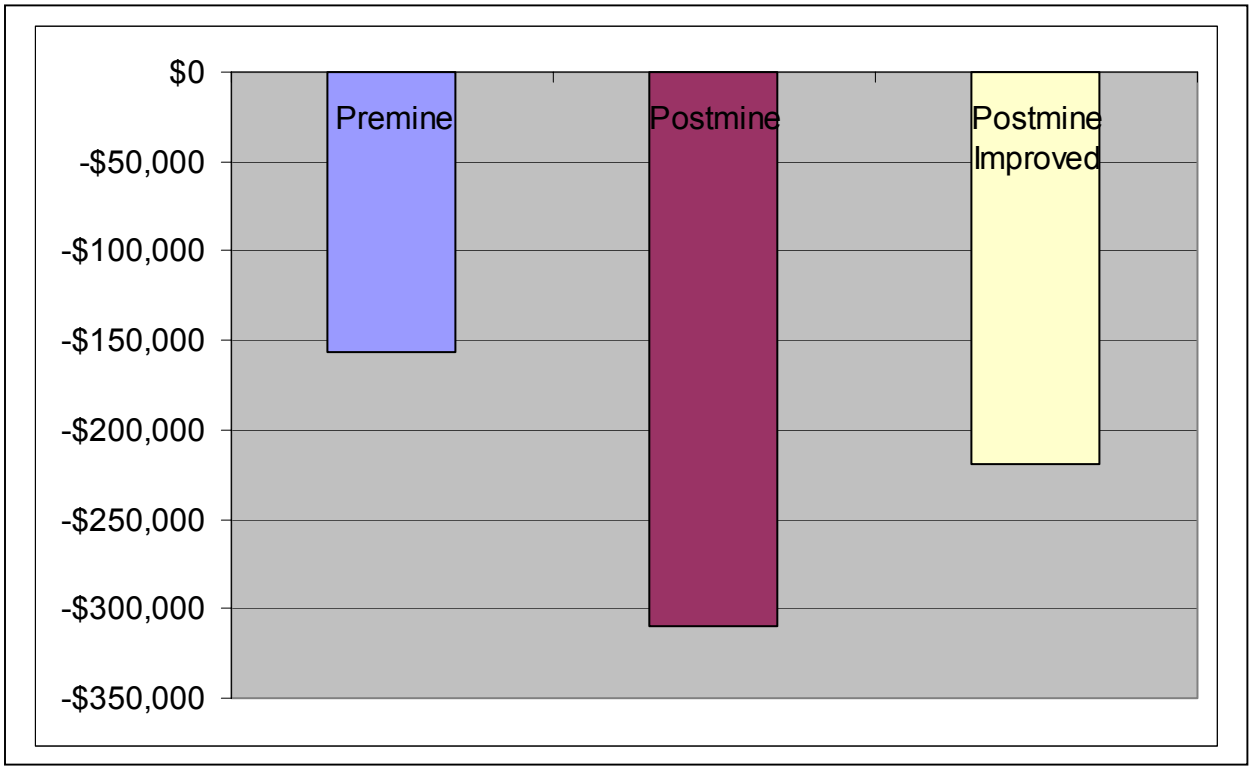

Figure 8 – Premining vs. Postmining vs. Postmining Improved - Year 1

In Years 2 – 10 there was a substantial increase in cash flows with these changes to the reclamation plan, as shown on Figure 9. On average, the postmining improved case brings in $50,000 more annually than the other two cases. This increase in cash flow may well make the difference for this landowner to make the land payment and still have some income on which to live. Also note that this is only an improved case – there probably are different improvements that could optimize this further (i.e. increasing acres of pastureland such that the rancher would have excess hay to sell).

The net present value of each case was calculated as well. Cash flows and NPV for each case are shown in Tables 4, 5 and 6. This was used to determine the price per acre the rancher should pay to see a 5% rate of return on their investment (not that most ranchers expect to see that return). The results follow:

- Premining: $61 per 0.4 hectares (1 acre)
- Postmining: $39 per 0.4 hectares (1 acre)
- Postmining Improved: $89 per 0.4 hectares (1 acre)
- According to the Wyoming Agricultural Statistics Service, the Wyoming average value for farm real estate was approximately $230 per 0.4 hectares (1 acre) in 2000.

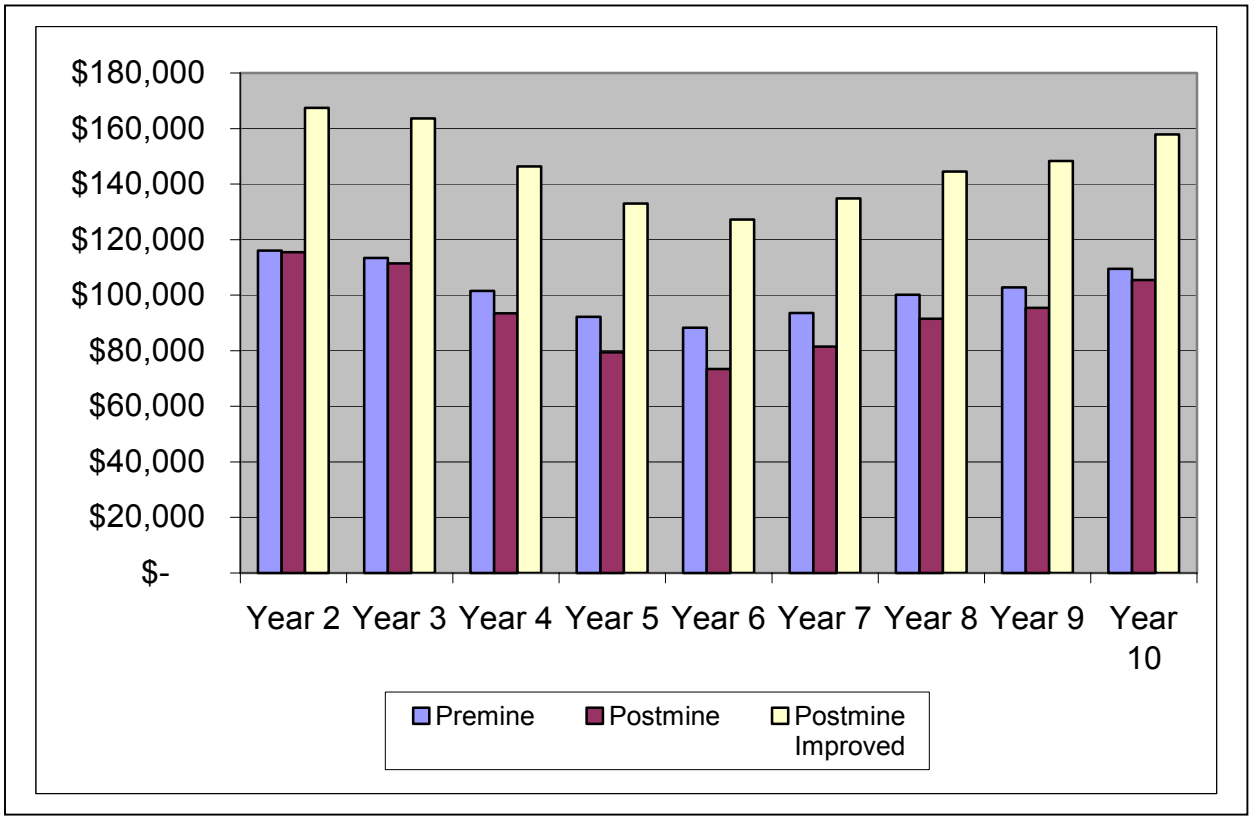

Figure 9 – Premining vs. Postmining vs. Postmining Improved - Years 2 - 10

Like it or not, the banker is going to have a say on what is successful reclamation.

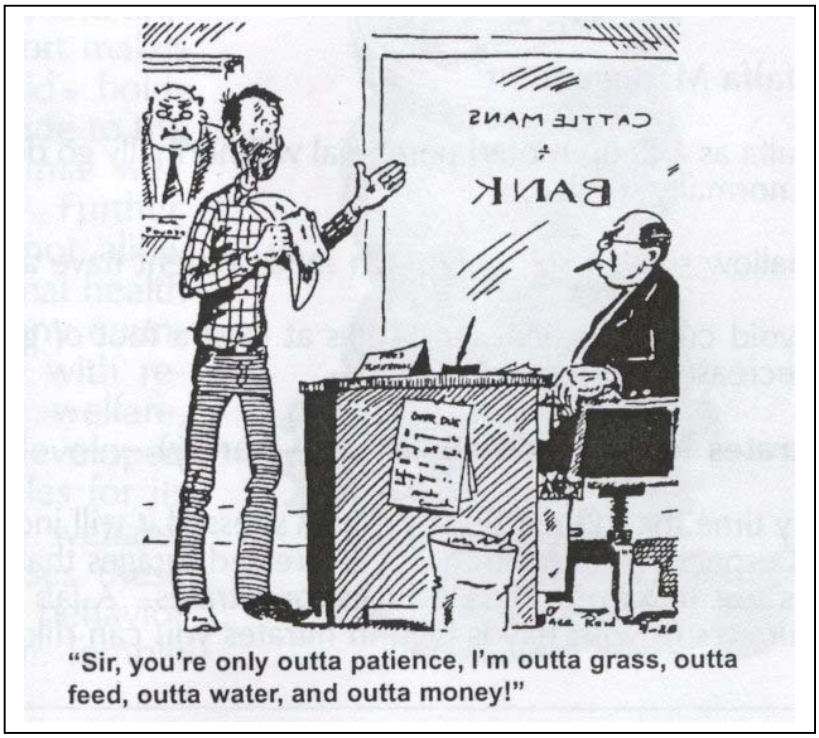

Figure 10 – Cartoon by Ace Reid (Cowpokes Cartoons, Kerrville, TX)

Conclusion

If a ranching family wants to make a living on the reclaimed range, the economic analysis shows the reclamation planning must be focused on the primary land use of ranching and agriculture. Although Wyoming regulations require the land to be reclaimed "…for the previous use which was of the greatest economic or social value to the community…", it appears economics have been ignored during reclamation planning. Instead, the planning has been focused on vegetation and wildlife issues. While these issues should support the reclamation plan and the resultant postmining land use, the issues should not define the plan and the postmining land use.

Successful reclamation cannot be determined solely from soil sampling, vegetation sampling, and water sampling. Methods for determining postmining success utilizing measures pertinent to the postmining land user, such as carrying capacity, have been proposed and warrant further consideration (Collyer, 1983 and Schuman et. al., 1990). If the ranch is not economically

sustainable, it will not likely be managed in a manner to be biologically sustainable. The regulatory agencies need to encourage postmining improvements for agriculture, such as pastureland establishment. It is critical that this be done early in the permitting and reclamation process, before a substantial percentage of the area available for reclamation has been completed in the field.

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Table 4. Case 1 – Premining Jacobs Ranch Cash Flow Analysis

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Capital										
Land	0									
Acres	9284									
$/acre	0									
Fence	0									
Livestock	267,000									
Water (well @ 150')	6,000									
Subtotal Capital	$ 273,000									
Income										
Livestock	$ 132,165	$ 132,165	$ 129,522	$ 117,627	$ 108,375	$ 104,410	$ 109,697	$ 116,305	$ 118,949	$ 125,557
# of head	267	267	267	267	267	267	267	267	267	267
avg lb/animal	550	550	550	550	550	550	550	550	550	550
$/lb	1	1	0.98	0.89	0.82	0.79	0.83	0.88	0.9	0.95
Hay	$4,838	$4,838	$4,838	$4,838	$4,838	$4,838	$4,838	$4,838	$4,838	$4,838
Surplus	97	97	97	97	97	97	97	97	97	97
$/ton sold	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50
Hunting										
Subtotal Income	$ 137,003	$ 137,003	$ 134,359	$ 122,464	$ 113,213	$ 109,248	$ 114,534	$ 121,143	$ 123,786	$ 130,394

Table 4 Continued

Expense										
Car/Truck	3200	3200	3200	3200	3200	3200	3200	3200	3200	3200
Equipment - Hay	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000

Feed										
Tons/head needed	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total tons needed	400.5	400.5	400.5	400.5	400.5	400.5	400.5	400.5	400.5	400.5
Acres of Hayland	663	663	663	663	663	663	663	663	663	663
Tons/acre produced	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Total tons produced	497	497	497	497	497	497	497	497	497	497
Tons to purchase	0	0	0	0	0	0	0	0	0	0
$/ton delivered	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100
Freight	$ 961	$ 961	$ 961	$ 961	$ 961	$ 961	$ 961	$ 961	$ 961	$ 961

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Fuel	2196.9	2196.9	2196.9	2196.9	2196.9	2196.9	2196.9	2196.9	2196.9	2196.9
Insurance	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Repairs & Maint.	930	930	930	930	930	930	930	930	930	930
Taxes	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600
Utilities	2413	2413	2413	2413	2413	2413	2413	2413	2413	2413
Vet, breeding, Meds	6675	6675	6675	6675	6675	6675	6675	6675	6675	6675
Subtotal Expense	$ 20,976	$ 20,976	$ 20,976	$ 20,976	$ 20,976	$ 20,976	$ 20,976	$ 20,976	$ 20,976	$ 20,976

Cash Flow

Total	-$156,973	$116,027	$113,383	$101,488	$92,237	$88,272	$93,559	$100,167	$102,810	$109,418
NPV at 5%	$570,206									
NPV per acre	$61									

Table 5. Case 2 – Postmining Jacobs Ranch Cash Flow Analysis

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Capital										
Land	0									
Acres	9284									
$/acre	0									
Fence	0									
Livestock	405,000									
Water (well @ 500')	20,000									
Subtotal Capital	$ 425,000									
Income										
Livestock	$ 200,475	$ 200,475	$ 196,466	$ 178,423	$ 164,390	$ 158,375	$ 166,394	$ 176,418	$ 180,428	$ 190,451
# of head	405	405	405	405	405	405	405	405	405	405
avg lb/animal	550	550	550	550	550	550	550	550	550	550
$/lb	1	1	0.98	0.89	0.82	0.79	0.83	0.88	0.9	0.95
Hay	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Surplus	0	0	0	0	0	0	0	0	0	0
$/ton sold	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50
Hunting										
Subtotal Income	$ 200,475	$ 200,475	$ 196,466	$ 178,423	$ 164,390	$ 158,375	$ 166,394	$ 176,418	$ 180,428	$ 190,451
Expense										
Car/Truck	3200	3200	3200	3200	3200	3200	3200	3200	3200	3200
Equipment - Hay	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
Feed	$60,750	$60,750	$60,750	$60,750	$60,750	$60,750	$60,750	$60,750	$60,750	$60,750
Tons/head needed	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total tons needed	607.5	607.5	607.5	607.5	607.5	607.5	607.5	607.5	607.5	607.5
Acres of Hayland	0	0	0	0	0	0	0	0	0	0
Tons/acre produced	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75

Table 5 Continued

Expense										
Car/Truck	3200	3200	3200	3200	3200	3200	3200	3200	3200	3200
Equipment - Hay	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000

Feed	$60,750	$60,750	$60,750	$60,750	$60,750	$60,750	$60,750	$60,750	$60,750	$60,750
Tons/head needed	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total tons needed	607.5	607.5	607.5	607.5	607.5	607.5	607.5	607.5	607.5	607.5
Acres of Hayland	0	0	0	0	0	0	0	0	0	0
Tons/acre produced	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Total tons produced	0	0	0	0	0	0	0	0	0	0
Tons to purchase	608	608	608	608	608	608	608	608	608	608
$/ton delivered	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100
Freight	$ 1,458	$ 1,458	$ 1,458	$ 1,458	$ 1,458	$ 1,458	$ 1,458	$ 1,458	$ 1,458	$ 1,458

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Fuel	2025	2025	2025	2025	2025	2025	2025	2025	2025	2025
Insurance	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Repairs & Maint.	405	405	405	405	405	405	405	405	405	405
Taxes	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600
Utilities	2413	2413	2413	2413	2413	2413	2413	2413	2413	2413
Vet, breeding, Meds	10125	10125	10125	10125	10125	10125	10125	10125	10125	10125
Subtotal Expense	$ 84,976	$ 84,976	$ 84,976	$ 84,976	$ 84,976	$ 84,976	$ 84,976	$ 84,976	$ 84,976	$ 84,976

Cash Flow

Total	-$309,501	$115,499	$111,490	$93,447	$79,414	$73,399	$81,418	$91,442	$95,452	$105,475
NPV at 5%	$363,528									
NPV per acre	$39									

Table 6. Case 3 – Postmining Improved Jacobs Ranch Cash Flow Analysis

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Capital										
Land	0									
Acres	9284									
$/acre	0									
Fence	0									
Livestock	387,000									
Water (well @ 500')	-									
Subtotal Capital	$ 387,000									
Income										
Livestock	$ 191,565	$ 191,565	$ 187,734	$ 170,493	$ 157,083	$ 151,336	$ 158,999	$ 168,577	$ 172,409	$ 181,987
# of head	387	387	387	387	387	387	387	387	387	387
avg lb/animal	550	550	550	550	550	550	550	550	550	550
$/lb	1	1	0.98	0.89	0.82	0.79	0.83	0.88	0.9	0.95
Hay	$1,350	$1,350	$1,350	$1,350	$1,350	$1,350	$1,350	$1,350	$1,350	$1,350
Surplus	27	27	27	27	27	27	27	27	27	27
$/ton sold	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50
Hunting										
Subtotal Income	$ 192,915	$ 192,915	$ 189,084	$ 171,843	$ 158,433	$ 152,686	$ 160,349	$ 169,927	$ 173,759	$ 183,337

Table 6 Continued

Expense										
Car/Truck	3200	3200	3200	3200	3200	3200	3200	3200	3200	3200
Equipment - Hay	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000

Feed	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		
Tons/head needed	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5		
Total tons needed	580.5	580.5	580.5	580.5	580.5	580.5	580.5	580.5	580.5	580.5		
Acres of Hayland	810	810	810	810	810	810	810	810	810	810		
Tons/acre produced	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75		
Total tons produced	608	608	608	608	608	608	608	608	608			608
Tons to purchase	0	0	0	0	0	0	0	0	0			0
$/ton delivered	$100	$100	$100	$100	$100	$100	$100	$100	$100			$100
Freight	$ 1,393	$ 1,393	$ 1,393	$ 1,393	$ 1,393	$ 1,393	$ 1,393	$ 1,393	$ 1,393	$ 1,393		

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Fuel	2988	2988	2988	2988	2988	2988	2988	2988	2988	2988
Insurance	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Repairs & Maint.	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
Taxes	2600	2600	2600	2600	2600	2600	2600	2600	2600	2600
Utilities	2413	2413	2413	2413	2413	2413	2413	2413	2413	2413
Vet, breeding, Meds	9675	9675	9675	9675	9675	9675	9675	9675	9675	9675
Subtotal Expense	$ 25,466	$ 25,466	$ 25,466	$ 25,466	$ 25,466	$ 25,466	$ 25,466	$ 25,466	$ 25,466	$ 25,466

Cash Flow

Total	-$219,551	$167,449	$163,618	$146,377	$132,967	$127,220	$134,883	$144,461	$148,292	$157,871
NPV at 5%	$829,302									
NPV per acre	$89									