POTENTIAL IMPACTS OF MX DEPLOYMENT ON RANCH MANAGEMENT AND RANCH ECONOMICS IN NEVADA AND UTAH

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ABSTRACT

Deployment of the MX Missile System in Nevada and Utah will have significant impacts on the range livestock industries of those states. Direct changes in ranch management and economics will vary depending upon the type of operation impacted, nature of the impact (physical, non-physical, or both), and the duration of the impact.

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BACKGROUND

In June of 1979, former President Jimmy Carter authorized the United States Air Force to develop a new intercontinental ballistic missile known as MX. During September of 1979, Mr. Carter announced that MX would be based in a sheltered, roadmobile system to be constructed in the western deserts.

Eighty-five hydrographic basins within Nevada and Utah are being considered as possible sites for deployment of MX. In addition, alternative deployment sites are being considered, primarily in the states of Texas and New Mexico. This paper addresses possible impacts of MX deployment within hydrographic basins of Nevada and Utah, subsequently referred to as the "study area".

Public rangelands, administered by the Bureau of Land Management (BLM), comprise the majority of those lands potentially impacted by deployment of MX within the study area. A principal use of these lands, according to BLM multiple use objectives, is domestic livestock grazing. Domestic livestock grazed on these lands in Nevada and Utah include primarily cattle and sheep. Public rangelands have historically been a key resource utilized by livestock operators in the study area. Many ranches of varying type, size, and economic stature have been developed based upon the availability of public rangelands for domestic livestock grazing. Private investment on public lands within the study area by ranch operators has been substantial.

The proposed deployment of the MX Missile System on rangelands in Nevada and Utah carries with it potential impacts to ranch management and ranch economics. Loss of forage through construction disturbances, loss of water, possible increased operating costs, and other impacts are concerns of the livestock industries in both states. To address these concerns a study, to which this paper is an overview, was commissioned by the Air Force in July of 1980. The results of this study are contained in a report entitled "Potential Impacts of MX Deployment on Ranch Management and Ranch Economics", dated January 29, 1981, (Torell and Baughman).

APPROACH

Initially, the study area was divided into five geographical regions based on statistical tests which indicated that ranch types located within each region were significantly different (Figure 1). Ultimately, ranches located within the study area were separated into 15 classification types (Table 1). Variables considered in classifying ranches included class of livestock raised, geographic location, and season of public range use.

Random sampling techniques applied to each ranch classification type provided a list of ranches to be sampled. Of the 667 operations found to utilize federal rangelands within the study area (Table 1), 19 percent or 128 operators were interviewed. Interviews were purposed at collecting various kinds of production and economic data. Statistical analyses indicated that information collected through sample ranch interviews did not differ significantly from secondary data utilized in preliminary ranch classification procedures.

FIGURE 1. THE NEVADA/UTAH STUDY REGIONS

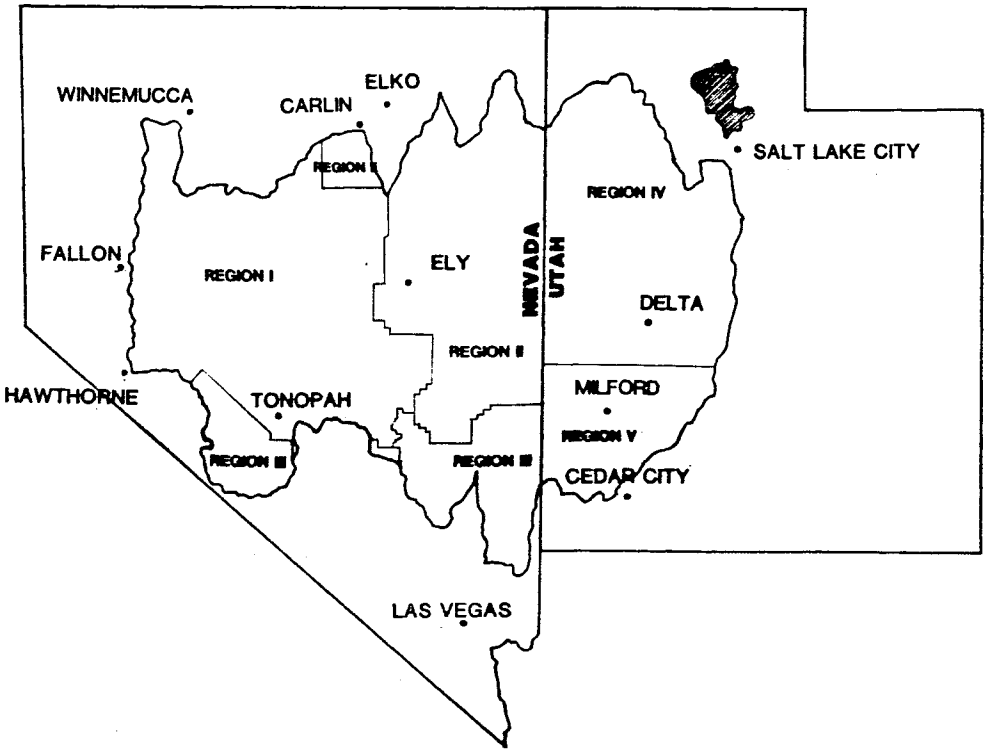

TABLE 1. AGGREGATION CLASSIFICATIONS, TOTAL NUMBER OF RANCHES, AND NUMBER OF RANCHES SAMPLED IN EACH CLASSIFICATION

REGION	CLASSIFICATION	TOTAL NUMBER OF RANCHES	NUMBER OF SAMPLED RANCHES	PERCENT OF RANCHES SAMPLED
I	Summer Cattle[1]	37	6	16
	Year-round Cattle	41	11	27
II	Summer Cattle	63	11	17
	Year-round Cattle	38	12	32
I & II	Year-round Sheep	21	6	29
III	Year-round Cattle	44	9	20
IV	Summer Cattle	132	20	15
	Year-round Cattle[2]	46	8	17
	Year-round Sheep	27	6	22
	Winter Sheep	57	8	14
V	Summer Cattle	73	10	14
	Winter Cattle	14	5	36
	Year-round Cattle	30	7	23
	Year-round Sheep	44	9	20
	TOTAL	667	128	

[1]/Summer Operator: grazes federal range during summer months only.
Winter Operator: grazes federal range during winter months only.
Year-round Operator: grazes federal range year-round.

[2]/Two classification models for this classification type were utilized; one selling yearlings and the other weaner calves.

Information collected during operator interviews, and supplemented by secondary data, was utilized to construct linear programming (LP) models for each of the 15 ranch classification types. The COPLAN LP framework was the specific algorithm utilized.[1,2]

For each of the 15 ranch types LP solutions were developed under nonimpacted conditions (benchmark). Results of these analyses for selected ranch types and enterprise characteristics are shown in Table 2. The table indicates that Return To Land and Management varied from a high of $72.83 (Region II-Summer Cattle) to a low of -$91.45 per cow (Region III-Year-round Cattle) for cattle operations. Further, the table indicates that Return To Land and Management for sheep operations ranged from $12.30 (Regions I & II-Year-round Sheep) to -$2.18 per ewe (Region IV-Winter Sheep).

In order to estimate the range of potential impacts to benchmark ranch conditions, it was necessary to develop several scenarios depicting reasonable impact levels. Both physical and non-physical impact scenarios were developed.

Potential short and long term losses of forage resulting from MX related vegetative disturbances were estimated by dividing total acreage requirements for various missile deployment schemes by an acre per AUM

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[1]/A complete description of "COPLAN" is provided in Evans and Childs (1978).

[2]/The use of linear programming as an appropriate analytical tool for range livestock operations has been demonstrated by Ching (1977), and Torell and others (1980) in Nevada, Capps (1980) in Utah, Kearl (1978) in Wyoming, and D'Aquino (1974) in Colorado.

TABLE 2. CHARACTERISTICS OF SELECTED RANGE LIVESTOCK ENTERPRISES LOCATED WITHIN THE NEVADA/UTAH MX STUDY AREA

		REGION II		REGION I & II	REGION III	REGION IV			
CHARACTERISTICS	UNITS	SUMMER CATTLE	YEAR-ROUND CATTLE	YEAR-ROUND SHEEP	YEAR-ROUND CATTLE	SUMMER CATTLE	YEAR-ROUND CATTLE	YEAR-ROUND SHEEP	WINTER SHEEP
SUMMER FEDERAL RANGE	AUMs	1,865	1,851	3,979	1,299	433	1,084	1,926	0
WINTER FEDERAL RANGE	AUMs	0	3,914	3,979	2,636	0	1,066	3,770	2,990
PRIVATE RANGELAND	AUMs	3,017	2,784	7,058	866	721	1,039	2,345	1,673
ALFALFA HAYLAND	Acres	302	43	0	36	75	167	0	0
GRASS HAYLAND	Acres	277	139	0	23	44	0	0	0
NUMBER OF COWS	Head	390	680	N/A	361	95	255	N/A	N/A
NUMBER OF EWES	Head	N/A	N/A	4,932	N/A	N/A	N/A	3,122	2,351
TOTAL SALES	$/Cow	457.62	260.83	58.85	241.36	521.26	438.67	66.23	68.05
TOTAL VARIABLE COSTS	$/Cow	261.14	189.47	34.47	215.25	348.58	238.54	46.43	57.34
TOTAL FIXED COSTS	$/Cow	123.65	108.06	12.96	117.56	261.59	140.15	12.99	12.89
RETURN TO LAND AND MANAGEMENT	$/Cow	72.83	-31.70	12.30	-91.45	-88.61	14.98	7.41	-2.18

ratio which was developed for each region.[3] Table 3 provides a summary as to potential losses in forage resulting from various deployment schemes.

Utilizing the data shown in Table 3, physical impact scenarios were selected to address the range of impacts potentially accruing to individual ranch operations. In addition, nonphysical impact scenarios were selected to reflect increased death loss rates and increased variable costs of production. Ultimately thirteen scenarios were selected for analysis.

DISCUSSION OF IMPACTS

MX related reductions in AUMs may result in substantial changes in resource use and ranch management. Direct reductions in available public winter forage were shown to cause additional indirect reductions in the use of public summer forage and private forage sources. For example, when winter grazing on public rangelands was completely eliminated for

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[3]/Animal Unit Month (AUM) - The amount of feed or forage required by one mature cow with calf or equivalent for one month.

[4]/Scenarios selected for analysis included:

I. 1st Operating Base - Construction Phase
II. Single Cluster of Schelters - Construction Phase
III. Single Cluster of Shelters - Operation Phase
IV. Five Clusters of Shelters - Construction Phase
V. Five Clusters of Shelters - Operation Phase
VI. Ten Clusters of Shelters - Construction Phase
VII. Ten Clusters of Shelters - Operation Phase
VIII. Twenty Clusters of Shelters - Construction Phase
X. 100 Percent Loss of Seasonal Natural Resource Land Grazing
XI. 25 Percent Increase in Variable Costs
XII. 100 Percent Increase in Death Loss
XIII. Ten Clusters of Shelters/All Facilities-Construction Phase; 25 Percent Increase in Variable Costs; 100 Percent Increase in Death Loss.

A single cluster of shelters contains 23 shelters and all connecting roadways. As proposed, the MX Missile System would include a total of 200 clusters and 4600 shelters.

TABLE 3. POTENTIAL LOSSES OF AUMS ASSOCIATED WITH ALTERNATIVE DEPLOYMENT SCHEMES WITHIN THE MX STUDY AREA

	DEPLOYMENT SCHEME											
	1st OB		2nd OB		Single Cluster of Shelters		Five Clusters of Shelters		Ten Clusters of Shelters		Ten Clusters of Shelters and all Supportive Facilities	
	(AUMs)											
REGION	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.
I	454	451	232	229	56	33	278	166	557	333	595	333
II	488	484	250	246	60	36	299	179	598	357	639	357
III	354	352	181	179	43	26	217	130	461	260	464	260
IV	638	633	326	322	78	47	391	233	782	467	835	467
V	671	666	343	339	82	49	411	246	823	492	879	491
Total Vegetative Disturbance (Acres)	8,400	8,340	4,300	4,240	1,030	615	5,150	3,075	10,928	6,154	11,003	6,154
Total Area Necessary For Deployment[1] (Square Miles)	N/A	N/A	N/A	N/A	25	25	125	125	250	250	250	250

[1]/Based upon 25 square miles for deployment of each cluster of shelters.

Region V year-round cattle operators, the optimal use of resources during the summer season was to let summer public grazing allotments as well as leased private pasture go completely unused.

In addition to indirect reductions of private and summer federal AUMs, allotment reductions also resulted in changes in optimal grazing schemes. Use of private range resources was switched to those seasons in which federal AUMs were lost. For example, Region II year-round cattle operations were shown to decrease the use of private forage during the summer while increasing the amount used during fall and spring.

While each ranch type in each region were given the option of purchasing hay resources as an adjustment to reductions in public forage, purchasing hay was not profitable under the income/cost structure specified in the analysis. All ranch types were shown to optimize profits by reducing herd size rather than by purchasing supplemental feed to offset MX related forage losses.

Estimated net returns lost per federal AUM lost resulting from losses in public forage availability ranged from a high of nearly $31 per AUM (Region IV year-round cattle) to a low of $2.23 per AUM (Region III year-round cattle).[5] Three factors were shown to influence the degree to which reductions in public grazing availability affected net returns.

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[5]/The net return lost per federal AUM lost indicates the economic value of the federal AUM to each ranch type.

First, the income/cost structure of a particular livestock operation influenced the economic value of an AUM of forage. Operators having high total sales as related to costs of production, could be expected to accrue a larger economic loss per loss of AUM. The income/cost structure of a particular ranch operation not only was shown to be directly influenced by the cost per unit of output incurred in livestock production, but also to be affected by factors influencing total livestock sales. Those include livestock selling prices and livestock production parameters such as selling weights, calving percentages, death losses, etc., which directly affect pounds of product sold.

A second factor shown to influence net return loss was the type of livestock operation (i.e., cow-yearling, cow-calf). Those operations with the highest estimated loss in net revenue were generally cow-yearling operations. This follows since cow-yearling operators, especially in Utah, generally feed calves to a nearly "finished" condition. Even though conditioning of yearlings generally occurred on private pastures and/or feedlots, the calf was acquired by the operator as a result of cows dependent upon federal range for a part of annual forage requirements. Therefore, when one considers that allotment reductions would result in reduced cow herd sizes, the reduction in net revenue is greater for those operators who more thoroughly "finish" calves.

The third factor influencing economic losses resulting from AUM reductions is the degree to which federal allotment reductions affect the use of other forage sources. When the loss of public forage caused additional indirect reductions in the use of other forage sources, then the economic loss per public AUM lost was shown to increase.

While the previous discussion has centered on impacts which generally become readily apparent in the short run, impacts to rancher wealth may not explicitly affect operators in the short run. In many cases the operator does not realize impacts to wealth until he attempts to sell or borrow against ranch assets. Grazing preferences on public rangelands have been shown to add to the wealth of ranchers (Nielson and Workman, 1971) (McConnen, 1978). Many of the impacts previously discussed may result in direct reductions in rancher wealth.

Potential impacts to rancher wealth occurring as a result of MX were shown to vary according to the extent of impact assumed. Total loss in rancher wealth attributable to MX related reductions in public forage ranged from a low of $2,240 (Region III year-round cattle-Scenario V) to a high of $305,272 (Region I year-round cattle-Scenario V).

SUMMARY

Deployment of the MX System in Nevada and Utah will have significant impacts on the range livestock industries of those states. Direct changes in ranch management and ranch economics will vary depending upon the type of operation impacted, nature of impact (physical, non-physical or both), and duration of the impact. The extent to which individual ranch operators are able to sustain a level of productivity comparable to pre-MX conditions will depend upon the type of operation, nature of impact, degree of impact, and degree to which ranch mitigation programs are developed and implemented. During construction operators may be unable to cover variable costs of production under present management practices. In addition, impacted ranchers who have recently incurred large financial obligations may be unable to cover fixed costs of operation. In

both cases, operators may be faced with a financial crisis of such magnitude that they are forced to liquidate assets.

Because impacted operators may be forced to reduce herd sizes, the short run supply of livestock at regional markets may increase substantially. Depending upon market conditions at the time herd reductions begin, a general price decrease for live animals may occur.

This would increase the impact to operators forced to reduce herd size while being advantageous to operators desiring to purchase livestock to build herd sizes.

Construction and operation of the MX Missile System in Nevada and Utah may reduce the supply of available ranch labor. Typically, livestock operators depend upon the availability of family labor supplemented by full or part-time laborers. Wage levels offered by contractors working on MX may entice both family and non-family labor to leave ranch units.

Consideration of compounding effects of other governmental agency actions within the study area cannot be ignored. Of primary concern to range livestock operators is the cummulative effect of BLM grazing policy changes coupled with MX induced impacts. A major implication of the BLM's current EIS process is a change in allowable levels of grazing on public rangelands. Construction and operation of the MX system in Nevada and Utah may compound the impacts associated with BLM proposed actions.

In addition, the Intermountain Power Project at Delta, Utah, the White Pine Power Project proposed for White Pine County, Nevada, the numerous wilderness study areas, and increasing demands for public lands by other user groups may compound impacts to the range livestock industries of Nevada and Utah. It is possible that ranch units able to operate viably under MX induced impacts may become non-viable under conditions of cumulative impacts.

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