SUPPLEMENTAL FEEDING OF MOOSE IN WESTERN WYOMING FOR DAMAGE PREVENTION

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Moose (Alces alces shirasi) are fed alfalfa (Medicago sativa) at four locations in western Wyoming to minimize damage to haystacks. Feedgrounds are on private property and only in areas where extensive damage has occurred repeatedly. History and effectiveness of the feeding program in preventing damage, other damage prevention measures, and moose population dynamics in western Wyoming are discussed.

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In Wyoming, the Game and Fish Commission is legally responsible for preventing wildlife damage to private property. If damage occurs, the Wyoming Game and Fish Department (WGFD) must compensate landowners for the value of crops eaten or destroyed, if prompt notification is given to the Department. Ranchers can appeal damage claim settlements in arbitration hearing if they are dissatisfied with settlements.

Among those species causing consistent damage is the moose. In 1970 the Wyoming Game and Fish Department provided a rancher in the upper Green River drainage in Sublette County with alfalfa to feed moose, thereby minimizing damage to stored hay. This action followed

several years of increasing damage to hay on this ranch. Two additional feedgrounds were established in the drainage in 1971, and one in 1974. All feedgrounds have been used annually since their establishment, except in 1984, when one was not used. From 1972 to 1974 moose were fed temporarily at 3 other ranches to minimize damage.

DESCRIPTION OF STUDY AREA

The first reported observations of moose in the Green River drainage were made around 1900 (Straley 1961). Moose dispersed throughout the Wind River and Wyoming Ranges and this herd now occupies approximately 6650 km^2. The Sublette moose herd is bounded by the Gros Ventre Range on the north, the Wyoming Range on the west, and the Wind River Range to the east. LaBarge Creek, the Little Colorado Desert, and the Big Sandy River define the southern border of this herd. The 1984 post-hunting season population was estimated at about 2000 moose (Johnson 1984).

Summer range consists mostly of mountainous terrain (2500-3200m). Wet meadows, willow (Salix spp.), aspen (Populus tremuloides), conifer, and sagebrush (Artemisia spp.) stands provide excellent summer forage. Winter range consist of aspen and subalpine fir (Abies lasiocarpa) stands in foothills (1940-2500m), and willow and cottonwood (P. balsamifera) stands associated with the Green River and its tributaries. Some moose remain in winter range year-round. Major drainages of the Wyoming Range that provide critical moose winter range include: South, Middle, and North Piney Creeks, South and North Cottonwood Creeks, Horse Creek, and Middle and North Beaver Creeks. Boulder Creek and the East Fork, New Fork, and Green Rivers drain the Wind River Range

and provide critical winter range. Critical winter range, as defined by the WGFD, refers to those areas that are necessary for moose to survive in normal to severe winters. Critical winter range for this herd is predominately floodplains supporting willow stands.

Over 80% of the critical moose winter range is on private property. These areas are primarily ranchlands, were native grasses (Bromus spp., Poa spp., and Phleum spp.), sedges (Carex spp.), rushes (Juncus spp.), and forbs or alfalfa are grown to provide forage for livestock. Ranchers flood-irrigate meadows from May through July, and hay is stored in meadows in stackyards and fed to cattle in winter. Haystacks are frequently located near or within moose winter range. Most of these stacks are fenced to keep cattle, but not wildlife, out. Moose damage haystacks by eating only bales or portions of bales that have high percentages of alfalfa or clover (Trifolium spp.), scattering and trampling the less palatable stored crops.

The four moose feedgrounds are located on private property in areas where extensive damage has occurred and were started at the urging of landowners to alleviate repetitive damage by moose. Feedgrounds are located on Cottonwood Creek (Fear Feedground), Horse Creek (Myer Feedground), the Green River (Pape Feedground), and Beaver Creek (Vickrey Feedground) and are all less than 25 km apart. Moose are fed alfalfa ad libitum and eat from 1 kg/day in early winter to 7kg/day in February. Feeding usually begins in January and ends in mid-March. Second cutting alfalfa is the most preferred feed by moose. Native hay is not eaten unless it contains high percentages of alsike clover (T. hybridum). Moldy or dusty alfalfa is usually not consumed by moose.

Over 80 permanent stackyards have been constructed by WGFD in the

upper Green River area to keep moose, elk (Cervus elaphus), and mule deer (Odocoileus hemionus) out of haystacks. Stackyards are 2.5m tall and made of woven wire fence. The materials for 1 stackyard cost about $750. Stackyards are effective in stopping damage at specific locations. Construction of stackyards has been concentrated especially where no feedgrounds exist on the Piney Creeks and along the Green River.

Hazing is used to drive moose away from haystacks that are normally not damaged by moose; however, this technique is not always successful. Animals often return within one or two days to the stack.

METHODS

Damage claims from 1958-83 were reviewed for moose crop depredation west of the Green River and north of LaBarge Creek. Moose numbers on feedgrounds were estimated from ground and aerial counts. Aerial censuses were made during winter helicopter classification counts from 1980 through 1984, and fixed-wing trend counts from 1973 through 1979, excluding 1976 and 1978 (Johnson 1984). We estimated populations using the POP50 simulation model (Bartholow 1981).

Amounts of alfalfa provided at feedgrounds were obtained from feed reports and personal diaries of Department employees. All years mentioned in this paper refer to biological year, e.g., 1984 refers to winter 1984-1985.

RESULTS AND DISCUSSION

The frequency of moose damage claims and quantitites of hay damaged peaked in the early 1970's resulting in feedground establishment (Table 1). The incidence of damage declined thereafter on Horse Creek,

Table 1. Moose damage claims from the Sublette moose herd, west of the Green River, on drainages with and without feedgrounds, 1958-1983.

	Period[a]				
	1958-61	1962-69	1970-73	1974-80	1981-83
Drainages with feedgrounds (n=3)					
Claims paid per year ($\bar{x}$)	1.8	2.2	2.8	0.6	1.0
Tons damage per year ($\bar{x}$)	7.3	10.3	44.5	4.0	47.0[b]
Drainages without feedgrounds (n=4)					
Claims paid per year ($\bar{x}$)	0	0.4	0.5	0.7	1.3
Tons damage per year ($\bar{x}$)	0	4.1	5.2	7.5	7.0

[a]1958-61 moose population increasing; 1962-69 moose numbers increasing rapidly; 1970-73 moose feedgrounds being established; 1974-80 feedgrounds established; 1981-83 reduced population.

[b]Includes one 115 ton damage claim from 1981 settled in arbitration.

Cottonwood Creek and the Green River. Damage claims from drainages without feedgrounds continued to increase during 1974 through 1983 (Table 1).

The Sublette moose herd peaked in 1972 when the post-season population was estimated at 3411 animals (Johnson 1982). The herd has since been lowered through hunting in response to landowner complaints concerning damage, and the 1984 post-season population was estimated at 2008 (Johnson 1984). From 1971 through 1977 the mean annual moose harvest was 546 moose, whereas from 1978 through 1984 it was 367 animals. The herd has been declining by an annual rate of 4.6% from 1980-84 due to hunting and is now at the WGFD population objective.

The number of moose on all feedgrounds has declined from 583 in 1974 to 89 in 1984 (Table 2). Number of moose fed and post-season population estimates for this herd are highly correlated (r=0.9519) for 1979-1984, excluding 1980. In 1980, snow depth was 65% of normal for this region (Soil Conservation Service 1982), and moose did not concentrate on critical winter ranges.

Increased hunting pressure to reduce the population has probably contributed as much to reducing damage as any other technique. Moose are hunted under limited quota drawings with specified numbers of permits for each hunt area. Since 1982, 150 permits have been issued annually for Hunt Area 25 with 40 to 75 of these restricting hunters to a portion of Hunt Area 25 that includes all the moose feedgrounds. This has reduced the resident moose population near feedgrounds. Trend counts in the area with restricted permits (Horse Creek) have declined in the last four years, while trend counts in the rest of Hunt Area 25 (Cottonwood Creek and the Piney Creeks) have remained about the same

Table 2. Numbers of moose in the Sublette Moose Herd counted at feedgrounds, using either ground or aerial counts, for 1970-1984.

	Feedgrounds					
Year	Myer	Pape	Vickrey	Fear	Others	Total
1970		40				40
1971		80+	40	100		220
1972		80+	35	50	140	305
1973		88	30	100	120	338
1974	183	64	63	153	120	583
1975	b	93	73	120		286
1976[a]						
1977	100+	52	18	118		288
1978[b]						
1979	111	86	33	108		338
1980[c]	21	16	28	18		163
1981	85	36	100	109		330
1982	80	28	65	50		223
1983	59	15	45	50		169
1984	33	0	35	21		89

[a]Record low snow pack (Soil Conservation Service 1982), no estimate of moose numbers available.

[b]No estimate available.

[c]Snow pack 65% of normal.

(Table 3). Moose that use Pape and Vickrey Feedgrounds on the Green River and Beaver Creek are harvested primarily in the Hoback and upper Green River drainages based on tag returns (James Straley, unpubl. data). Moose trend counts in these areas have decreased since 1973 (Johnson 1984).

Table 3. Trend counts of moose in the Sublette Moose herd in major drainages on the west side of the Green River during winter, 1981-1984.

Drainage	1981	1982	1983	1984
Horse Creek	177	173	162	149
Cottonwood Creek	186	159	163	180
North Piney Creek	147	144	144	159
South and Middle Piney Creeks	197	145	220	201

CONCLUSIONS

Number of moose damage claims paid to ranchers on drainages with feedgrounds declined after feedgrounds were established. Establishment of feedgrounds, increased harvest to reduce the population, and construction of permanent, moose-proof stackyards were largely responsible for the reduction in damage claims during the 1970's. Establishment of feedgrounds was not, however, successful in eliminating all damage on drainages with feedgrounds. Moose feedgrounds will never eliminate all damage even if they are instituted on all drainages and are no more than 10 to 15 km apart, because moose are difficult to hold in one location. Some damage is inevitable.

Construction of permanent stackyards is more cost-effective than feeding moose. Rather than establish new feedgrounds, permanent stackyards should be built to solve damage problems. No accurate estimate of amounts of alfalfa fed exists, but 100 tons per year is conservative. Since 1974, at least $100,000 has been spent on alfalfa and $60,000 for all permanent stackyards. Neither of these figures includes labor, vehicle costs, or other Department expenditures.

Landowner intolerance to moose is caused by excessive moose damage to haystacks. Habitat manipulation to improve winter range may succeed in attracting moose away from haystacks and into willow stands. The ranching community accepts moose feedgrounds as reasonable mitigation for moose damage and occurrence on their property. Ranchers view the feeding program favorably and are generally willing to feed moose themselves, if alfalfa is provided. Until many stackyards are constructed and habitat improvement projects initiated and proven successful, feedgrounds should continue to operate. Further reduction through hunting of the herd segment that uses feedgrounds will eventually eliminate the need for feeding moose, except in severe winters. However, reducing the moose herd to this level may be politically unacceptable to hunters, ranchers, and other local residents.

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