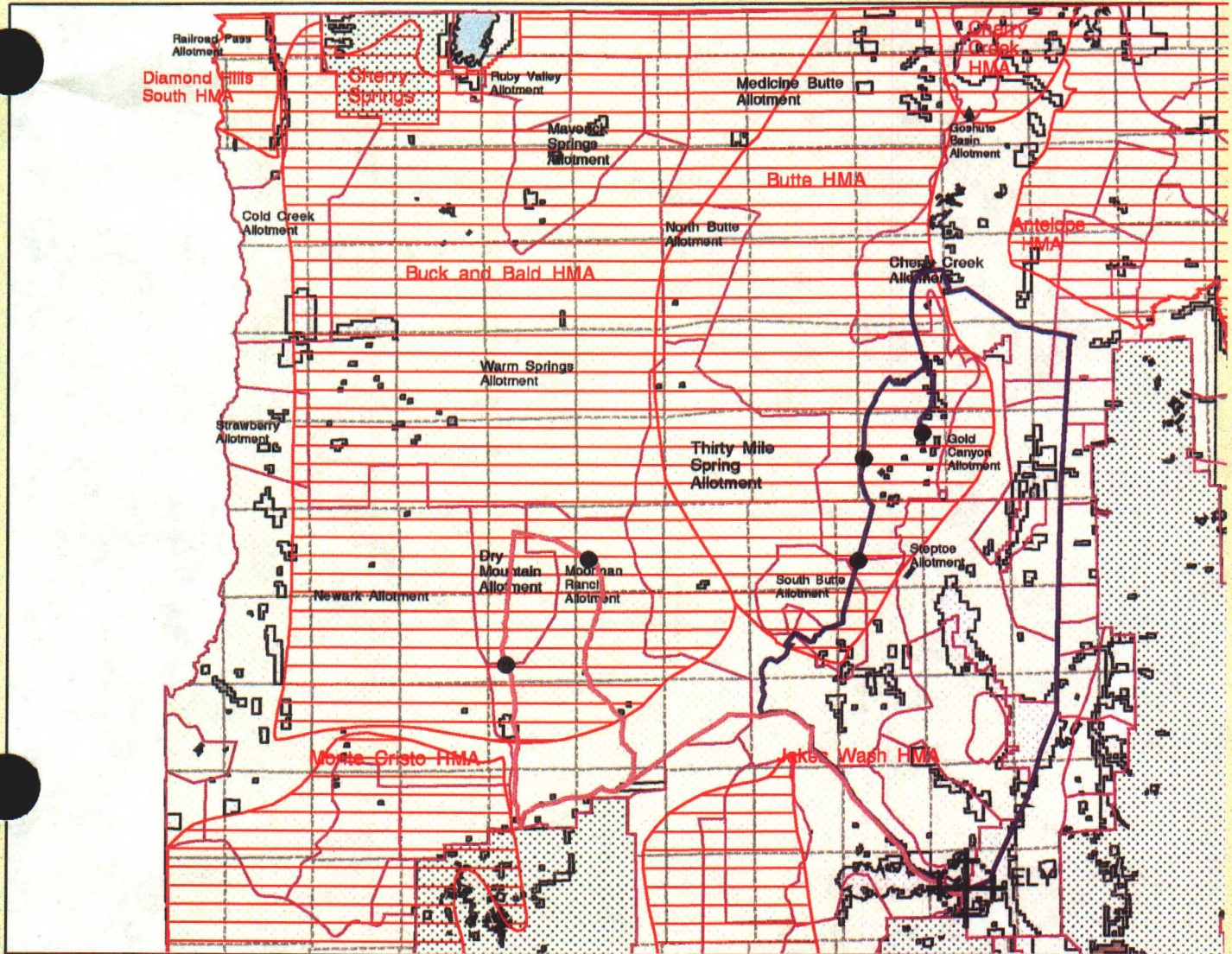
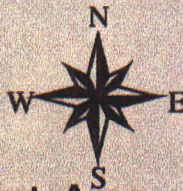









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ELY DISTRICT, BUREAU OF LAND MANAGEMENT TOUR SUMMARY MAP



6.6 0 6.6 13.2 Miles



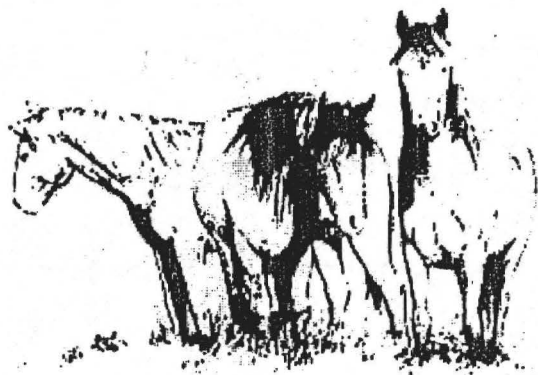
-  Wild Horse Herd Management Area
-  Allotment Boundary
-  Public Lands
-  Forest Service
-  PRIVATE LAND
-  Route Day 1
-  Route Day 2

United States Department of the Interior
 Bureau of Land Management
 Ely District Office
 HC33 Box 33500
 Ely, NV 89301

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This product may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.



BUTTE HERD MANAGEMENT AREA,
MANAGED BY THE ELY FIELD OFFICE,
BUREAU OF LAND MANAGEMENT



The Butte
Herd
Management
Area (HMA) is
located
approximately
30 miles

north-northwest of the town of Ely,
Nevada in White Pine County, Nevada.
The Butte HMA comprises approximately
430,770 acres (673 square miles),
99.3% of which is public lands.



The Butte wild horse herd is managed
by the Ely Field Office for an
appropriate management level of 114
wild horses. This number was
developed based on an evaluation of
the horses habitat which indicated that between 97
and 131 horses could be sustained in the area without
interrupting the delicate balance of the ecosystem.

In order to keep wild horse numbers in balance with
their environment, the BLM periodically gathers wild
horses from the range and places them into the
National Wild Horse adoption program. Between 1985 and
1999, a total of 398 wild horses were removed from the
Butte HMA.

The area which includes the Butte HMA is very remote.
Access to the HMA is accomplished via dirt roads and
trails only. The only significant human settlement in
the area aside from a couple of small ranches is the
town of Ely (population about 5,400)

The layout of the Butte HMA consists of one large
valley bounded on three sides by large mountain ranges
and the White Pine/Elko County line on the north end.
The Mountain ranges include the Butte, Egan and Cherry
Creek Mountains. These mountain ranges have peaks
exceeding 9,000 feet above sea level. The Butte
valley is wide and long. Its lowest elevation is
around 5,900 feet and is marked by a large alkaline
playa or dry lake bed.

The Butte HMA affords a classic Great Basin
environment marked by
extremes of almost every
kind. Summer time
temperatures can exceed 100
degrees, and winter lows can
fall below 30 degrees below
zero. Precipitation in the
Eastern Nevada region occurs
mostly in the winter in the
form of snow with sparse
summer moisture. Moisture
totals of over 12 inches are
common for the mountains,
while less than 8 inches may
fall in the valleys.



Vegetation in the Butte HMA
is also characteristic of
the Great Basin, with
dominant plants having
evolved to survive the
extremes. Typical
vegetation varies with
elevation with upper mountain slopes generally brush
covered with fir and mountain mahogany covering
extensive areas. Through the mid elevations, pinion
and juniper trees are dominant and often form closed
stands which prevent other vegetation from growing.
As the elevation and moisture supply falls, the
vegetation shifts towards a shrub dominated community.
Sagebrush is the most common shrub along the pinion
juniper perimeter. Sagebrush gives way to white sage,
black sage, saltbush and other "salt desert shrub"
type communities. Salt desert shrub plants have
evolved to deal with the highly saline soils which
developed after thousands of years of internal
drainage of runoff waters.

Wild horses in the area can be found throughout the HMA at different times of the year. Typically, horses will remain at the upper elevations during the summer as long as the forage and water hold out. As these resources are depleted, or when snow drives them down (as early as September in some years), they move off the mountain and into the valleys. Here they exist on the sparse grasses such as Sandberg's bluegrass, needle and thread grass, and Indian rice grass. In addition to grasses, horses in the region have adapted to a diet dominated by the dominant shrubs such as white sage and salt bush.

Water is of critical importance to every animal in the Butte HMA. Water is very limited and occurs only at very few natural springs and a few man-made wells. There are no perennial streams or creeks in the Butte HMA. As a result of the limited water, the Butte HMA is prone to an almost regular drought every few years. When this occurs, horses can rapidly cause extensive ecological damage to their environment as they stay close to water.

The Butte HMA is home to numerous wildlife species including mule deer, Pronghorn antelope, coyote, jackrabbits, and numerous species of birds, rodents.

Human interest in the Butte HMA has been historically limited to livestock ranching, hunting, prospecting, and firewood and pine nut harvesting. In recent years, outdoor tourism has become increasingly important, and Eastern Nevada is evolving into an important area for those seeking vast unoccupied expanses of public lands.

The history of the Butte wild horse herd is somewhat clouded. Few people visited the area before fairly recent times. The Pony Express trekked through the area, and is likely to have been a major source of horses during its decline. Ranches also no doubt contributed to the wild horse population during the late 1800's and early to mid 1900's. There may also have been transient horse management for the Army remount program which was active into the 1930's. Native Americans did not use the horse, and Spanish explorers never found their way into the area.

Due to the probable ancestry of Butte wild horses, and the rigors of survival in this harsh environment, Butte wild horses can be very dependable sturdy riding and packing horses. Average heights vary depending on whether horses were born during drought years or not, but tend to be around 14 to 15 hands. Colors are also variable, but are dominated by the darker black, bay, chestnut, and sorrel colors. Variations on these basic colors are common, and white markings occur on most animals.

Wild horse foals in Eastern Nevada are born in the spring, mostly during the month of April or May. Births are timed to coincide with spring green-up which would afford the most nutritious forage to nursing mares and foals.

Wild horses are very social creatures and are formed into what's known as a matriarchal society. A matriarchal society is one which is led by a dominant female. This dominant mare is responsible for daily activities of the band. Contrary to popular belief, the stud serves the band in a secondary role only. He does influence the structure of the band and is responsible for gathering up the component mares and maintaining and protecting the group, but has little to do with daily activities.

Bands can range in size from two to twenty or more. Wild horse bands generally consist of one dominant stud, and one to several unrelated mares. Offspring either wander off or are forcibly ejected from the group before becoming reproductively mature to limit inbreeding. Young mares which leave their parental band are quickly gathered up into surrounding bands, while young studs join together into bachelor groups. Young studs will remain in bachelor herds for several years until they are mature enough to take their own mare group.

For more information on the BUTTE HERD MANAGEMENT AREA, contact the Ely Field Office, Bureau of Land Management at (775) 289-1800, or visit our website at www.nv.blm.gov/Ely/wildhorses.htm.



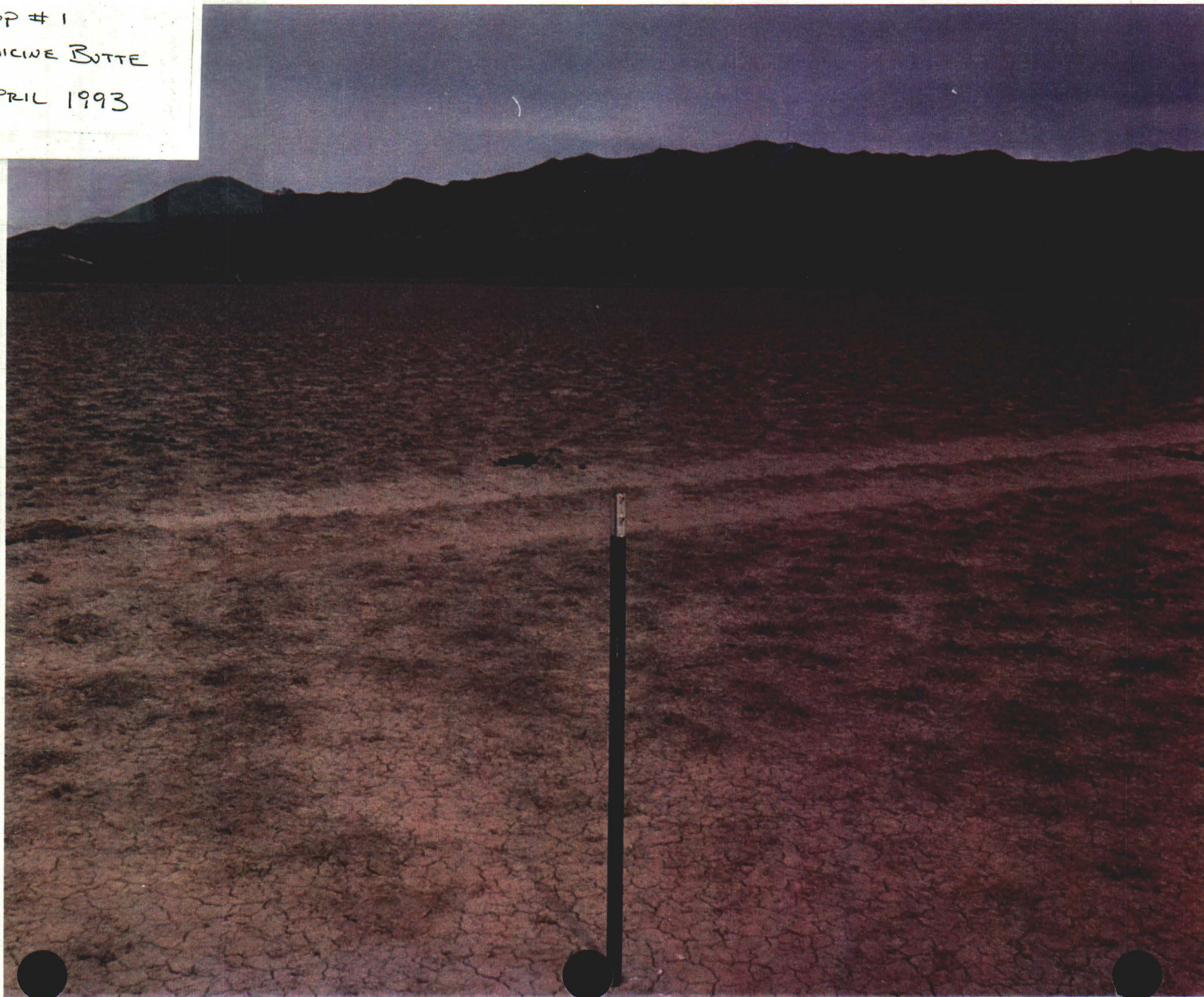
Bureau of
Land Management
Nevada



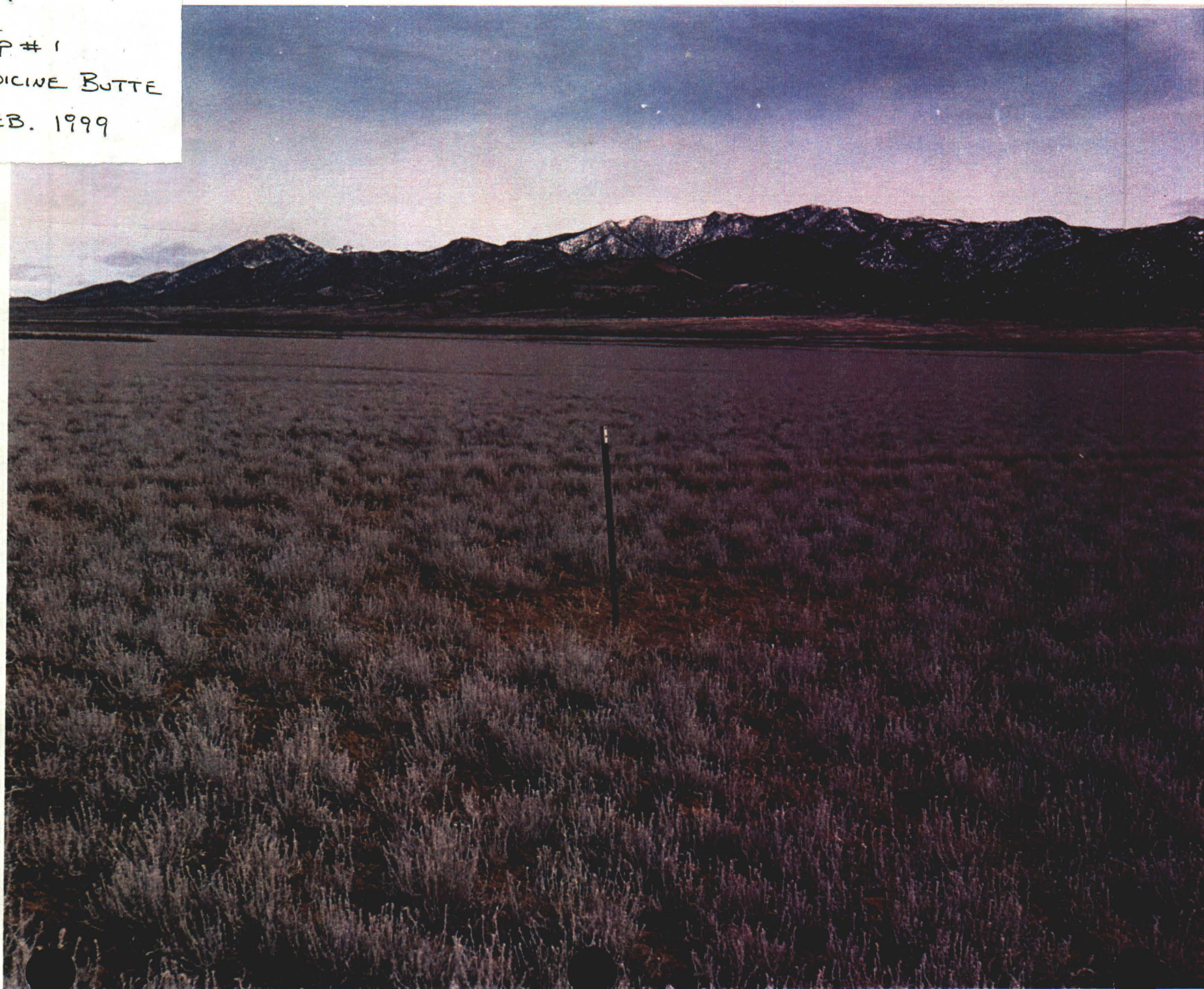
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MEDICINE BUTTE

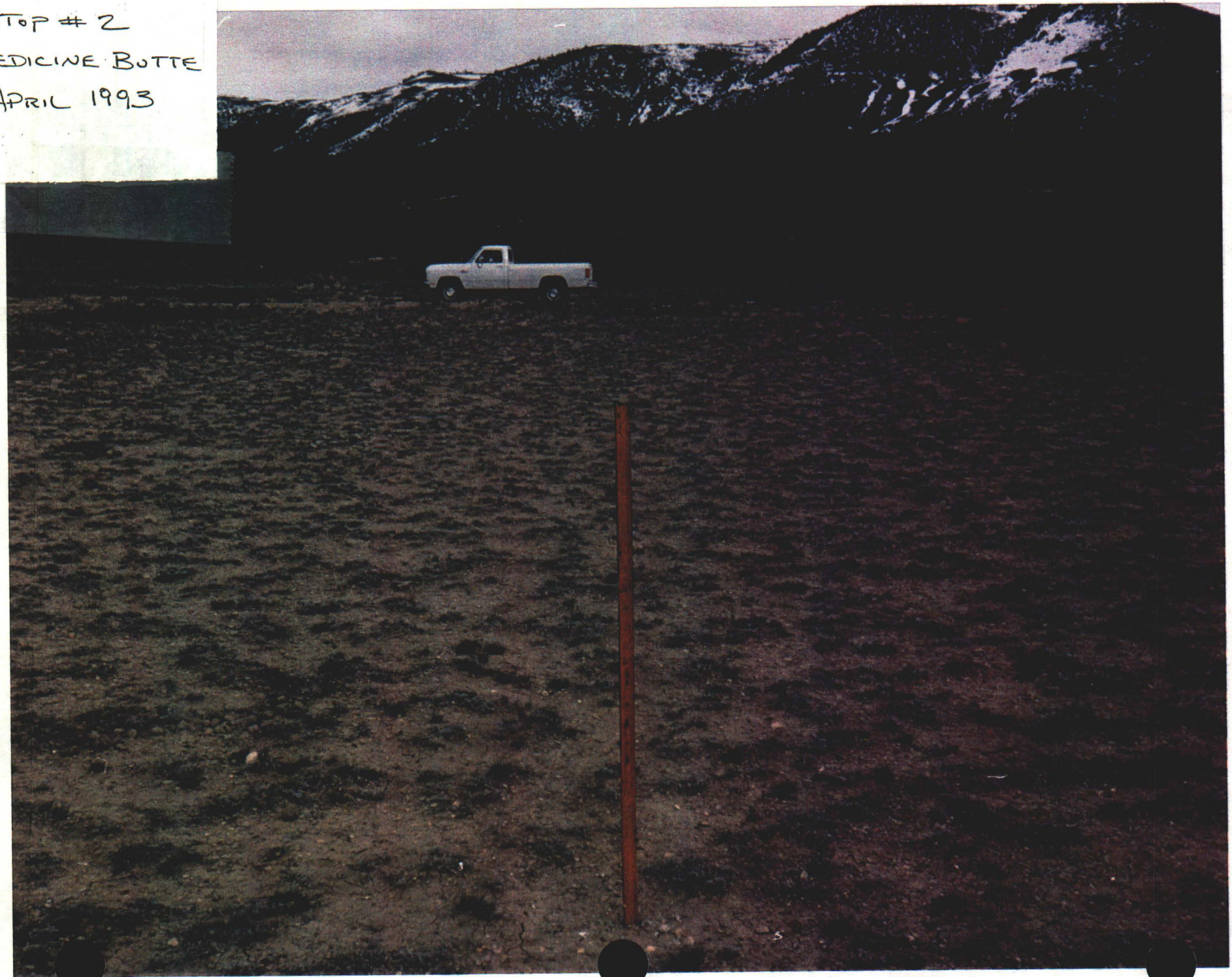
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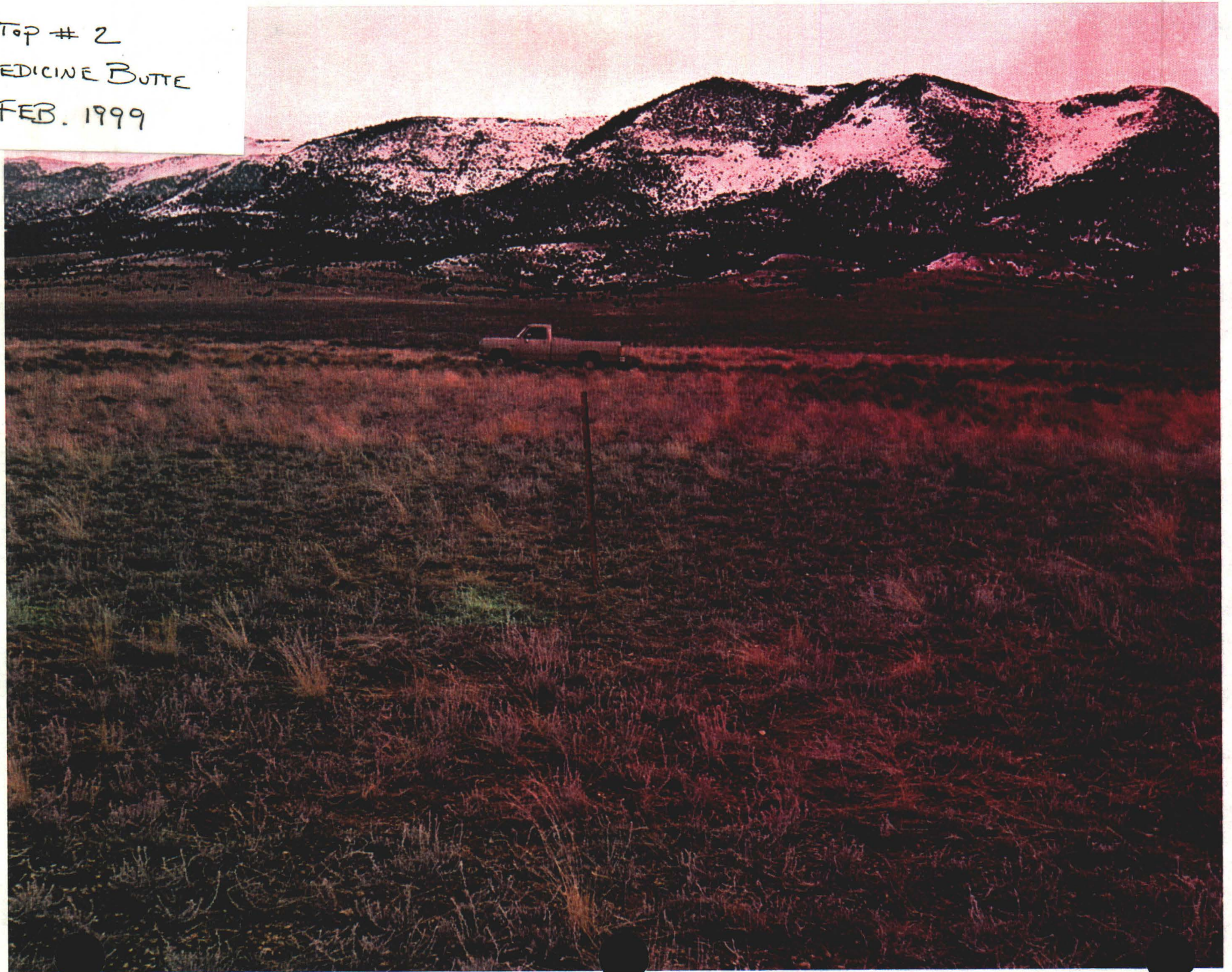
STOP # 1
MEDICINE BUTTE
FEB. 1999



STOP # 2
MEDICINE BUTTE
APRIL 1993



STOP # 2
MEDICINE BUTTE
FEB. 1999



ELY DISTRICT WILD HORSE REMOVAL SUMMARY
Pre-FMUD Removals Since 1985

<u>Date</u>	<u>HMA</u>	<u>Animals Removed</u>
7/85	Monte Cristo	185
2/86	Buck and Bald	347
9/86	Antelope	107
2/87	Antelope	58
7/87	Sand Springs East	408
2/88	Antelope	526
7/88	Jakes Wash (emergency)	60 (includes 19 dead)
8/89	Buck and Bald	338
11/89	Diamond Horse Free Area	66

Post-FMUD Removals

<u>Date</u>	<u>HMA</u>	<u>Animals Removed</u>
9/90	Antelope	412
2/91	Antelope	225
12/92	Antelope (fertility mgmt. project)	270
7/93	Butte	195
8/93	Dry Lake	232
8/93	Wilson Creek	16
8/93	Patterson Horse Free Area	70
10/93	Meadow Valley Mtns. (emergency)	86
10/93	Meadow Valley Mtns. Horse Free Area (emergency)	211
8/94	Buck and Bald	562
8/94	Diamond Horse Free Area	248
9/94	Monte Cristo	118
11/94	Butte	70
11/94	Antelope	85
7/95	Sand Springs East	701
8/95	Monte Cristo	749
2/96	Diamond Hills South	89
8/96	Delamar Mountains (emergency)	61
8/96	Clover Mountains (emergency)	46
9/96	Meadow Valley Mtns. (emergency)	62
9/96	White River (emergency)	277
9/96	Seaman (emergency)	266
9/96	Dry Lake (emergency)	220
9/96	Miller Flat (emergency)	99
9/96	Wilson Creek (emergency)	94
10/96	Little Mountain (emergency)	3
10/96	Highland Peak (emergency)	32
8/97	Diamond Hills South	364
12/97	Buck and Bald	1,045
12/97	Butte	133
12/98	Antelope (fertility)	429
2/99	Monte Cristo (fertility)	311
2/99	Sand Springs East (fertility)	268

Ely District
Wild Horse Herd Management Areas
 August 21, 1998

Ely Field Office

<u>Herd Area Number</u>	<u>Herd Area Name</u>	<u>Appropriate Management Level*</u>	<u>Censused Population Numbers</u>	<u>Date</u>	<u>Total Acres</u>
401	Antelope (HMAP)	233 (78)	739	7/98	400,335
402	Monte Cristo (HMAP)	236	696	6/98	228,940
403	Buck and Bald	340 (60)	426**	5/97	627,030
404	Wilson Creek	160	127	6/97	689,185
405	Sand Springs East	257	724	6/98	386,776
406	Cherry Creek	0 (11)	0	8/98	44,269
407	Butte (HMAP)	74 (40)	82**	6/97	436,500
408	Jakes Wash	6 (29)	88	8/98	67,045
409	White River	90	66	6/97	98,534
410	Dry Lake	94	140	6/97	494,335
411	Seaman	159	51	6/97	361,318
412	Diamond Hills South	22	40***	10/96	10,500
413	Moriah	0 (61)	122	8/98	83,673
Ely Field Office Subtotal		1,671 (279)	3,301		3,928,440

*AMLs that are not in parentheses are actual AMLs established in FMUDs as issued for allotments within the HMA. If no number follows in parentheses, the AML is fully established for that HMA. If a number follows in parentheses, it is an additional estimate to the established AML for those allotments that do not yet have an FMUD issued. All established AMLs have a \pm 15% range for management of the herd.

**These population numbers are based on actual census data, reduced by the number of animals removed during a subsequent removal. There were 1,045 wild horses removed from the Buck and Bald HMA censused population of 1,471 in December 1997. There were 133 wild horses removed from the Butte HMA censused population of 215 in December 1997.

***These population numbers are not based on census, but are the actual number of animals released back into the HMA after the August 1997 capture/removal. These population numbers assume all animals were captured during the removal operation.

Caliente Field Station

<u>Herd Area Number</u>	<u>Herd Area Name</u>	<u>Appropriate Management Level*</u>	<u>Censused Population Numbers</u>	<u>Date</u>	<u>Total Acres</u>
512	Mormon Mountains	(0) ¹	0	6/97	175,423
513	Meadow Valley Mtns	(0) ²	27	6/97	94,966
514	Blue Nose Peak	(20) ³	2 ^a	6/97	86,695
515	Delamar Mountain	(100) ⁴	66 ^a	6/97	191,570
516	Clover Mountain	(40) ³	60	6/97	175,717
517	Clover Creek	(20) ³	0 ^a	6/97	33,653
518	Applewhite	(15) ⁴	13	6/97	27,814
519	Little Mountain	(30) ⁵	33	6/97	54,558
520	Miller Flat	(40) ⁵	59	6/97	91,181
521	Deer Lodge Canyon	(50)	45	6/97	106,607
522	Highland Peak	(40) ⁶	38	6/97	139,625
523	Rattlesnake	(10) ⁶	1	6/97	75,461
Caliente FS Subtotal		<u>(365)</u>	<u>344</u>		<u>1,253,270</u>
Ely District Total		1,671 (644)	3,645		5,181,710

*AMLs that are not in parentheses are actual AMLs established in FMUDs as issued for allotments within the HMA. If no number follows in parentheses, the AML is fully established for that HMA. If a number follows in parentheses, it is an additional estimate to the established AML for those allotments that do not yet have an FMUD issued. All established AMLs have a \pm 15% range for management of the herd.

¹ AML is being set according to guidance contained within the Desert Tortoise Recovery Plan. The Caliente MFP is currently being amended through a draft EIS to reflect this management direction.

² AML is being set through the FMUD process. The FMUD should be issued in the Fall 1998.

³ The Blue Nose Peak, Clover Mountain, and Clover Creek HMAs will be managed under similar objectives due to horse movement between the three HMAs. All three HMAs are under evaluation. The Clover Mountain and Clover Creek portions should be set by the Spring 1999.

⁴ The Delamar Mountain and Applewhite HMAs will be managed under similar objectives due to horse movement between the two HMAs.

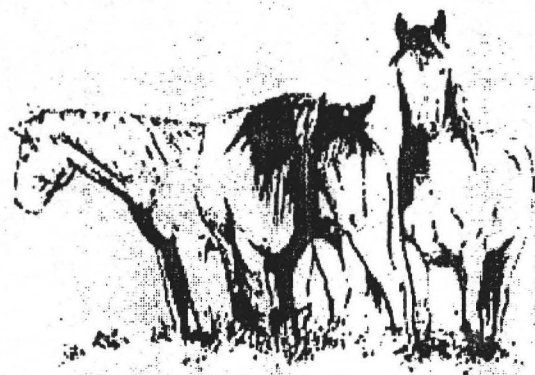
⁵ The Miller Flat and Little Mountain HMAs will be managed under similar objectives due to horse movement between the two HMAs. The Miller Flat portion should be set by the Spring 1999.

⁶ The Rattlesnake and Highland Peak HMAs will be managed in conjunction with the Dry Lake HMA (#410) due to horse movements (typically seasonal) between the three HMAs.

^a Additional horses are known to exist within the HMA but due to flying conditions and timing of the census not all animals were counted.

BUCK AND BALD
WILD HORSE HERD MANAGEMENT AREA,

MANAGED BY THE ELY FIELD OFFICE,
BUREAU OF LAND MANAGEMENT



The Buck and Bald Herd Management Area (HMA) is located approximately 55 miles north-

northwest of the town of Ely in White Pine County, Nevada. The Buck and Bald HMA comprises approximately 627,030 acres (679 square miles), 98% of which is public lands.

The Buck and Bald wild horse herd is managed by the Ely Field Office for an appropriate management level of 400 wild horses. This

number was developed based on evaluation of the horses' habitat which indicated that between 340 and 460 wild horses could be sustained in the area without interrupting the delicate balance of the ecosystem.

In order to keep wild horse numbers in balance with their environment, the BLM periodically gathers wild horses from the range and places them into the National Wild Horse adoption program. Between 1985 and 1999, a total of 2,292 wild horses were removed from the Buck and Bald HMA and a total of 3,020 wild horses were captured.

The area which includes the Buck and Bald HMA is very remote. Access to the HMA is accomplished via dirt roads and trails mainly with two paved roads entering the HMA on the far east and far west sides.

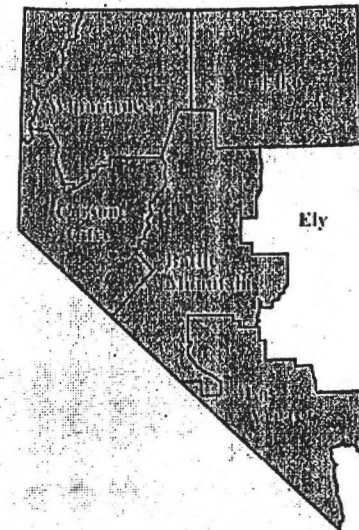


The only significant human settlement in the area aside from a couple of small ranches are the towns of Ely and Eureka.

The layout of the Buck and Bald HMA consists of four large valleys (Newark Ruby, Huntington, and Long) bounded on the sides by large mountain ranges and separated in the middle by the south half of the Ruby mountains. The White Pine/Elko County line is the north end. The Mountain ranges include the Butte, South Ruby (buck and bald), Maverick Springs, and Diamond Mountains. All mountain ranges have peaks exceeding 8,500 feet above sea level. Newark valley is wide and long. Its lowest elevation is around 5,900 feet and is marked by a large alkaline playa or dry lake bed. Long valley is similar to Newark except it occurs at a slightly higher elevation and is mostly vegetated with only a small playa.

The Buck and Bald HMA affords a classic Great Basin environment marked by extremes of almost every kind. Summertime temperatures can exceed 100 degrees, and winter lows can fall below 30 degrees below zero. Precipitation in the Eastern Nevada region occurs mostly in the winter in the form of snow with sparse summer moisture. Moisture totals of over 12 inches are common for the mountains, while less than 8 inches may fall in the valleys.

Vegetation in the Buck and Bald HMA is also characteristic of the Great Basin, with dominant plants having evolved to survive the extremes. Typical vegetation varies with elevation with upper mountain slopes generally brush covered with fir and mountain mahogany covering extensive areas. Through the mid elevations, pinion and juniper trees are dominant and often form closed stands which prevent other vegetation from growing. As the elevation and moisture supply falls, the vegetation shifts towards a shrub dominated community. Sagebrush is the most common shrub along the pinion-juniper perimeter. Sagebrush gives way to white sage, black sage, saltbush and other "salt desert shrub" type plants.



Salt desert shrub plants have evolved to deal with the highly saline soils which developed after thousands of years of internal drainage of runoff waters.

Wild horses in the area can be found throughout the HMA at different times of the year. Typically, horses will remain at the upper elevations during the summer as long as the forage and water hold out. As these resources are depleted, or when snow drives them down (as early as September in some years), they move off the mountain and into the valleys. Here they exist on the sparse grasses such as Sandberg's bluegrass, needle and thread grass, and Indian rice grass. In addition to grasses, horses in the region have adapted to a diet dominated by the dominant shrubs such as white sage and salt bush.

Water is of critical importance to every animal in the Buck and Bald HMA. Water is very limited and occurs only at very few natural springs and a few man-made wells. There are a few small perennial streams in the Buck and Bald HMA.

The Buck and Bald HMA is home to numerous wildlife species including mule deer, pronghorn antelope, coyote, jackrabbits, and numerous species of birds and rodents.

Human interest in the Buck and Bald HMA has been historically limited to livestock ranching, hunting, prospecting, and firewood and pine nut harvesting. In recent years, outdoor tourism has become increasingly important, and Eastern Nevada is evolving into an important area for those seeking vast unoccupied expanses of public lands.

The history of the Buck and Bald wild horse herd is somewhat clouded. Few people visited the area before fairly recent times. The Pony Express trekked through the area, and is likely to have been a major source of horses during its decline. Ranches also no doubt contributed to the wild horse population during the late 1800's and early to mid 1900's. There may also have been transient horse management for the Army remount program which was active into the 1930's. Native Americans in Nevada did not use the horse, and Spanish explorers never found their way into the area.

Due to the probable ancestry of Buck and Bald wild horses, and the rigors of survival in this harsh environment, Buck and Bald wild horses can be very dependable sturdy riding and packing horses. Average heights vary depending on whether horses were born during drought years or not, but tend to be around 14 to 15 hands. Colors are also variable, but are dominated by the darker black, bay, chestnut, and

sorrel colors. Variations on these basic colors are also common, including paint, pinto, palomino, and roan, and white markings occur on most animals. The Buck and Bald wild horse herd also contains a curly horse ancestry. Though the origin of this trait are not known, the pleasing and unique results are found in wild horses only from this geographic area.

Wild horse foals in Eastern Nevada are born in the spring, mostly during the month of April or May. Births are timed to coincide with spring green-up which would afford the most nutritious forage to nursing mares and foals.

Wild horses are very social creatures and are formed into what's known as a matriarchal society. A matriarchal society is one which is led by a dominant female. This dominant mare is responsible for daily activities of the band. Contrary to popular belief, the stud serves the band in a secondary role only. He does influence the structure of the band and is responsible for gathering up the component mares and maintaining and protecting the group, but has little to do with daily activities.

Bands can range in size from two to twenty or more. Wild horse bands generally consist of one dominant stud, and one to several unrelated mares. Offspring either wander off or are forcibly ejected from the group before becoming reproductively mature to limit inbreeding. Young mares which leave their parental band are quickly gathered up into surrounding bands, while young studs join together into bachelor groups. Young studs will remain in bachelor herds for several years until they are mature enough to take their own mare group.

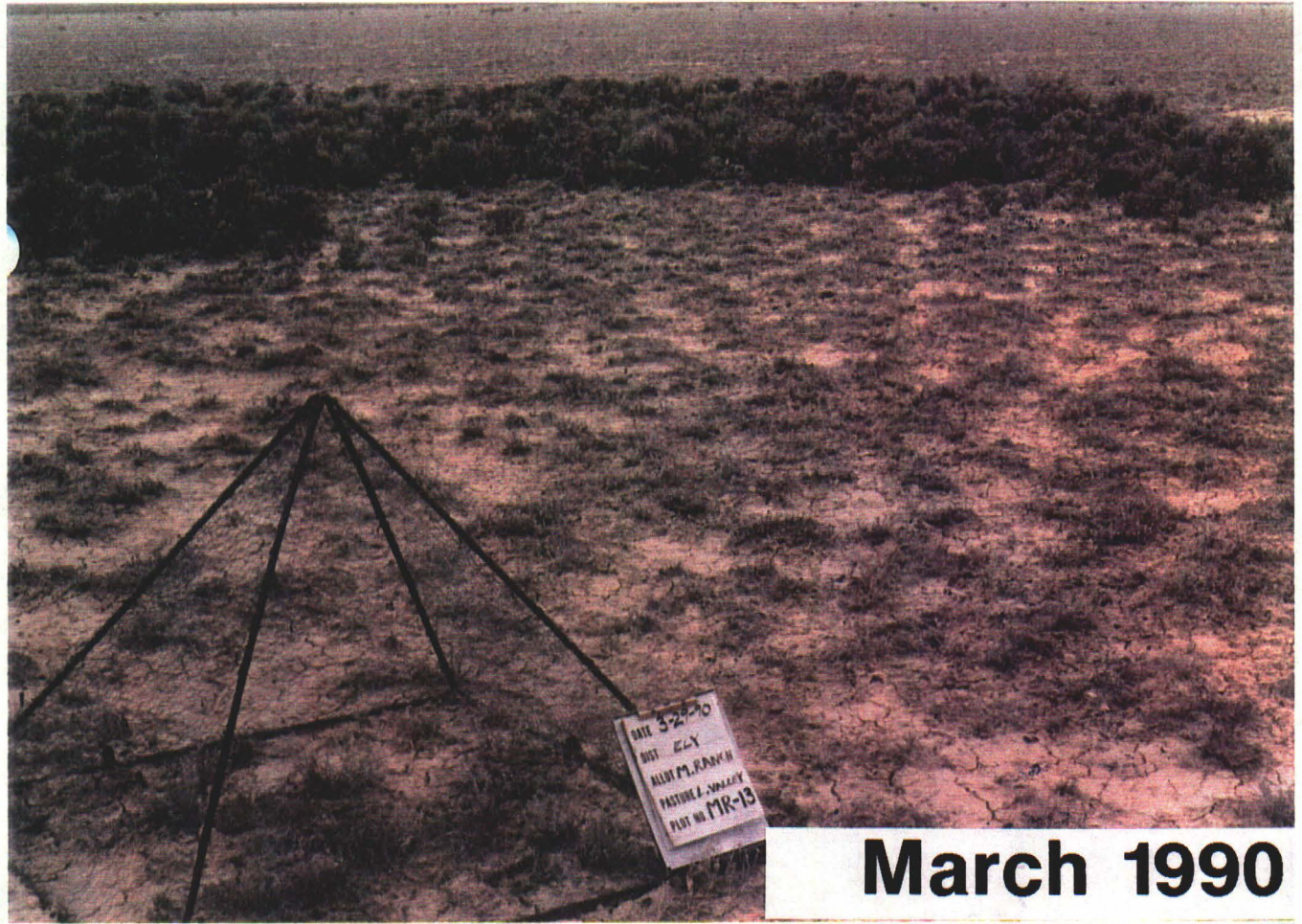
For more information on the BUCK AND BALD HERD MANAGEMENT AREA, contact the Ely Field Office, Bureau of Land Management at (775) 289-1800, or visit our website at www.nv.blm.gov/Ely/wildhorses.htm. For more information about Nevada mountain ranges including plant and animal resources go to: www.brcc.unr.edu/mtn/list.html



Bureau of
Land Management
Nevada



Morman Ranch Allotment

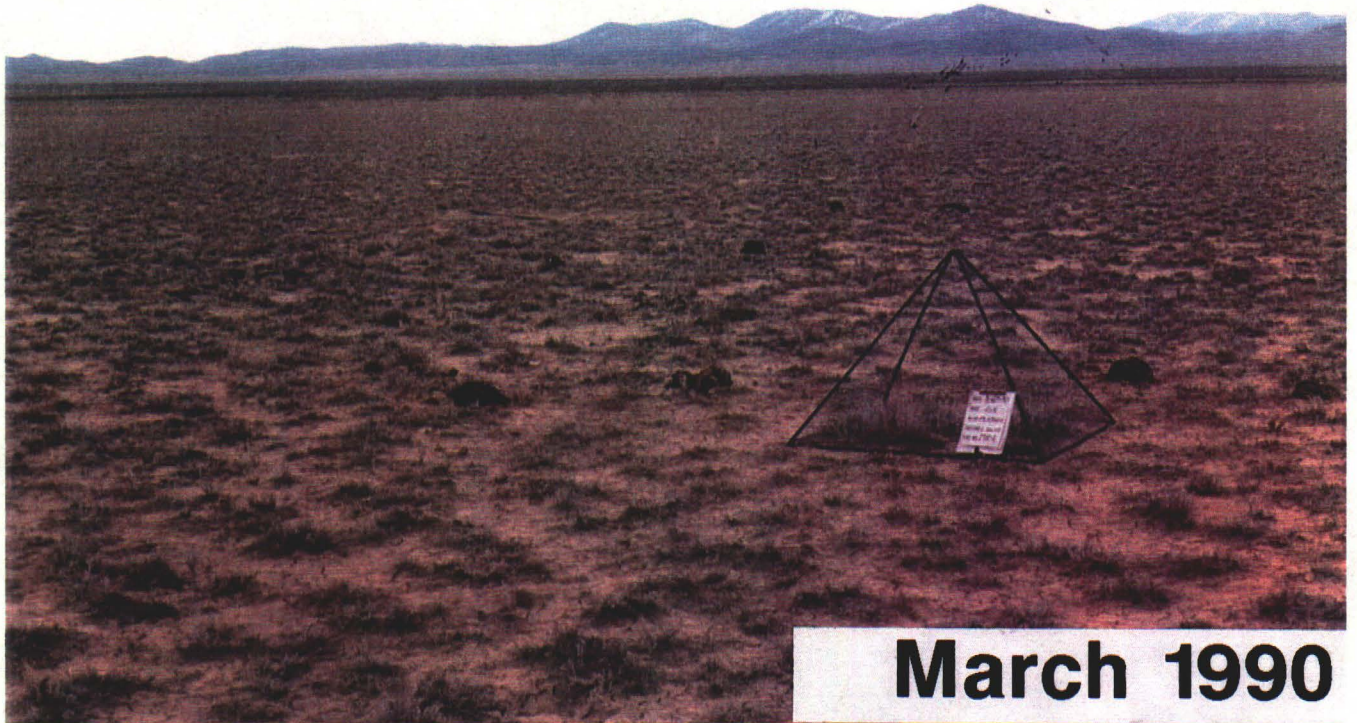


March 1990



June 1999

Morman Ranch Allotment



March 1990



June 1999

Post Gather Report:
Sand Springs East Herd
Management Area (NV 405)
Managed by the Ely Field Office,
Bureau of Land Management,
Nevada.

PART 1. INTRODUCTION/BACKGROUND

The Sand Springs East Herd Management Area (HMA) was gathered during the period 2/3 through 2/14, 1999. The gather was initiated following completion of population census conducted in June 1998. This census documented the location and distribution of 724 head of wild horses. The Appropriate Management Level (AML) for the Sand Springs East HMA is 257 wild horses yearlong. This AML was set in consultation with affected interests through the Nevada BLM's Multiple Use Decision (MUD) Making process.

On February 3, 1999 BLM personnel initiated wild horse gather operations in the Sand Springs East HMA. The gather resulted in the capture of a total of 533 wild horses over 9 days from 3 trap sites (average 59 horses/day). See Appendix 1 for Daily Capture Summaries. A total of 268 wild horses up to five years old were removed from the range.

Trap locations were as follows (see map 1.): Ike Spring Wash; Located in the extreme southeast corner of the HMA, this trap site yielded 166 horses over 3 days. Fish Creek ranch (little smoky valley); This trap is located in the northeast corner of the HMA. This trap yielded 196 horses in 2 days of trapping. Sand Springs Valley; This final trap site yielded 171 horses in 4 days of trapping. There was a total of two days when trapping operations had to be suspended due to road conditions or high winds. On February 14, capture operations were suspended due to difficulty in locating horses and on February 18, the last wild horses not fitting the Bureau's Selective Removal Criteria were released back out on the range.

Processing Summary

A total of 533 horses were processed at the central holding facility during the Sand Springs East wild horse removal. Processing of these wild horses consisted of the following activities:

1. Individually inspecting each horse for overall health and soundness
2. Classifying individuals by age, color and sex
3. Administering fertility control vaccinations.

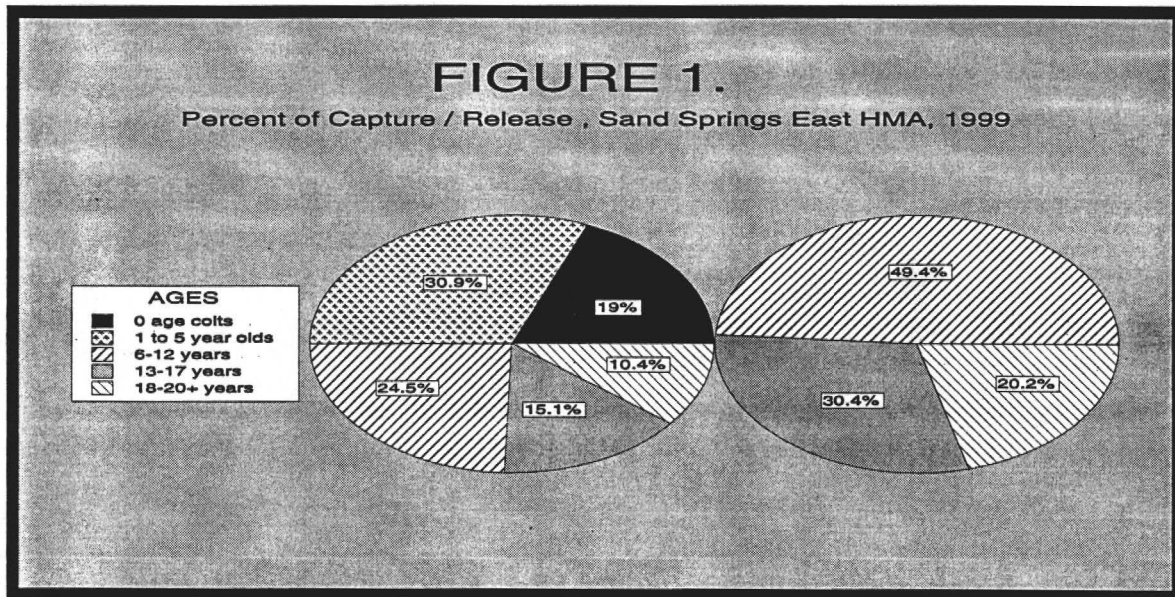
Fertility Control Research

Fertility control vaccinations consisted of a mixture of three time release doses of Porcine Zona Pelucida (PZP) and Freund's adjuvant. PZP is derived from an ultra-finely ground mixture of cellular material from pig ovaries, and Freund's adjuvant is a solution of heat killed tuberculosis virus. This combination of materials was developed by reproductive scientists at the University of California at Davis, working in conjunction with animal scientists at the Medical College of Ohio. The current formulation of the vaccine is the end result of several years of investigation and refinement culminating in the current mixture which has an effectiveness of 95% and a duration of one year with no documented permanent impacts to horse behavior, biological processes (reproductive cycling), or long term fertility. The current formulation is undergoing field trials to determine effectiveness of the drug on an entire population and the delivery method under field conditions. The delivery method is a dart driven at low speed by a volume of compressed air.

PART 2. ANALYSIS OF GATHER DATA

Age Distribution

The age structure of the Sand Springs East HMA is beginning to show evidence of impacts as a result of the selective removal policy. The overall age of the Sand Springs East HMA was 10.5 years old. Of release animals (animals over 5 years), the average age was 13.0 years, with studs averaging 13.9 years and mares averaging 11.5 years old (Figure 1).



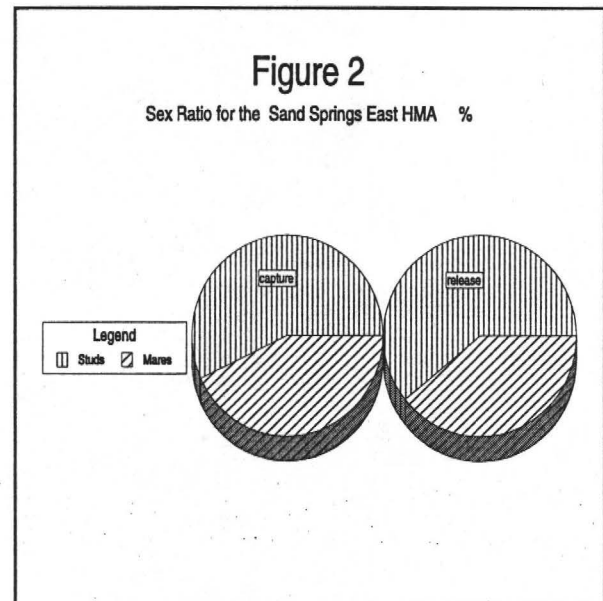
Sex Ratio

The sex ratio for captured animals varied according to age. The following table demonstrates the differences in sex ratio depending on age.

TABLE 1. Wild Horse Sex Ratios for Various Age Classes of Horses Gathered During the Winter, 1999 Sand Springs East HMA Wild Horse Removal Contract.

Age Class	% Studs	% Mares
0 - 5 yrs.	53%	47%
6 - 12 yrs.	50%	50%
13 - 17 yrs.	69%	31%
18 - 20+ yrs.	80%	20%
overall/all ages	58%	42%

These differences can be attributed to several factors. For horses aged 0 to 5 years old, there is roughly an equal split between the sexes. This is representative of the equal chances for either a stud or mare at birth, and the fact that there is a high survival of young. The sex ratio for foals captured was exactly even. For ages 6 to 12 years, there is no real selective pressure upon either sex, as these figures represent the most healthy segment of the herd. As horses begin to age, the pressure of survival begins to influence the ratio, and studs begin to be favored over mares. Mares during this time have been reproducing regularly and enduring the physical stresses associated with bearing young in an inhospitable environment. Studs, have been embroiled in the maintenance of their harems, but are subjected to fairly limited biological stress, as they defend their harem year around, and are not faced with an annual rut like deer and elk. As horses reach old age, the disparity between studs and mares continues to increase, and mortality increases. Figure 2 demonstrates the effect age has on sex ratios. Release animals (animals over 5 years) were dominated by studs.



Size/Physical Condition

Overall, the Sand Springs East wild horse herd appeared generally healthy. There were a significant number of notable exceptions to this conclusion, however. Old mares were, almost without exception, in the fair to poor category in terms of body condition. While the majority were obviously pregnant, most showed prominent rib and bone lines, and several were very difficult to dart with the immunocontraceptive due to the thin musculature around the pelvis and hips. This was attributed to the old age of the mares, late term pregnancy, and the seemingly accelerated rate of wear on the teeth. Close cropping of vegetation is the likely cause for the unusual tooth wear leading to ingestion of sand. Parrot mouthed dentition was also common and may have impacted foraging efficiency.

The average age of the entire herd as captured was 10.5 years old, and the ratio of shippable animals to unshippable animals (0-5 year olds : > 5 year olds) was near 1:1 (49.8% under 6 years old) indicating a vigorously reproducing population. Overall, Sand Springs East wild horses averaged in the thirteen to fourteen hand category, in terms of size, with most falling below fourteen hands. In comparison to domestic saddle and ranch horses, conformation tended toward a fairly stout body form with thicker limbs, broader and longer heads, and somewhat poorly developed musculature. Parasites within the herd appeared to have little influence on the herd judging by the outward signs such as coat sheen, mane and tail length, and skin health. Only two horses showed signs of scabbies.

Color Variation

Color distribution among the Sand Springs East HMA can be judged as generally unremarkable. Table 2. Documents the occurrence of the various colors of horses within the HMA. Individual trap totals are displayed as they indicate certain portions of the herd area may be geographically isolated .

Table 2. Sand Springs East HMA distribution of Colors (3 trap sites)

Color		Total			%	>5 yrs.			%	>12 yrs.			%
Bay 31%	Stud	50 *	41 **	18 ***	35	31	16	9	34	16	12	6	37
	Mare	28	21	12	26	12	10	6	27	3	3	1	19
Brown 24%	Stud	23	14	22	19	10	9	13	20	7	7	5	21
	Mare	28	22	21	31	11	6	9	26	3	4	6	35
Sorrel 14%	Stud	15	12	20	15	8	4	11	14	2	1	4	6
	Mare	3	15	8	12	2	8	4	16	1	3	1	11
Black 11%	Stud	5	18	13	12	3	12	9	15	2	9	5	17
	Mare	7	11	3	9	4	5	1	10	2	2	0	11
Roan 12%	Stud	4	26	5	11	1	13	5	12	0	9	3	13
	Mare	2	18	11	14	1	8	8	17	0	4	4	22
Grey 0%	Stud	0	2	0	0	0	3	0	2	0	2	0	2
	Mare	0	1	0	0	0	1	3	4	0	0	0	0
Pinto 2%	Stud	2	1	2	2	2	0	0	1	2	0	0	2
	Mare	1	0	4	2	1	0	1	2	1	0	0	3
Paint 0.2%	Stud	1	0	0	.3	1	0	0	.6	1	0	0	1
	Mare	0	0	0	1	0	0	0	0	0	0	0	0
Dun 3%	Stud	1	6	1	3	0	1	0	.6	0	0	0	0
	Mare	0	2	5	3	0	1	0	.9	0	0	0	0
White 0.5%	Stud	0	2	0	.7	0	2	0	1.2	0	0	0	0
	Mare	0	1	0	.4	0	1	0	.9	0	0	0	0
Curly **** 5%	Stud	1	7	7	5	1	4	5	6	0	4	3	8
	Mare	0	9	3	5	0	4	2	2	0	0	0	0
TOTAL		101	125	81	XX	56	60	47	XX	31	40	23	XX
		68	94	64	XX	32	40	29	XX	10	16	12	XX

* Ike Spring Trap (Southeast corner of HMA)

**Fish Creek Ranch(Little Smoky Valley Trap (North half of HMA)

***Sand Springs Valley Trap (Southwest corner of HMA

****Curly horses are included in the rest of the table under their respective colors, and are included only for reference.

Over 55% of the horses captured were of the darker bay or brown colors. These same colors made up 53% of the release herd. Sorrels (chestnuts), blacks, and roans (mostly strawberry or red) make up the second most common color categories, totalling 37% of the capture herd and 41% of the release herd. Other colors present included pinto/paint (2% of capture and 1.9% of release), dun (3% of capture and 0.8% of release), and white (0.5% of capture and release).

Curly horses were sprinkled throughout the herd, mostly in the Eastern portions of the herd area. This trait was found in 5% of captured horses and was in 6% of released horses. Exceptional specimens of this trait were captured, but were within the selective removal criteria, and were shipped for adoption. Predominant underlying colors for curly horses were as follows: 22.2% bay, 22.2% roan, 22.2% black, 14.8% brown, 11.1% sorrel, and 7.4% white. The average age of curly horses was 7.9 years for all ages, and 12.5 years for those over five years.

PART 3. POPULATION TRENDS

Wild Horse population statistics for 1987 and 1995 gathers in the Sand Springs East HMA were compared to 1999 numbers. Substantial differences were noted in several categories.

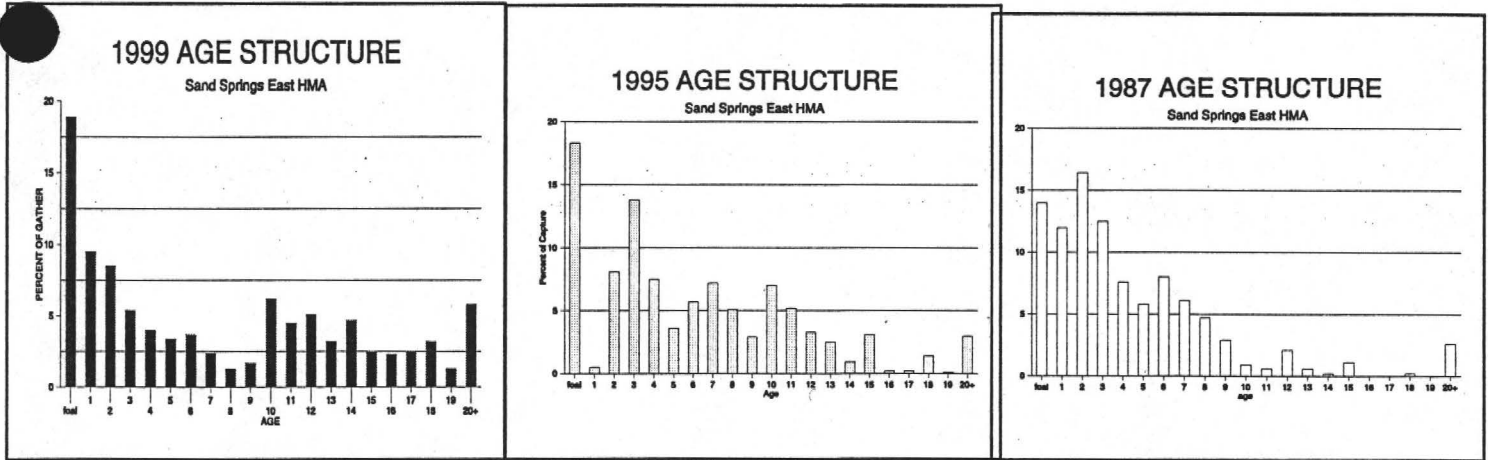
General information

The 1987 wild horse gather was a "gate cut" capture of 408 horses. Gate cut captures involved the non selective capture and removal of a targeted number of wild horses (all ages of horses were removed). Gather operations ceased when the targeted number of horses was captured; therefore, population wide statistics are not available for comparison. However, assuming a normal distribution of horses of various ages, sexes and colors, it is acceptable to use gather statistics as representative values for the entire population at that time.

The 1995 wild horse gather was the first selective removal of wild horses for the HMA. Horses aged 0 to 9 years old were removed, and the entire population was captured. The total capture for 1995 was 961 wild horses.

The 1999 wild horse gather was the second selective removal gather for the HMA. Horses aged 0 to 5 years old were removed, and the entire population was captured. The total capture for 1999 was 533 wild horses. The following set of three graphs compares the differences in age structure between pre-gather populations of the Sand Springs East HMA and demonstrate changes in the age structure which have occurred as a result of selective removal gathers.

Figure 3. Comparisons of Age Structure for the Sand Springs East wild horse herd for three periods.



The average age of the 1987 gather population was 4.5 years old, while the 1995 population had an average age of 6.3 years. In contrast, the 1999 gather herd had an average age of 10.5 years, over twice the age encountered during the first gather. Since it is reasonable to assume that the 1987 herd structure was representative of a "natural" herd due to the fact that the herd had not been gathered on a population level basis prior to 1987, significant effects to herd structure have occurred as a result of selective removal.

This conclusion is supported by the reproductive rate of the 1987 herd. The ratio of zero age foals to mares over two for 1987 was 49.1:100. In contrast, the same ratio for the 1999 herd was 83.1:100 (54.5:100 in 1995). The lower reproductive rate for 1987 and the trend toward increasing reproductive rates over time as the herd age structure and sex ratios change has potentially major implications to both the wild horse program, and the health of the herd.

Potential negative impacts to the Bureaus wild horse program include increasing costs and overburdened adoption programs. Costs increase as it becomes necessary to gather more animals more often to maintain population levels to say nothing of the near impossible task of reducing most of our current herds to within management levels. The national adoption program becomes overtaxed as populations dominated by horses which are proven survivors, have proven survival and reproductive tactics, and are at the peak of their reproductive life will produce more foals on a percapita basis than a herd which is younger and therefore less experienced in survival.

Population health is also potentially affected. The average age distribution of the 1999 released mares (64% of the core population, animals over 5 years of age, was in the 6-12 year old category). This fact points toward an inevitable decline in

reproductive vigor within the next few generations. In addition, the older the herd becomes, the more susceptible it becomes to extreme environmental events or diseases encouraged by weakness. Mares would be particularly hard hit, should an event such as this occur, since they appear to be less resilient with age. The survivability of the population following an event such as this, would come into question. In the Great Basin, alternating periods of feast and famine, and regular visits by extreme weather and climatic events leads to the conclusion that a mortality event will surely occur, its just a question of when.

Sex ratios have also seemingly suffered with the implementation of successive selective removals (Table 3).

TABLE 3. Change In Sex Ratios (Expressed As The Percentage Of Studs In The Population) Between Various Age Groups, Sand Springs East HMA, Ely Field Office, Bureau of Land Management, Nevada.

Year	Overall	Percentage of Studs			
		0-5 yr.	6-12 yr.	13-17 yr.	18-20 yr.
87	52.1	56.2	42.8	68.8	71.4
95	53.2	47.4	55.3	68.6	77.3
99	57.5	53.2	50.3	44.4	80.0

The increase in studs as a whole in the population occurs as a symptom to selective removals which increase older age horses in the population. Increasing age has been shown to favor studs due to the biological stresses associated with pregnancy and foaling in mares. As can be seen by Table 3., there is a substantial decrease in the number of 13 to 17 year old mares relative to studs, and nearly an equal proportion of studs to mares for the 6 to 12 year old category. This situation is also in keeping with the characteristic favoring of mares during the prime years of life as studs struggle to gain control of and keep harems of mares, and survive as bachelors.

With respect to physical characteristics (colors), changes are also notable over time between gathers. Table 4. Documents the actual changes in the distribution of color in the herd over time.

Table 3. Changes In Horse Color Over Time, Sand Springs East Herd Management Area, Bureau of Land Management, Ely Field Office, Nevada

COLOR	YEAR (% or capture population)		
	1987	1995	1999
Bay/Brown	62.4	54.8	55.4
Sorrel (Chestnut)	17.3	15.6	13.9
Black	8.6	15.1	10.7
Roan (red, blue, Strawberry)	4.7	11.5	12.4
Grey	3.7	0.3	0
White	0	0	0.5
Pinto/Paint	1.7	2.2	2.1
Buckskin/Dun	0	0.3	2.8
Palomino	0	0.1	0

Bay, sorrel and black are dominant colors among horses (¹Sponenberg, 1996). As can be seen in the table, two of the three dominant colors have decreased over the years. Correspondingly, all other major color groups have increased in abundance. Since colors other than bay, sorrel and black are generally accepted as recessive traits, and given the repeated selection of 85 to 95% of all new generations of young through selective removal gathers, this data tends to suggest that genetic changes are occurring within the herd. A conclusion regarding the genetic health of the herd cannot be made based on this information alone. However the data suggests a problem and should be sufficient to warrant additional attention to this matter. The importance of this data would be enhanced if unrelated wild horse herds in other areas demonstrated the same or similar trends in color distribution.

PART 4. COMPARISON OF SAND SPRINGS HERD STATISTICS TO OTHER HMAs

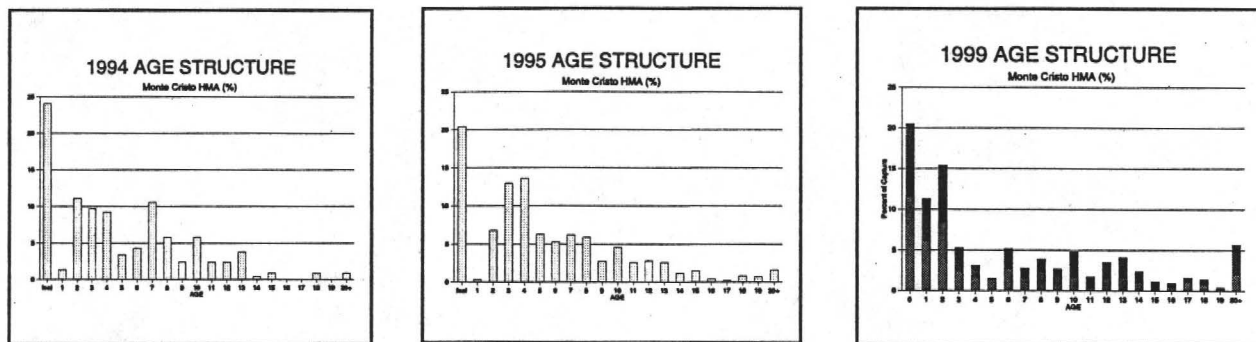
The Sand Springs East HMA was compared with two other HMAs gathered during the winter of 1998/99 by the Ely Field Office.

¹Sponenberg, Phillip, DVM, PhD. 1996. Equine Color Genetics. Iowa State University Press.

The Monte Cristo HMA (NV402) is located adjacent to the Sand Springs East HMA to the north and east and the Antelope HMA (NV401) is an unrelated wild horse herd in the extreme northeast corner of White Pine County.

The following figures detail the differences between the Monte Cristo, Antelope, and Sand Springs East HMAs for pre- and post-selective removal herds.

Figure 4. Age Structure trend of Monte Cristo HMA for 1994, 1995, and 1999.



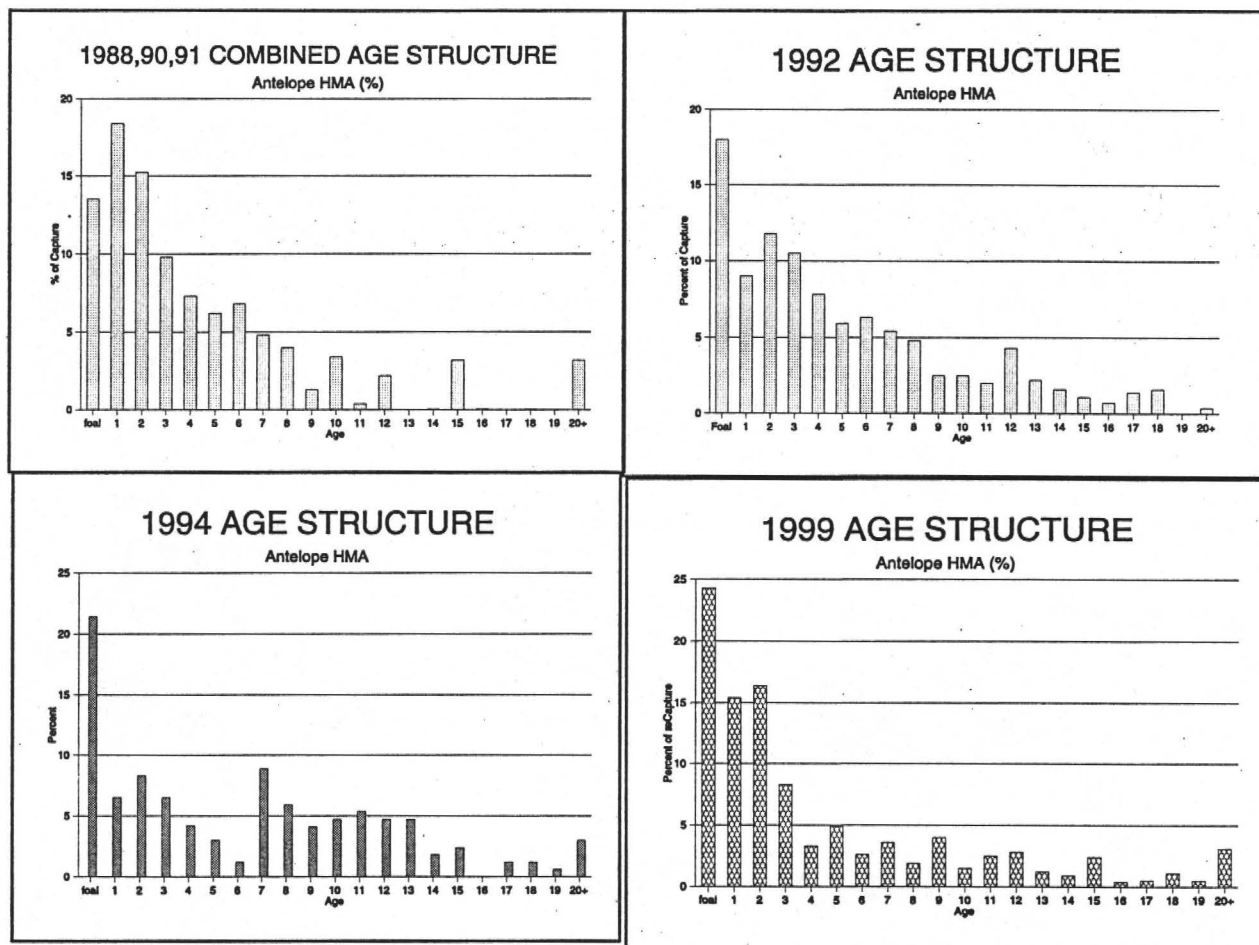
The Monte Cristo HMA had been gathered five times prior to the 1999 gather. The first three gather, occurred in 1979, 1983, and 1985, and were "gate cut" gathers of 96, 43, and 185 animals respectively.

The fourth gather which occurred in 1994 had been limited to the north half of the HMA and had been a selective removal of wild horses with the maximum removal age being five years. A total of 207 wild horses were captured, and 117 (56.5%) were removed during this summer gather.

During 1995, the entire HMA was gathered utilizing the selective removal policy. The age criteria for removal was nine years. A total of 945 horses were captured during this summer gather, with 749 (79.3%) being removed.

During 1999, the entire HMA was again gathered utilizing the selective removal policy. This winter gather was targeted for the removal of horses up to five years old. A total of 538 wild horses were gathered with 303 (56.3%) horses being removed from the range.

Figure 5. Changes in the Age Structure of The Antelope HMA over Time.



The Antelope Herd Management Area (NV401) is located in the northeast corner of the Ely District. The Antelope HMA has been gathered a total of 8 times since 1985, more than any other HMA on the Ely District. A total of 2,112 wild horses have been removed over the years.

Gate cut wild horse gathers in the antelope HMA occurred in the summer of 1986, spring of 1987, spring 1988, summer 1990, and spring 1991. A total of 1,328 horses of all ages were captured during these gathers.

Selective removals occurred in the winter of 1992, winter of 1994, and winter of 1998. Removals totalled 784 wild horses aged 0 to 5 years.

During the winter of 1992/93, northern Nevada experienced a record winter for snowfall and temperatures. The Antelope HMA underwent a significant winter die off during this time, as did many northern Nevada wildlife herds. This die-off appears to have targeted the younger age classes (Figure 5) resulting in a

per capita increase in the number of older age wild horses in 1994. Successive normal to above average winters and above average springs, combined with a major drought in 1996, which resulted in emergency removals of wild horses in eastern Nevada, presumably combined to kill off older horses and allow for a high level of recruitment of young apparently correcting what was shaping up to be a heavily skewed/old aged wild horse herd similar to the Sand Springs East herd. Figure 6 compares the current sex ratios of the three wild horse herds for various age categories. And Figure 7 documents the differences between the two areas with respect to implied reproductive vigor.

Figure 6. Comparison Sex Ratios of Various Age Categories for the Sand Springs East, Antelope, and Monte Cristo HMA's for 1999.

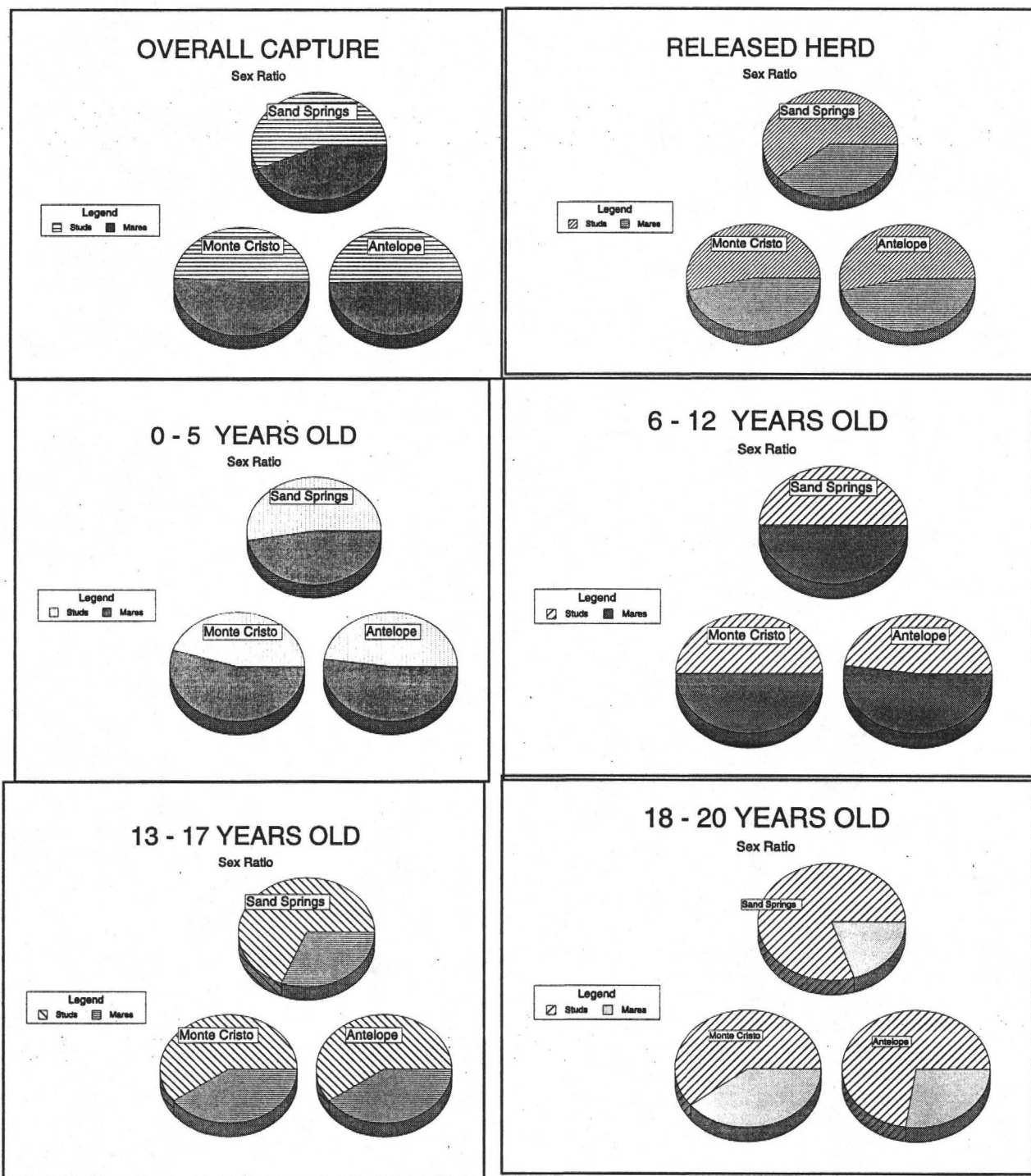


FIGURE 7. Reproductive vigor for Antelope, Monte Cristo, and Sand Springs East HMAs based on 1999 findings presented in comparison to average herd age.

Monte Cristo HMA Ratio

Of Foals: 100 mares <2 years old

61.1 : 100

Average age of mares over 2 years old was 10 years old

Sand Springs HMA Ratio

Of Foals: 100 mares <2 years old

83.3 : 100

Average age of mares over 2 years old was 9 years old

Antelope HMA Ratio

of Foals: 100 mares <2 years old

71.7 : 100

Average age of mares over 2 years old was 7 years old

When placed side by side, the sex ratios, average ages, and implied reproductive vigor seem to indicate a relationship between age and reproduction for all three areas.

The average age for mares over 2 years old for the three areas may be the greatest single factor influencing reproduction among the three herds. The average age for mares over 2 years in the Monte Cristo HMA was 10 years, while the Average age for Sand Springs East Mares over 2 years was 9 years. In the Antelope HMA, the average age for mares over 2 years was 7.

Sex ratios for the three areas proved to also be very similar among areas for the majority of the age classes which were analyzed. The most notable exception proved to be the 18 to 20 year category in which the sex ratio heavily favored studs. This phenomenon was also true for the 13 to 17 year old bracket. In general, the theme in which studs become favored in the population with age proved to hold true for all three areas.

PART 5. CONCLUSIONS

The 1999 Sand Springs East HMA wild horse gather successfully removed wild horses from the range, but did not result in achievement of the Appropriate Management Level. A significant number of wild horses were unaccounted for at the conclusion of the gather, but are presumed to have been captured during the subsequent Sand Springs West HMA wild horse gather conducted by the Battle Mountain District, Tonopah Field Station. The sand Springs East wild horse herd seems to have a generally unremarkable character with exception of an abundance of roan and curly horses. These traits may be at risk for elimination from the herd without conservation action during future gathers. The average age of the curly horses was 10 years and the average age of roan horses was 13 years. Similarly, a few exceptionally large specimens of horses were noted during the gather, but were almost entirely removed, as they met the selective removal criteria.

It seems, based on the findings of the 1999 wild horse gathers, that the Bureau's selective removal policy is beginning to influence several wild horse population variables. Age Structure data was available from periods before initiation of the selective removal policy for the Antelope and Sand Springs East HMAs. These data provide a useful glimpse into what may be the closest that eastern Nevada wild horse herds came to being in a "natural state".

Before selective removals were imposed both HMAs demonstrated generally young, balanced and moderately reproductive characteristics. After the first round of selective removals, changes in age structure could be noted. With completion of a second selective removal, especially when it involved removing horses to age nine, the age structure was significantly skewed, sex ratios favoring studs were apparent, and a relationship between average age of the herd (and possibly sex ratio) and reproductive vigor seemed to be in place. By 1999 gathers, two of the three herds were significantly different from what they were at the beginning of the examination period, and selective removal gathers had been the only form of management imposed upon them. The Sand Springs East HMA was particularly affected.

Data for the Antelope HMA did not follow trends for the other two HMAs as closely. However, environmental factors leading to a documented mortality event, and the lack of a selective removal targeting animals to 9 years of age could explain these differences. The similarity between 1992 data for Antelope HMA and 1994/95 data for the other two HMAs seems to support this conclusion.

All three areas maintained younger herds overall before initiation of the selective removal policy. Reproductive rates for the three HMAs were different, but appeared to have a strikingly close relationship to herd age supporting assertions regarding the influences of increasing age on sex ration, age at reproductive maturity, and reproductive success. For example, the reproductive rate in the Monte Cristo HMA was over 25% lower than for the Sand Springs HMA. Since these two areas are adjacent to each other, climatic variables are not likely to be the blame. The vegetation in both areas did not appear to be different enough to have a significant affect on reproduction either and both areas had endured the same selective removal gather history. The age of the reproductive mares was dramatically different, however.

The reproductive capacity of the population appears to increase dramatically with the advancing age of the core herd of older age animals. This heightened reproductive capacity appears to be sustainable through the age of around 10 years, at which time, the overall herd reproduction begins to wane. Data was not available to project reproductive performance beyond the average age of 10 years, however, it can be assumed to continue in its downward trend.

Sex ratios contribute to this phenomenon. As the average age of the herd climbs, studs become favored over mares due to several factors. The factors leading to this selection are likely to be numerous, but a primary cause is likely to be the lower relative biological stress on studs versus mares which are pregnant and

under a higher nutrient demand and relatively lower energy balance during late pregnancy which corresponds to late winter.

Another likely influence on reproductive rates among the various herds, as age increases, has been shown by others to be earlier reproductive maturity among mares. With more mature studs per mare, the social stability of the herd is disrupted as males attempt to gain control of harems. Band size decreases, and mares are pressed into reproduction at an earlier age. At both the Monte Cristo and Sand Springs East HMAs, this phenomenon was observed when animals showing one year old teeth were observed to be pregnant, and animals showing two year old teeth were nursing or weaning young under one year old.

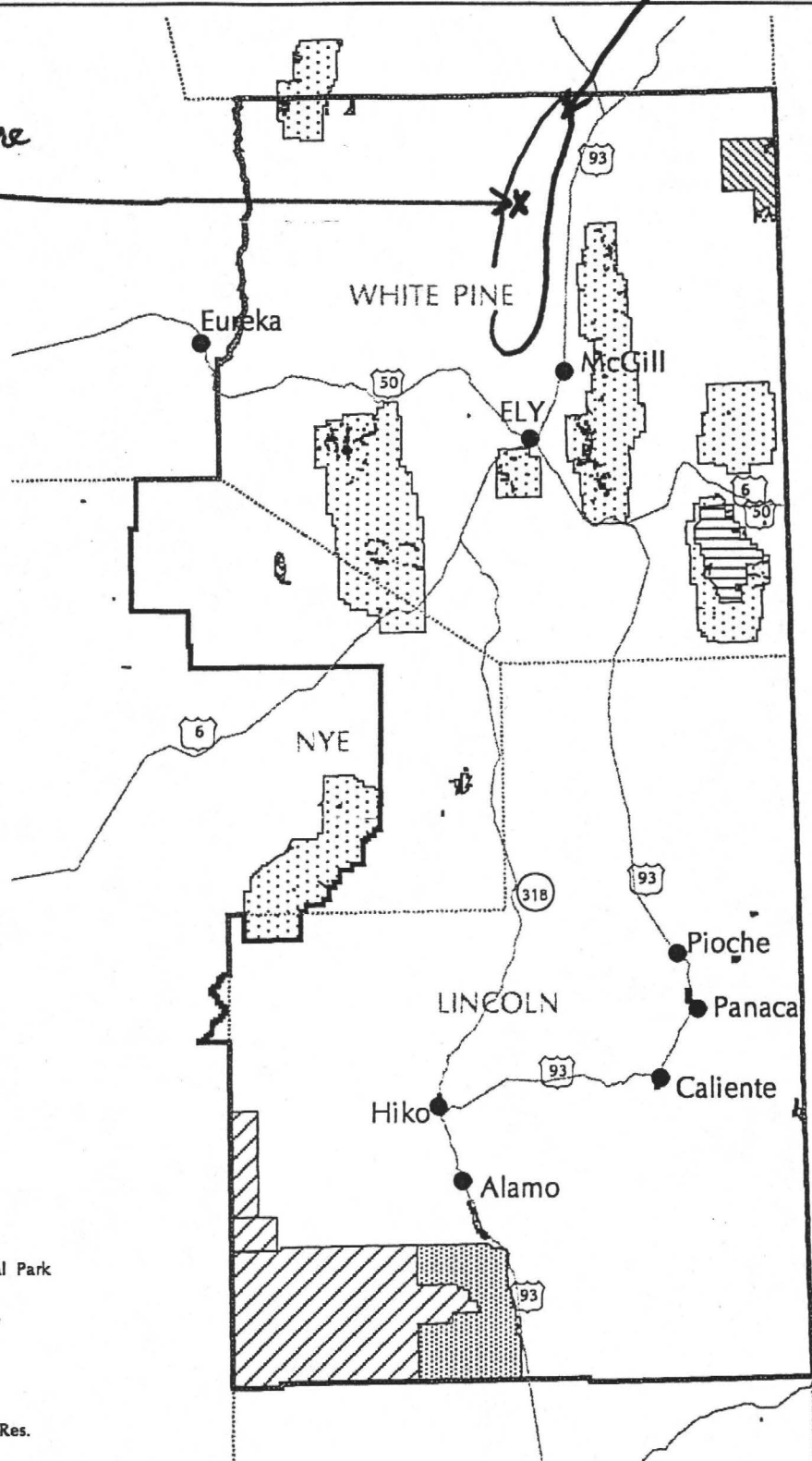
Wild horse color trends indicate that traditionally recessive color traits may be increasing in the population. When combined with the increasing age of the herd, and a history of 85-90% removals of younger age classes through selective removals, the apparent genetic integrity of the Sand Springs East wild horse herd appears to be in question. If this interpretation is true, measures which would ensure that genetic continuity would be maintained should be implemented during the next gather, or before.

Overall, the current fertility research indicates clear progress towards management of wild horse reproduction as a means of controlling wild horse numbers. However, the apparent reproductive response of the herds having undergone selective removal (i.e. increased fecundity, earlier reproductive maturity) suggest that a combination of selective removal and immuno-contraceptive treatments would not be effective in managing herds. It appears that with management of older horses through removals, the average age of the herd could be shifted back towards pre-selective removal levels with the associated lower reproductive rate. With this accomplished, immuno-contraception would have a greater benefit to managers.



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