11/12/99

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Winnemucca Field Office
5100 East Winnemucca Boulevard
Winnemucca, Nevada 89445
http://www.nv.blm.gov/winnemucca

In Reply Refer To:
4700 (NV022-44)

November 10, 1999

Dear Interested Party:

The Winnemucca Field Office sent the Draft Wild Horse Fertility Control Research Programmatic Environmental Assessment (PEA) to the public for review October 21,1999. The draft PEA addressed the use of a revised immunocontraceptive vaccine, porcine zona pellucidae (PZP). The Winnemucca Office received one comment letter to the PEA supporting the use of PZP. On November 10, 1999 the final PEA and the Record of Decision Record/Finding of No Significant Impact was approved, adopting the proposed action.

A copy of the Decision of Record for the PEA is available for review. If you have any questions or wish a copy of the Decision of Record, please contact Bryan Fuell or Rodger Bryan at 775-623-1500.

Sincerely,

Colin P. Christensen
Assistant Field Manager
Renewable Resources

10-21-99

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Winnemucca Field Office
5100 East Winnemucca Boulevard
Winnemucca, Nevada 89445
http://www.nv.blm.gov/winnemucca

U.S. Department of the Interior 150 1849•1999

In Reply Refer To:
8500 (NV022-44)

DISTRICT FILE

October 21, 1999

Dear Interested Party,

The Winnemucca Field Office of the Bureau of Land Management proposes to conduct wild horse fertility control research.

The proposed action is to treat all mares in the study HMA's that are 6 years of age and older with a revised immunocontraceptive vaccine, porcine zona pellucidae (PZP). The immunocontraceptive vaccine would inhibit reproduction in the breeding season following inoculation.

A copy of the draft programmatic environmental analysis (PEA) is enclosed for you review. All comments to this draft PEA must be received by this office by November 9, 1999. If no or minimal comments are received the draft will become the final and a Decision Record/Finding of No Significant Impact would be prepared. If you have any questions, please contact Bryan Fuell or Rodger Bryan at 775-623-1500.

Sincerely,

Rodger T. Bryan

for Colin P. Christensen
Assistant Field Manager
Renewable Resources

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Enclosure:
1. Wild Horse Fertility Control Research PEA (40 pp)

PROGRAMMATIC ENVIRONMENTAL ASSESSMENT
Winnemucca Field Office
Wild Horse Fertility Control Research

I. Description of the Alternatives including the Proposed Action

A. Introduction

The Winnemucca Field Office (WFO) of the Bureau of Land Management proposes to implement wild horse population level fertility control research. The WFO manages approximately 7,000 wild horses within 20 Herd Management Areas (HMA's)(Appendix I). Most of these HMA's have been gathered in the past 10 years under an age selective removal strategy. All of these HMA's have the potential to be selected to conduct preliminary population level fertility control research. The purpose of the research is to study the effect of immunocontraception on population growth rates.

This environmental assessment (EA) is designed to serve as an umbrella or district wide analysis of population level fertility control research. The EA describes Fertility control research in general terms. Specific proposals for fertility control research, would be tiered to this EA.

B. Background

The issue of how many horses would inhabit the range has been, and continues to be a source of controversy. Controlling the population of wild horses is considered the most difficult and controversial problem associated with wild horse management. Relocation of animals through adoption to private individuals or placement of some older unadoptable animals into sanctuaries has been the only major management tools for wild horses.

Establishing and maintaining Appropriate Management Levels (AML) is necessary to ensure the attainment of herd and habitat objectives and protects the range from deterioration(Appendix I). Healthy rangelands within HMA's can only be achieved when all users are in balance with resource capacities.

BLM is supporting research aimed at controlling the reproduction rate of wild horses through a collaborative effort to develop an immunocontraceptive vaccine. The vaccine is a safe, humane and inexpensive tool, when used with management prescriptions, and may reduce the frequency of gathering excess wild horses. In 1992, BLM initiated field management pilot studies using the available immunocontraceptive vaccine. The studies have been used on a varied group of HMA's in Nevada and would be used to develop management strategies implementing the fertility control treatment.

Porcine zona pellucidae (PZP) immunocontraception is a technique whereby injection of vaccine derived from the proteinaceous membrane surrounding pig

egg cells stimulate the immune system of female horses to produce antibodies. At sufficiently high numbers these antibodies inhibit fertilization and, as a result, prevent pregnancy.

In addition, the bureau is working with the University of Nevada, Reno, to learn more about population dynamics of wild horses and is using that information to develop and enhance a computer model for wild horse populations. The model would be used to predict potential effects on population growth rates through implementation of different management strategies.

C. Purpose and Need

Since wild horses have no true natural predators, other than an occasional mountain lion, populations increase at high rates. Current statistics indicate that populations generally increase at rates of about 20% per year. In years of adverse winters the rate may fall to as low as 5%, whereas, in good years the rate may be has high as 40%.

The proposed project is a continuation of previous research on fertility control conducted in Nevada. The immunocontraceptive vaccine used in this project would represent a refinement of the vaccine based on data obtained from previous research. Development of an effective fertility control vaccine may lead to a reduction in the number of wild horses that need to be gathered nationally each year and increase the time period between maintenance gathers of excess wild horses. The results of the proposed research may lead to the development of a vaccine which could provide two to three years of contraceptive protection, with a minimum of disturbance.

D. Land Use Plan Conformance Statement

The proposed fertility control projects are in accordance with the wild horse objectives in the Paradise-Denio and Sonoma-Gerlach Resource Area Management Framework Plans (MFP)/Final Grazing Environmental Impact Statements (EIS) and Records of Decision (1982), and are consistent with Federal, State, and local laws, regulations, and plans to the maximum extent possible.

E. Proposed Action and Alternatives

1. Proposed Action

The proposed action has two parts. Part one is to treat a percentage of mares in a study HMA that are 6 years of age and older with a revised immunocontraceptive vaccine, PZP. The immunocontraceptive vaccine would inhibit reproduction the following breeding season. Wild horses

that are 5 years of age and younger would be placed in BLM's Wild Horse and Burro Adoption Program, unless selected for the study. The gathers and implementation of the proposed action would be scheduled through HMA specific NEPA documentation. All HMA's within the WFO could be selected to conduct preliminary population level fertility control research on wild free-roaming horses.

The inoculation of mares would consist of a liquid dose of PZP vaccine and a time released portion of the drug in the form of pellets. The approach under study incorporates the PZP into a non-toxic, bio-degradable material which can be formed into small pellets. The pellets are injected with the liquid and are designed to release PZP at several points in time during the first three months after injection much the way time-release cold pills work. This formulation would be delivered as an intramuscular injection by a jabstick syringe, CO2 dart, or hand pump air powered dart into the mares in the working chute, corral, or field. Upon impact the liquid in the chamber would be propelled into the muscle along with the pellets. This delivery method has been previously shown to work. Such a vaccine would permit a single injection to cause one or more years of contraception at approximately 90% efficiency.

Delivery of the vaccine would be by means of syringe or dart with a 12 gauge needle or 1.5" barbless needle respectfully. 0.5 cc of the PZP vaccine would be emulsified with 0.5 cc of adjuvant [1] and loaded into the delivery system. The pellets would placed in the barrel of the syringe or dart needle and would be injected with the liquid. Only trained personnel would mix and/or administer the vaccine.

All treated mares would be freeze branded on the left hip or shoulder to enable the researchers to positively identify animals in the research project during the data collection phase.

The effectiveness of treatments would be determined by counting foals produced in each of the next two years. Observations would be made from the ground utilizing binoculars, spotting scopes or by helicopter. Vehicular travel would be limited to existing roads.

Part two of the proposed action could include the use of a primer vaccine. Priming would ready the mare for immunocontraception but leave her fertile for reproduction. The primer vaccine would contain the liquid dose of PZP but would be free of the time released pellets. Research has shown that priming between July and December leaves

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[1]Compound that stimulates antibody production.

virtually no contraception >5%. Priming in January and February can yield ≥50% efficacy. The mares treated with a second dose of PZP within five years of priming would produce the same result as the inoculation with the pellets. This means a population could be primed during summer gathers without contraception, then inoculated later in time if immunocontraception is determined for management.

2. **Alternatives to the Proposed Action**

a. Other forms of fertility control that were considered by the Nevada Wild Horse Pilot Fertility Project Task Force were selective removal targeting one or the other sex, sterilization, and hormone implants. Selective removals targeting sex was not recommended due to doubts about its effectiveness. Sterilization was not recommended because of the invasive nature of the surgery required, lengthy post surgery recovery time, potential risk of death, and being non-reversible. The use of hormonal implants was not recommended because of the invasive procedures required for implanting, and a lengthy recovery time prior to release. These alternatives would not meet the goals and objective of fertility control research. For these reasons, further analysis of these alternatives are not explored in this EA.

b. No Action

Excess wild horses would be gathered periodically however mares returned to the HMA would not be treated with PZP inoculations and research data on the effectiveness of the immunocontraceptive vaccine would not be obtained. Development of an effective fertility control vaccine could be delayed indefinitely.

II. Affected Environment

The WFO supports vegetation typical of the Great Basin region. The extremes of climate, elevation, exposure, and soil type all combine to produce a diverse growth environment for a wide variety of plants. Vegetation varies from salt-tolerant shrubs and grasses which inhabit the lower valley bottoms, to the steppe vegetation at the intermediate elevations, to the mountain brush at the higher elevations. The boundary of these vegetation zones can be gradual or abrupt change, depending on the extremities of the factors listed above.

For a more detailed description of the affected environment, please consult the Sonoma-Gerlach and Paridise-Denio Grazing EIS's. These documents are available for review at the Winnemucca Field Office.

The following critical elements of the human environment are not present and/or not affected by the proposed action: air quality, areas of critical environmental concern, cultural resources, environmental justice, prime or unique farm land, flood plains, native American religious concerns, noxious weeds, threatened and endangered species, water quality, wetlands/riparian zones, wild and scenic rivers, or wilderness.

III. Environmental Consequences

A. Anticipated Impacts

1. Wild Horses

Immunocontraception research on wild free-roaming horse herds in Nevada has been conducted on the Antelope/Antelope Valley HMA's (1992)(Ely), on the Nevada Wild Horse Range (1996), the Kammas HMA /Antelope HA (1998)(Winnemucca), and the Antelope/Antelope Valley, Sand Springs, and Monte Cristo HMA's (1998)(Ely) utilizing PZP injections. The 1992 Antelope/Antelope Valley HMA's research found that reproductive success was 4.5% using 2 injections, 20.0% using 1 injection plus microspheres, and 28.6% using 1 injection with no microspheres. Reproductive success for mares treated with a placebo was 55.0% and untreated mares was 53.9%, which was significantly greater than treated mares. The following year, without further treatment, reproductive success was 44.0% for mares treated with 2 injections, and 54.5% for untreated mares. Data from the other groups is insufficient for comparison (Turner et al. 1997).

The Nevada Wild Horse Range field study utilized three formulations of a revised controlled release PZP vaccine, with the mares broken up into three groups. The microspheres were designed for longer delay in release and contained adjuvant. Reproductive success was 12.8% for group 1 (2 injections), 10.6% for group 2 (2 injections) and 11.3% for group 3 (1 injection). The lack of difference in fertility rates indicated that the controlled release component in the 1 injection group provided vaccine exposure equivalent to a second injection of vaccine (Turner et al. 1997).

The data for the Kamma HMA/Antelope HA (1998) has not completely been analyzed, but preliminary data shows approximately 75% effectiveness on treated mares. The data for the Antelope/Antelope Valley, Sand Springs, and Monte Cristo HMA's (1998) have not completely been analyzed to show comparative statistics.

Results of fertility control research conducted to date indicate that PZP Immunocontraception is highly effective, and that the reproductive success of the mares returns to normal the year following fertility

control. There would be no significant increase in stress above that normally associated with the processing and sorting of animals during a gather.

In the fertility control study on Assateague Island National Seashore (1987) and the Nevada studies showed that PZP vaccine had no apparent effects on pregnancies in progress, the health of the offspring, or the behavior of treated mares (Turner et al. 1997). Although some questions remain concerning the effects of long term immunocontraception on ovarian function, consecutive treatments for up to three years has been demonstrated to be fully reversible, with no indication of deleterious effect (Zimmerman 1995). Investigations into the effect of longer term applications are ongoing.

In an attempt to predict population dynamics, two computer simulations were run using the wild horse population model developed by Dr. Stephen Jenkins of the University of Nevada, Reno (Jenkins 1996). The first simulation was based on a selective removal of horses 5 years of age and younger, without fertility control. The second simulation was based on a selective removal of horses 5 years of age and younger, with fertility control. Appendix II describes the basic assumptions and methodology used to conduct the computer simulations.

Jenkins model uses data on survival and reproductive rates of wild horses to predict population growth. The model uses a random process to simulate unpredictable future variation in survival and fecundity, reflecting the fact that future environmental conditions that may affect wild horse populations cannot be known in advance. The model uses a series of trials to project a range of possible population sizes after a given number of years, which is more realistic than predicting a single, specific population size.

The wild horse population model was run for one three year gather cycle for both simulations (treated vs. non treated). The years selected for use in the model were based on the next scheduled gather. The model indicates that with treatment there would be a decrease in foal production in the year following inoculation, but foal production in the subsequent year would return to normal. The model indicates that without treatment population levels would continue to increase at normal high rates. The proposed project would not have a significant impact on the sex ratio of the horses. The projected sex ratio in each HMA under both scenarios remained virtually the same with or without treatment(Appendix II).

Results from the population modeling indicate that the proposed action would decrease foal production for one year but would not negatively

impact the wild horse population in long term management (Appendix II).

2. **Waste, Hazardous or Solid**

Syringes, darts, needles, vaccine containers, etc. used in the administration of the immunocontraceptive vaccine are considered regulated medical waste. Regulated medical waste must be placed in leak proof containers that are contained in a red plastic bag labeled medical waste. Medical waste must be handled and transported separately from other waste to an approved disposal facility.

The amount of regulated medical waste that would be generated by this project would be minimal and not result in any threat to the environment.

B. No Action

The effects of implementing selective removal were analyzed in the various environmental assessments prepared for each specific HMA.

C. Mitigating Measures

All regulated medical waste (i.e. syringes, darts and needles) generated by the project would be placed in approved containers as specified in Nevada Administrative Code 444.662, and disposed of in accordance with Nevada Administrative Code 444.646.

VI. Consultation and Coordination

A. List of Preparers

Bryan Fuell	Wild Horse & Burro Specialist
Rodger Bryan	Supervisor Wildlife and Fish Biologist
Tom Seley	Wild Horse & Burro Specialist
Dave Stockdale	Wild Horse & Burro Specilalist/GIS
Jerry Moritz	Environmental Coordination
Nadine Francis	Wildlife Biologist (Wild Horse & Burro Specialist)

VII. Literature Cited

Jenkins, S. H. Wildhorse population model users guide version 3.2. Department of Biology, University of Nevada Reno. 1996

Turner, J. W., Jr, I. Liu, and A. Rutberg. Immunocontraception limits foal production in free-roaming feral horses in Nevada. J. Wildl. Manage. 61(3):1997

Turner, J. W., Jr, I. Liu, A. Rutberg, and J. Kirkpatrick. Immunocontraception of free-roaming feral horses in Nevada summary of field studies in Antelope/Antelope Valley and Nevada Wild Horse Range. unpublished 1997

Turner, J. W., Jr, I. Liu, A. Rutberg, and J. Kirkpatrick. Final report 1992-1996 Nevada Wild Horse Fertility Control Project (BLM cooperative agreement # 1422F950A20002. 1997

Zimmerman, K.S., Assateague Island National Seashore, 1995. Environmental Assessment, Alternatives for Managing the Size of the Feral Horse Population of Assateague Island National Seashore.

Zoo Montana Science and Conservation Biology Program, 1998. Wildlife Fertility Control: Fact & Fancy.

Appendix I
Winnemucca Field Office HMA's

HMA	HMA Name	Allotment Name	Comments
NV-311	Augusta Mountains HMA	Jersey Valley Hole-In-The-Wall Home Station Gap Cottonwood (Battle Mountain)	FMUD 1/9/97 AML-148 FMUD-1/9/97 AML-71 FMUD-1/9/97 AML-56 FMUD-8/94 AML-33
NV-209	Black Rock Range-East HMA	Paiute Meadows Pine Forest	FMUD-4/12/93 AML-93 Schduled FY00 Aml-0
NV-227	Black Rock Range-West HMA	Soldier Meadows	FMUD-1/24/94 AML-93
NV-217	Blue Wing Mountains HMA	Blue Wing/Seven Troughs	Mgmt Agreement 10/21/99 AML-Horses 36 Burros 28
NV-220	Buffalo Hills HMA	Buffalo Hills	MUD 2/9/93. AML 314
NV-222	Calico Mountains HMA	Buffalo- Hills/Calico Leadville Soldier Meadow	FMUD-2/9/93 AML-142 FMUD-1/19/94 AML-126 FMUD-1/24/94 AML-65
NV-228	Fox-Lake Range HMA	Pole Canyon Rodeo Creek	Allotment Evalutation in progress MUD 12/14/97 AML-204
NV-221	Granite Range HMA	Buffalo Hills	FMUD 2/9/93. AML 258
NV-208	Jackson Mountians HMA	Bottle Creek Deer Creek Desert Valley Happy Creek Jackson Mountain Wilder-Quinn	Scheduled FY 00 FMUD-10/16/98 AML-10 FMUD-2/14/97 AML-60 FMUD-5/27/94 AML-117 FMUD 11/18/98 AML-10
NV-214	Kamma Mountains HMA	Blue Wing/Seven Troughs	Mgmt Agreement 6/2/99 AML 77
NV-215	Lava Beds HMA	Blue Wing/Seven Troughs	Mgnt Agreement 6/2/99 AML- Horse-148/Burro-16.
NV-200	Little Owyhee HMA	Little Owyhee	FMUD-3/26/93 AML-298
NV-210	McGee Mountian HMA	Alder Creek	FMUD-1/27/94 AML-Burros 41
NV-219	Nightingale Mountains HMA	Blue Wing/Seven Troughs	Mgmt Agreement 6/2/99. AML632
NV-229	North Stillwater HMA	Boyer Ranch (Carson) Copper Kettle (Carson) Cottowood Canyon (Carson) Jersey Valley Mississippi Canyon (Carson) Pleasant Valley Rawhide Rochester South Buffalo	 FMUD-1/9/97 AML-0 Scheduled FY-01 FMUD-9/28/98 AML-126
NV-216	Seven Troughs HMA	Blue Wing/Seven Troughs	Mgmt Agreement 6/2/99 AML-Horses-156 Burros-46
NV-218	Shawave Mountains HMA	Blue Wing/Seven Troughs	Mgmt Agreement 6/2/99. AML 73
NV-201	Snowstorm Mountains HMA	Bullhead	FMUD-8/25/94 AML-140
NV-231	Tobin Range HMA	Goldbanks Pleasant Valley Pumpernickle South Buffalo	Scheduled FY 00 Scheduled FY 01 FMUD-4/30/96 AML-17
NV-226	Warm Springs Canyon HMA	Soldier Meadows	FMUD 1/24/94 AML-Horses 175- Burros-24

Appendix II.

Jenkins computer model uses birth rates and sex ratios at birth to predict and evaluate populations with and without fertility treatment. The initial 1999 population size was determined using the age structure from the horses released in the previous gathers, then running the model for a 3 year period to determine a probable age structure. Those HMA's with no capture data, had probable populations generated by the program.

The model uses "coefficients of variation", which are indices of year-to-year variation in adult mortality, and foal mortality to simulate unpredictable variation in environmental conditions. Estimating these coefficients requires long-term demographic data, which are unavailable for the study area. Therefore, the program default values were used.

Jenkins model was run under two sets of conditions: one using no fertility control, and the other assuming a one year fertility drug was used that was 90 percent effective. Other initial conditions for the simulation included a 3 year gather cycle, 95 percent of horses are gathered, all captured horses 0-5 years of age are removed and no horses 6 years or older are removed. For both simulations, 30 individual trials were run. The model was run for one three year gather cycle only. No attempt was made to speculate as to future conditions beyond this time.

For a detailed description of the model, see the User's Guide (Jenkins 1996).

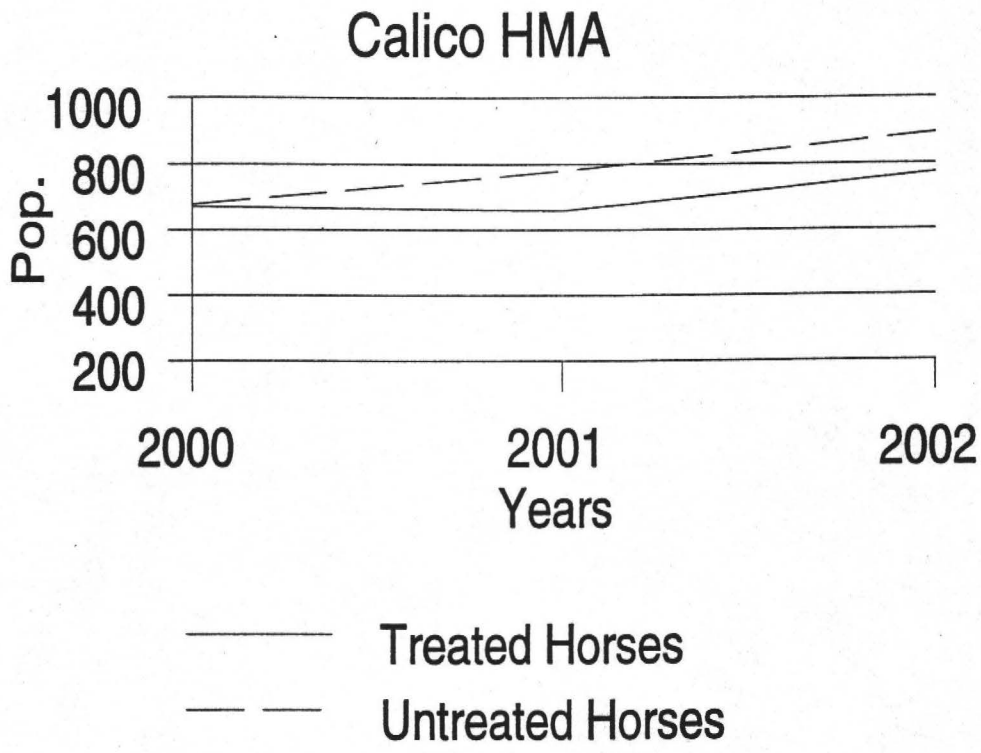
The following tables and graphs show each HMA population structure scenarios with fertility treatments and without:

CALICO MTNS. HMA AGE DISTRIBUTION BY YEAR							
	Initial	With Fertility Treatment			No Fertility Treatment		
Age/Year	1999	2000	2001	2002	2000	2001	2002
0	190	143	8	126	151	119	126
1	126	4	141	8	4	149	118
2	116	4	4	138	2	4	147
3	58	1	4	4	1	2	4
4	14	0	1	4	1	1	2
5	25	0	0	1	0	1	1
6	21	0	0	0	0	0	1
7	23	20	0	0	21	0	0
8	20	22	20	0	22	21	0
9	28	19	22	20	20	22	21
10	39	28	19	22	28	20	20
11	28	38	28	19	39	27	20
12	30	26	38	28	28	39	27
13	53	38	26	37	30	28	39
14	50	49	38	26	53	30	28
15	50	51	49	38	47	51	30
16	46	52	50	46	48	47	50
17	30	42	52	50	45	46	47
18	35	25	42	52	28	45	42
19	30	43	25	42	43	28	41
20+	58	66	92	112	67	100	129
Total	1,070	671	659	773	678	780	893

!999 population structure was determined using capture data from 1996.

The model conducted a gather in 1999 (removal or 0-5 year olds),
the 2000 population reflects post year data.

2001 shows the treatment/no treatment year.



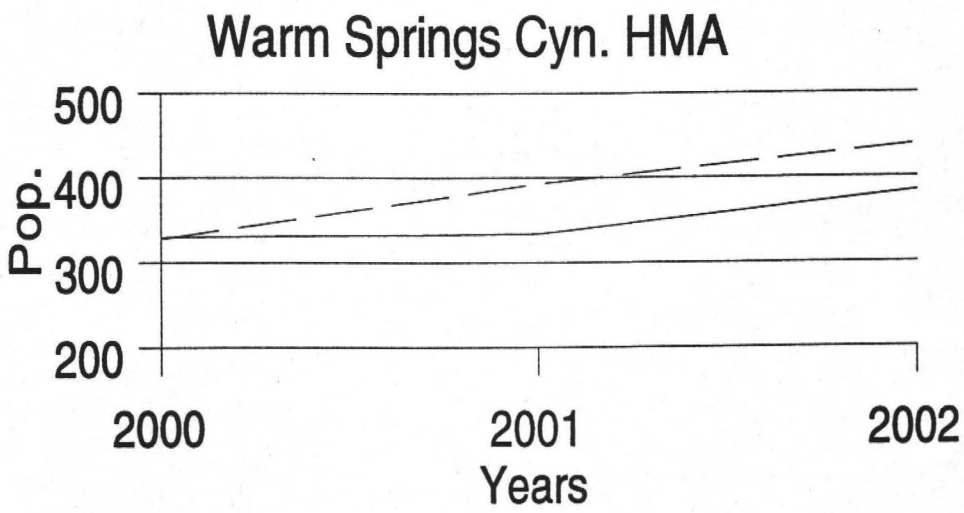
Comparison of Population growth for Treated and Untreated Horses

WARM SPRINGS CYN. HMA AGE DISTRIBUTION BY YEAR							
	Initial	With Fertility Treatment			No Fertility Treatment		
Age/Year	1999	2000	2001	2002	2000	2001	2002
0	112	70	7	55	67	70	53
1	75	5	68	7	5	66	69
2	84	3	5	68	1	5	64
3	13	1	3	5	1	1	5
4	4	0	1	3	0	1	1
5	6	0	0	1	0	0	1
6	9	0	0	0	0	0	0
7	5	5	0	0	6	0	0
8	7	4	5	0	5	6	0
9	6	7	4	5	7	5	6
10	14	6	7	4	6	7	5
11	11	10	6	7	12	6	7
12	10	11	10	6	11	12	6
13	45	10	11	10	9	11	12
14	31	41	10	11	47	9	11
15	25	34	41	10	28	47	9
16	33	23	33	40	24	28	44
17	11	30	23	31	33	24	28
18	20	9	30	22	7	29	23
19	18	18	9	29	18	9	29
20+	33	43	61	70	41	57	66
Total	572	330	334	384	328	393	439

!999 population structure was determined using capture data from 1996.

The model conducted a gather in 1999 (removal or 0-5 year olds), the 2000 population reflects post year data.

2001 shows the treatment/no treatment year.



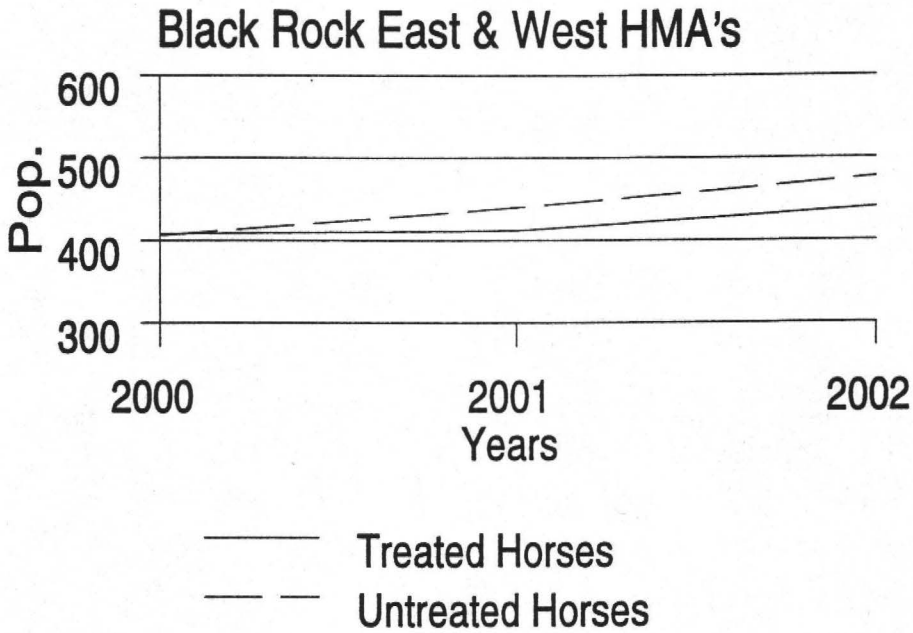
Comparison of Population growth for Treated and Untreated Horses

BLACK ROCK RANGE EAST & WEST HMA'S AGE DISTRIBUTION BY YEAR							
	Initial	With Fertility Treatment			No Fertility Treatment		
Age/Year	1999	2000	2001	2002	2000	2001	2002
0	86	58	6	44	63	44	39
1	71	2	56	6	0	59	44
2	92	1	2	52	1	0	57
3	25	3	1	2	3	1	0
4	11	0	3	1	0	3	1
5	24	0	0	3	0	0	3
6	18	0	0	0	1	0	0
7	8	17	0	0	17	1	0
8	4	7	17	0	7	17	1
9	3	4	7	15	3	7	17
10	13	3	4	7	2	3	7
11	11	13	3	4	13	2	3
12	10	11	13	3	11	13	2
13	54	10	11	12	10	11	13
14	45	50	10	11	49	10	11
15	44	40	50	9	42	49	10
16	38	42	40	48	39	42	49
17	29	34	42	39	38	39	42
18	26	28	34	40	25	38	39
19	22	21	28	34	19	25	38
20+	55	64	85	110	60	76	101
Total	689	408	412	440	406	440	477

!999 population structure was determined using capture data from 1996.

The model conducted a gather in 1999 (removal or 0-5 year olds), the 2000 population reflects post year data.

2001 shows the treatment/no treatment year.



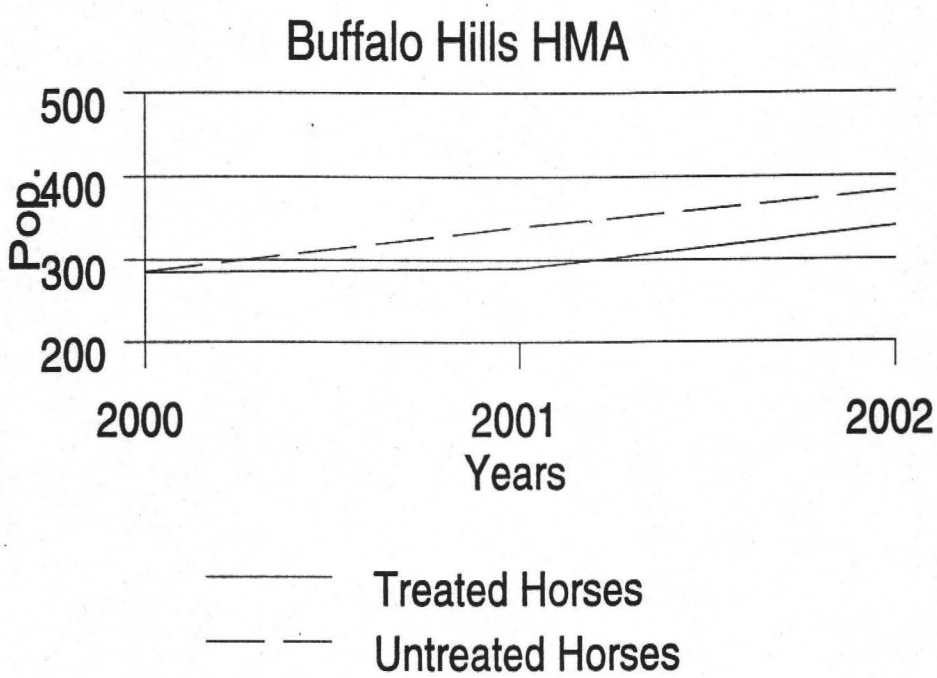
Comparison of Population growth for Treated and Untreated Horses

BUFFALO HILLS HMA AGE DISTRIBUTION BY YEAR							
	Initial	With Fertility Treatment			No Fertility Treatment		
Age/Year	1999	2000	2001	2002	2000	2001	2002
0	78	62	8	51	64	54	50
1	61	4	60	8	4	64	54
2	65	1	4	59	2	4	62
3	56	0	1	4	1	2	4
4	5	2	0	1	0	1	2
5	3	0	2	0	0	0	1
6	4	0	0	2	0	0	0
7	5	4	0	0	4	0	0
8	4	5	4	0	5	4	0
9	4	4	5	4	4	5	4
10	5	4	4	5	4	4	5
11	7	5	4	4	5	4	4
12	26	7	5	4	6	5	4
13	38	26	7	5	25	6	5
14	27	37	26	7	36	25	6
15	14	27	37	26	27	36	25
16	20	13	27	37	14	27	36
17	28	17	13	27	19	14	27
18	22	28	17	13	28	19	14
19	11	19	28	17	19	28	19
20+	8	19	38	66	19	38	66
Total	492	285	290	340	286	340	382

!999 population structure was determined using capture data from 1993.

The model conducted a gather in 1999 (removal or 0-5 year olds),
the 2000 population reflects post year data.

2001 shows the treatment/no treatment year.



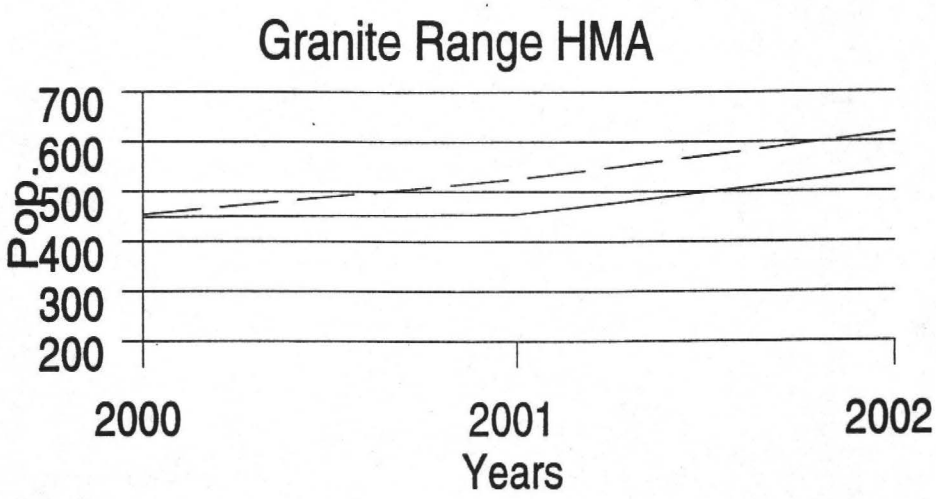
Comparison of Population growth for Treated and Untreated Horses

GRANITE RANGE HMA AGE DISTRIBUTION BY YEAR							
	Initial	With Fertility Treatment			No Fertility Treatment		
Age/Year	1999	2000	2001	2002	2000	2001	2002
0	147	91	9	98	94	82	89
1	99	3	90	9	4	93	82
2	129	3	3	89	2	4	93
3	27	2	3	3	5	2	4
4	8	0	2	3	0	5	2
5	8	2	0	2	2	0	5
6	9	0	2	0	0	2	0
7	9	9	0	2	5	0	2
8	18	12	9	0	8	5	0
9	12	19	12	8	16	8	5
10	22	9	18	11	9	16	8
11	12	23	9	18	24	9	16
12	25	10	23	9	12	24	9
13	50	23	10	22	28	12	22
14	39	49	23	10	5	28	12
15	56	36	48	23	32	43	28
16	30	45	36	47	48	32	48
17	26	25	45	36	28	46	32
18	21	23	25	45	25	28	46
19	12	18	23	25	19	25	28
20+	43	47	65	88	43	62	87
Total	802	449	455	543	454	526	618

!999 population structure was determined using capture data from 1995.

The model conducted a gather in 1999 (removal or 0-5 year olds), the 2000 population reflects post year data.

2001 shows the treatment/no treatment year.



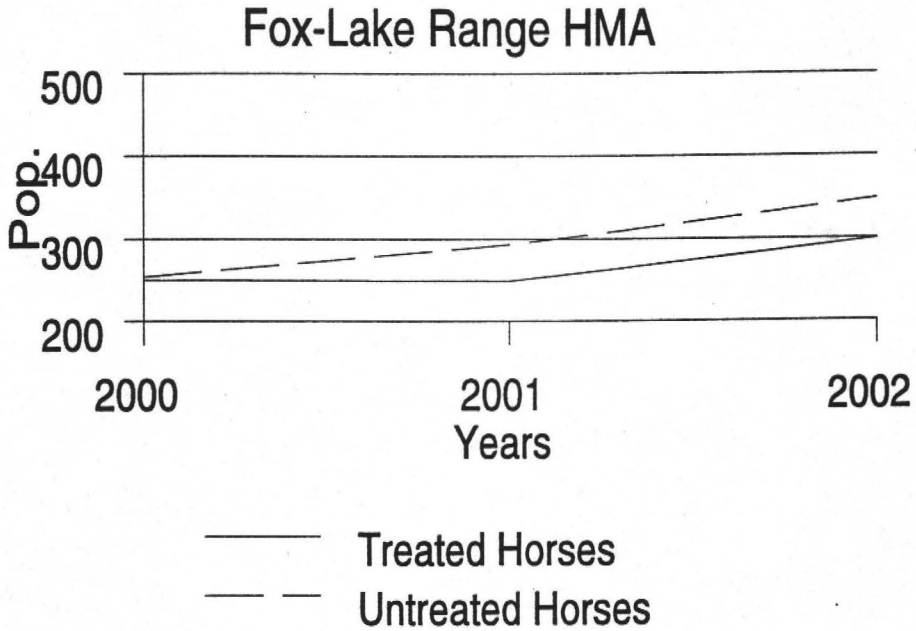
Comparison of Population growth for Treated and Untreated Horses

FOX-LAKE RANGE HMA AGE DISTRIBUTION BY YEAR							
	Initial	With Fertility Treatment			No Fertility Treatment		
Age/Year	1999	2000	2001	2002	2000	2001	2002
0	106	54	5	52	55	51	44
1	86	4	52	5	0	55	51
2	72	0	4	51	4	0	47
3	61	1	0	4	1	4	0
4	50	0	1	0	1	1	4
5	42	2	0	1	0	1	1
6	35	1	2	0	1	0	1
7	29	27	1	1	30	1	0
8	25	29	26	1	30	30	1
9	21	24	29	35	24	30	30
10	17	20	24	29	20	24	25
11	13	17	20	24	16	20	24
12	11	12	17	20	12	16	17
13	9	11	12	17	9	12	16
14	8	9	11	12	9	9	12
15	7	8	9	11	7	9	9
16	5	7	8	9	5	7	9
17	5	6	6	8	4	5	7
18	4	6	5	7	4	4	5
19	3	4	5	5	3	4	4
20+	7	9	12	17	7	10	14
Total	616	250	249	299	254	293	348

!999 population structure was determined using Jenkins computer model.

The model conducted a gather in 1999 (removal or 0-5 year olds),
the 2000 population reflects post year data.

2001 shows the treatment/no treatment year.



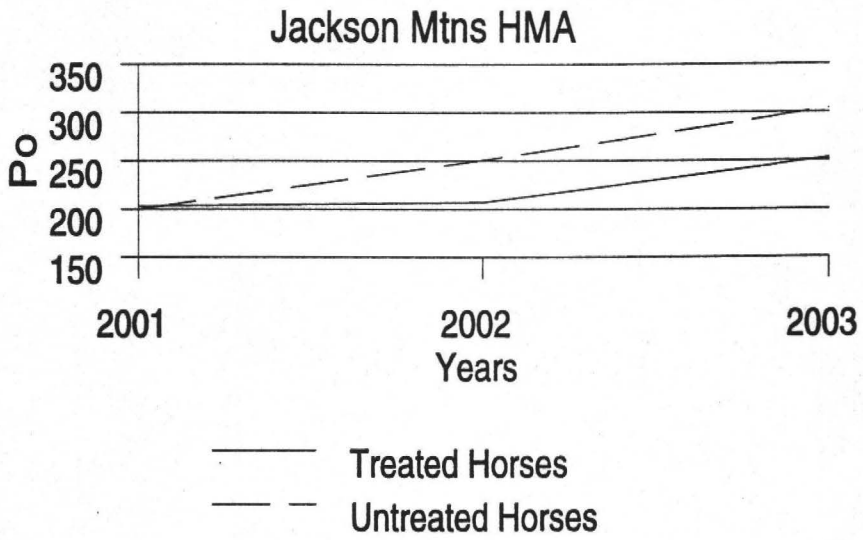
Comparison of Population growth for Treated and Untreated Horses

JACKSON MOUNTAINS HMA AGE DISTRIBUTION BY YEAR							
	Initial	With Fertility Treatment			No Fertility Treatment		
Age/Year	1999	2001	2002	2003	2001	2002	2003
0	66	60	6	53	60	55	56
1	63	4	58	6	4	56	54
2	17	3	4	54	3	4	55
3	5	4	3	4	4	3	4
4	3	3	4	3	2	4	3
5	3	2	3	4	4	2	4
6	2	4	2	3	5	4	2
7	2	2	4	2	2	5	4
8	3	2	2	4	2	2	5
9	2	2	2	2	2	2	2
10	3	2	2	2	2	2	2
11	3	3	2	2	3	2	2
12	29	1	3	2	2	3	2
13	28	2	1	3	3	2	3
14	27	3	2	1	3	3	2
15	26	21	3	2	20	3	3
16	10	23	21	3	21	20	3
17	11	21	23	19	21	21	18
18	6	18	21	22	15	21	20
19	10	8	18	21	6	14	20
20+	21	15	23	41	16	23	40
Total	340	203	207	253	200	251	304

!999 population structure was determined using capture data from 1997.

The model conducted a gather in 2000 (removal or 0-5 year olds), the 2001 population reflects post year data.

2002 shows the treatment/no treatment year.



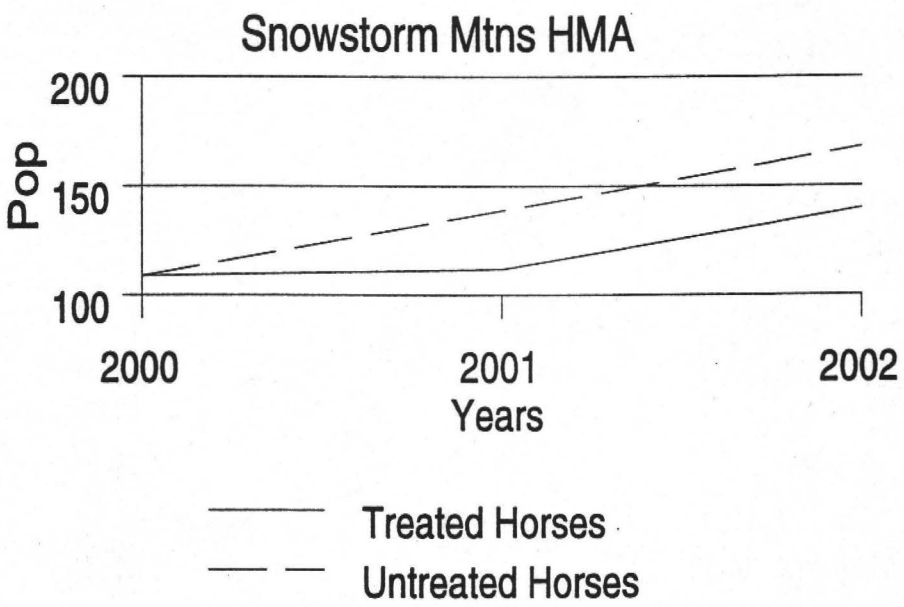
Comparison of Population growth for Treated and Untreated Horses

SNOWSTORM MOUNTAINS HMA AGE DISTRIBUTION BY YEAR							
	Initial	With Fertility Treatment			No Fertility Treatment		
Age/Year	1999	2000	2001	2002	2000	2001	2002
0	50	30	4	27	31	30	30
1	44	1	30	4	1	31	30
2	45	1	1	30	1	1	31
3	2	1	1	1	1	1	1
4	1	0	1	1	0	1	1
5	4	0	0	1	0	0	1
6	1	0	0	0	0	0	0
7	1	1	0	0	1	0	0
8	2	1	1	0	1	1	0
9	2	2	1	1	2	1	1
10	2	2	2	1	2	2	1
11	3	2	2	2	2	2	2
12	2	2	2	2	3	2	2
13	12	2	2	2	2	3	2
14	9	10	2	2	12	2	3
15	8	8	10	2	9	12	2
16	7	7	8	10	7	9	11
17	4	7	7	8	7	7	9
18	7	4	7	7	3	7	7
19	8	4	3	6	4	3	7
20+	24	24	28	31	20	24	27
Total	238	109	112	140	109	139	168

1999 population structure was determined using capture data from 1996.

The model conducted a gather in 1999 (removal or 0-5 year olds), the 2000 population reflects post year data.

2001 shows the treatment/no treatment year.



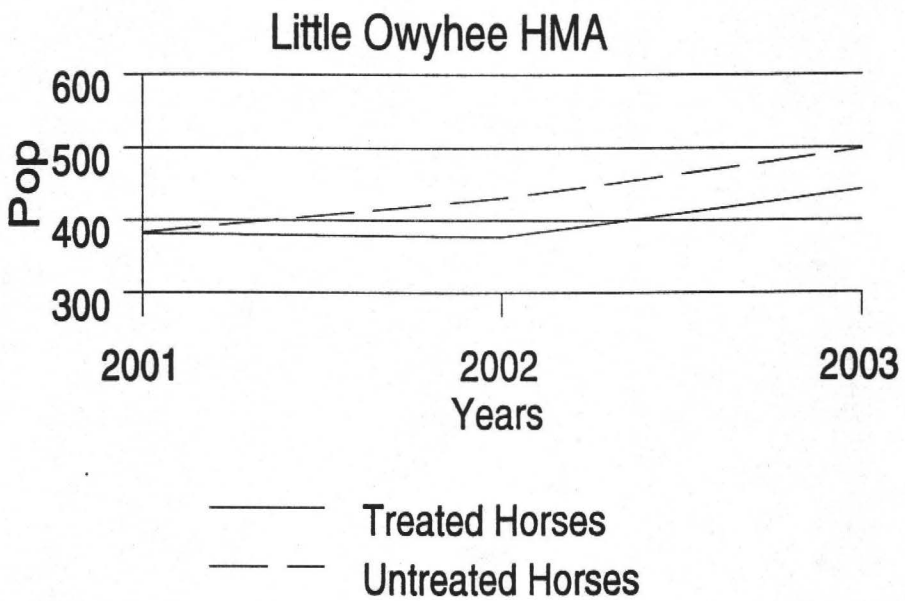
Comparison of Population growth for Treated and Untreated Horses

LITTLE OWYHEE HMA AGE DISTRIBUTION BY YEAR							
	Initial	With Fertility Treatment			No Fertility Treatment		
Age/Year	1999	2001	2002	2003	2001	2002	2003
0	92	79	7	70	76	56	75
1	93	3	79	7	3	76	56
2	5	2	3	79	2	3	76
3	1	4	2	3	4	2	3
4	9	0	4	2	1	4	2
5	5	0	0	4	0	1	4
6	3	0	0	0	0	0	1
7	1	1	0	0	1	0	0
8	2	3	1	0	2	1	0
9	3	0	3	1	1	2	1
10	2	2	0	3	2	1	2
11	18	3	2	0	3	2	1
12	59	2	3	2	2	3	2
13	36	18	2	3	17	2	3
14	36	58	17	2	57	17	2
15	37	34	56	17	35	54	17
16	32	35	31	56	37	34	51
17	24	36	33	30	36	33	31
18	11	30	34	31	31	36	32
19	24	20	29	32	21	31	35
20+	67	51	71	100	52	73	104
Total	560	381	377	442	383	431	498

!999 population structure was determined using capture data from 1997.

The model conducted a gather in 2000 (removal or 0-5 year olds), the 2001 population reflects post year data.

2002 shows the treatment/no treatment year.



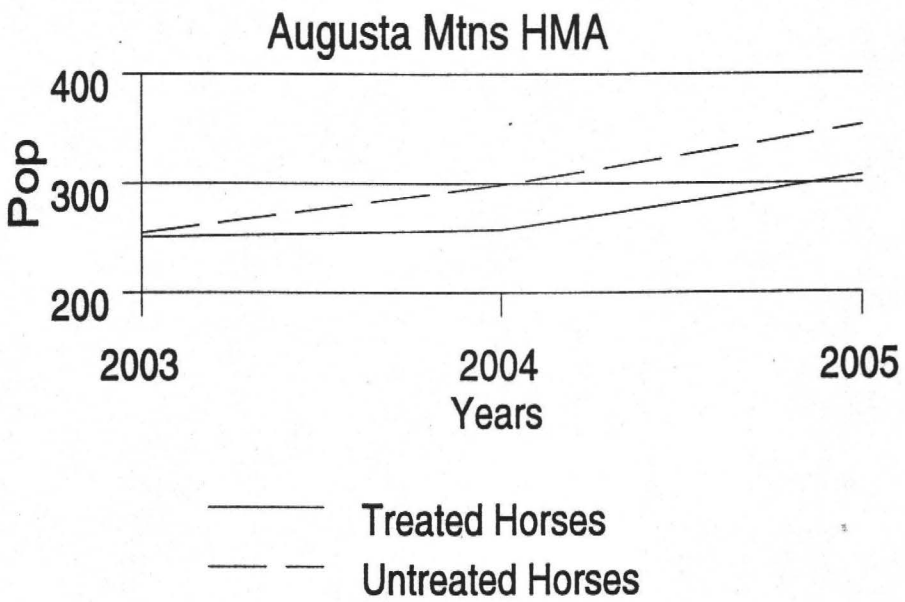
Comparison of Population growth for Treated and Untreated Horses

AUGUSTA MOUNTAINS HMA AGE DISTRIBUTION BY YEAR							
	Initial	With Fertility Treatment			No Fertility Treatment		
Age/Year	1999	2003	2004	2005	2003	2004	2005
0	4	50	8	52	51	51	55
1	2	1	50	8	1	51	51
2	0	1	1	50	1	1	51
3	4	1	1	1	0	1	1
4	2	1	1	1	1	0	1
5	2	0	1	1	0	1	0
6	9	0	0	1	0	0	1
7	16	3	0	0	3	0	0
8	24	1	3	0	2	3	0
9	14	1	1	3	2	2	3
10	29	9	1	1	9	2	2
11	13	12	9	1	15	9	2
12	21	23	12	7	24	13	9
13	16	13	23	12	12	24	13
14	17	26	13	23	26	11	24
15	13	13	26	13	13	25	11
16	9	21	13	24	21	13	25
17	9	14	20	13	15	20	13
18	14	16	14	21	17	15	19
19	8	12	16	14	11	15	15
20+	41	33	45	61	31	42	57
Total	268	251	258	307	363	299	353

!999 population structure was determined using capture data from 1999.

The model conducted a gather in 2002 (removal or 0-5 year olds), the 2003 population reflects post year data.

2004 shows the treatment/no treatment year.



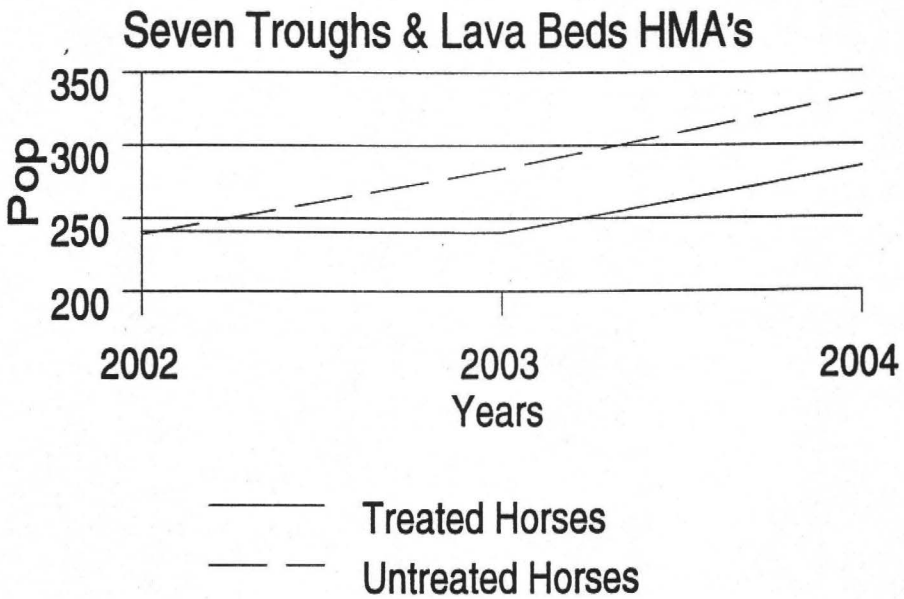
Comparison of Population growth for Treated and Untreated Horses

SEVEN TROUGHS & LAVA BEDS HMA'S AGE DISTRIBUTION BY YEAR							
	Initial	With Fertility Treatment			No Fertility Treatment		
Age/Year	1999	2002	2003	2004	2002	2003	2004
0	75	48	4	49	45	45	50
1	9	0	48	4	2	45	45
2	10	3	0	48	2	2	45
3	12	3	3	0	4	2	2
4	9	1	3	3	0	4	2
5	4	0	1	3	0	0	4
6	6	1	0	1	0	0	0
7	7	9	1	0	9	0	0
8	5	4	9	1	4	9	0
9	5	6	4	9	5	4	9
10	8	7	6	4	7	5	4
11	20	4	6	6	5	7	5
12	20	4	4	6	5	5	7
13	34	8	4	4	7	5	5
14	21	20	8	4	19	7	5
15	18	16	19	8	17	19	7
16	23	32	15	18	31	17	19
17	12	21	30	15	20	31	17
18	10	15	21	27	14	20	31
19	15	16	15	21	18	14	20
20+	38	23	39	54	25	43	57
Total	361	241	240	285	239	284	334

!999 population structure was determined using capture data from 1998.

The model conducted a gather in 2001 (removal or 0-5 year olds), the 2002 population reflects post year data.

2003 shows the treatment/no treatment year.



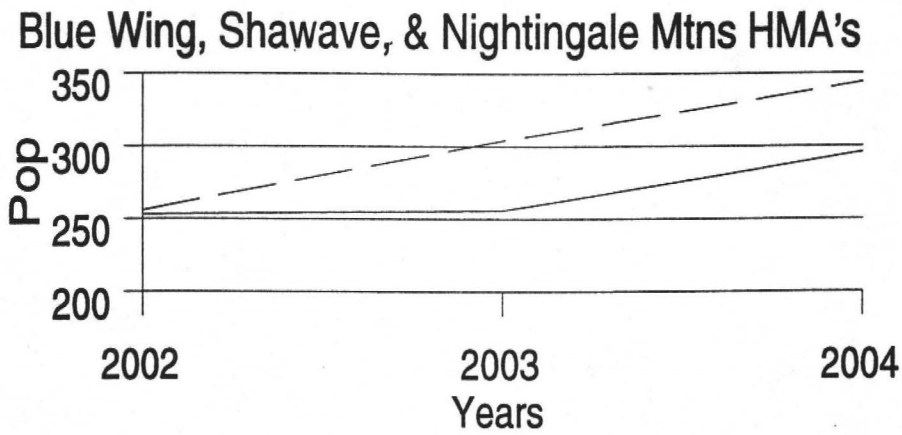
Comparison of Population growth for Treated and Untreated Horses

BLUE WING MTNS, SHAWAVE MTNS, & NIGHTINGALE MTNS HMA'S AGE DISTRIBUTION BY YEAR							
	Initial	With Fertility Treatment			No Fertility Treatment		
Age/Year	1999	2002	2003	2004	2002	2003	2004
0	72	51	6	45	50	48	42
1	5	1	50	6	1	50	48
2	19	3	1	50	1	1	50
3	33	2	3	1	3	1	1
4	17	0	2	3	0	3	1
5	11	0	0	2	0	2	3
6	6	29	0	0	29	0	0
7	6	15	27	0	17	28	0
8	6	11	15	27	11	17	28
9	5	5	11	15	6	11	17
10	5	5	5	10	5	6	11
11	22	5	4	5	6	5	6
12	23	4	5	4	4	6	5
13	23	4	4	5	5	4	6
14	18	17	4	4	17	5	4
15	23	20	17	4	21	17	5
16	25	18	21	17	17	20	17
17	13	18	18	20	16	17	20
18	14	12	18	17	12	16	17
19	19	16	12	16	16	12	16
20+	55	17	33	45	19	35	47
Total	420	253	256	296	256	304	344

!999 population structure was determined using capture data from 1998.

The model conducted a gather in 2001 (removal or 0-5 year olds), the 2002 population reflects post year data.

2003 shows the treatment/no treatment year



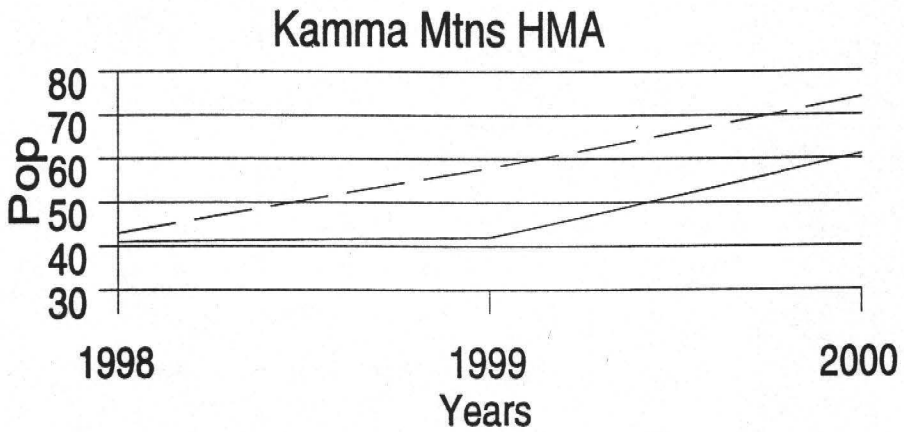
Comparison of Population growth for Treated and Untreated Horses

KAMMA MOUNTAINS HMA AGE DISTRIBUTION BY YEAR							
	Initial	With Fertility Treatment			No Fertility Treatment		
Age/Year	1997	1998	1999	2000	1998	1999	2000
0	9	12	2	19	13	15	19
1	4	2	12	2	2	13	15
2	6	1	2	12	1	2	12
3	7	0	1	2	0	1	2
4	7	2	0	1	1	0	1
5	1	0	2	0	1	1	0
6	5	0	0	2	1	1	1
7	2	5	0	4	5	1	1
8	2	2	5	0	2	5	1
9	4	2	2	5	2	2	5
10	2	4	2	2	4	2	2
11	1	2	4	2	2	4	2
12	1	0	2	4	1	2	4
13	0	1	0	2	1	1	2
14	1	0	1	0	0	1	1
15	2	1	0	1	1	0	1
16	0	0	1	0	1	1	0
17	1	2	0	1	0	1	1
18	0	0	2	0	1	0	1
19	1	1	0	2	0	1	0
20+	3	3	4	4	4	4	5
Total	59	41	42	61	43	58	74

!997 population structure was determined using capture data from 1997.

The model conducted a gather in 1997 (removal or 0-9 year olds), the 1998 population reflects post year data.

1999 shows the treatment/no treatment year.



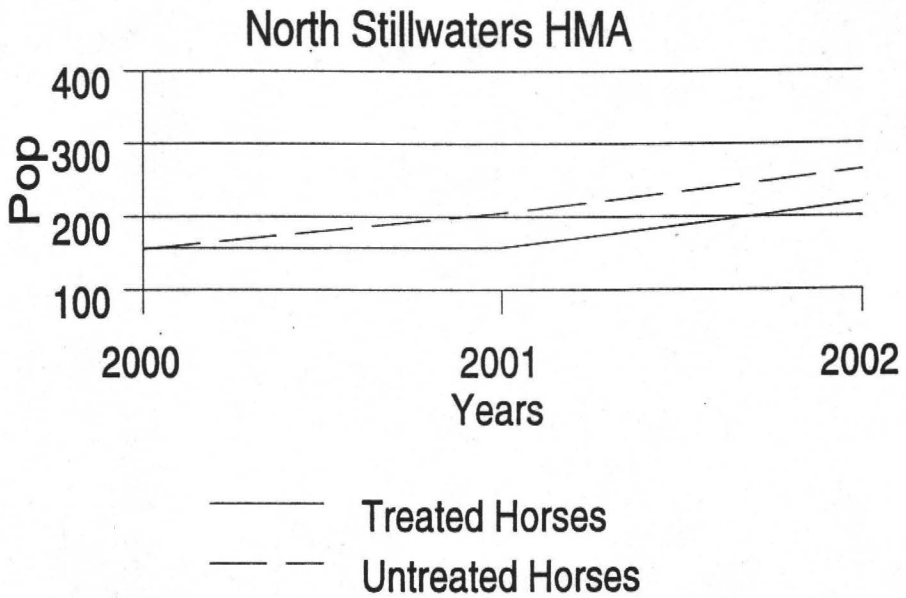
Comparison of Population growth for Treated and Untreated Horses

NORTH STILLWATER HMA AGE DISTRIBUTION BY YEAR							
	Initial	With Fertility Treatment			No Fertility Treatment		
Age/Year	1999	2000	2001	2002	2000	2001	2002
0	58	47	4	63	47	49	63
1	47	0	45	4	0	47	49
2	39	0	0	45	0	0	45
3	33	1	0	0	1	0	0
4	28	0	1	0	1	1	0
5	24	1	0	1	1	1	1
6	20	2	1	0	2	1	1
7	16	20	2	1	19	2	1
8	14	16	20	2	14	19	2
9	11	14	15	20	13	14	19
10	9	11	14	15	11	13	14
11	8	9	11	14	9	11	13
12	6	8	9	11	8	9	11
13	5	6	8	9	5	8	9
14	4	5	6	8	5	5	8
15	4	4	5	5	4	5	5
16	3	3	4	4	4	4	5
17	2	2	3	4	2	4	4
18	2	2	2	3	1	2	4
19	2	2	2	2	2	2	2
20+	4	4	6	8	4	6	8
Total	339	157	158	219	156	205	264

!999 population structure was determined using Jenkins computer model.

The model conducted a gather in 1999 (removal or 0-5 year olds), the 2000 population reflects post year data.

2001 shows the treatment/no treatment year.



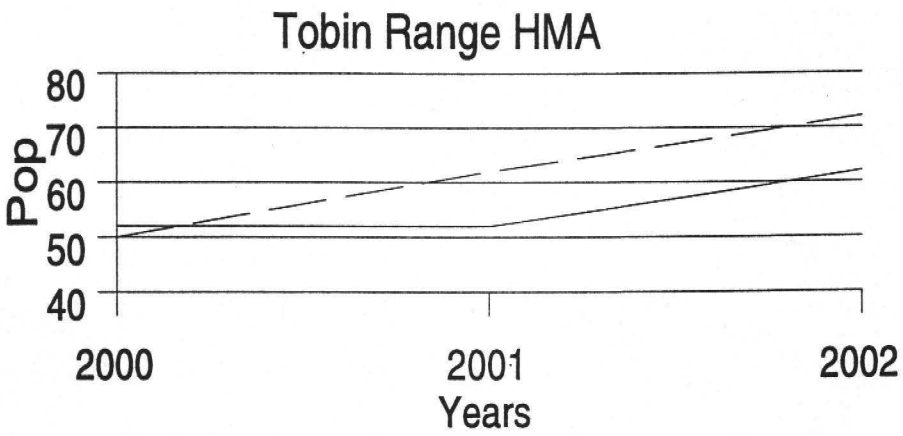
Comparison of Population growth for Treated and Untreated Horses

TOBIN RANGE HMA AGE DISTRIBUTION BY YEAR							
	Initial	With Fertility Treatment			No Fertility Treatment		
Age/Year	1999	2000	2001	2002	2000	2001	2002
0	14	12	1	12	11	11	12
1	8	4	11	1	4	11	11
2	8	0	4	11	0	4	10
3	8	1	0	4	1	0	4
4	6	1	1	0	1	1	0
5	5	0	1	1	0	1	1
6	4	1	0	1	1	0	1
7	3	4	1	0	4	1	0
8	2	3	4	1	3	4	1
9	3	2	3	4	2	3	4
10	4	3	2	2	3	2	3
11	3	4	3	2	4	3	2
12	2	3	4	3	3	4	3
13	2	2	3	3	2	3	4
14	1	2	2	3	2	2	3
15	2	1	2	2	1	2	2
16	1	2	1	2	2	1	2
17	2	1	2	1	1	2	1
18	1	2	1	2	2	1	2
19	1	1	2	1	1	2	1
20+	2	3	4	2	2	3	5
Total	82	52	52	62	50	62	72

!999 population structure was determined using Jenkins computer model.

The model conducted a gather in 1999 (removal or 0-5 year olds), the 2000 population reflects post year data.

2001 shows the treatment/no treatment year.



Comparison of Population growth for Treated and Untreated Horses