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United States Department of the Interior



BUREAU OF LAND MANAGEMENT

Surprise Field Office
PO Box 460
Cedarville, CA 96104
www.ca.blm.gov/surprise

In Reply Refer To:
4700(CA-370)

October 2, 2003

Dear Interested Party:

Enclosed, for your review, is a copy of the Buckhorn and Coppersmith Wild Horse Herd Management Areas Capture Plan Environmental Assessment (EA No. CA-370-03-27).

The purpose of these documents is to analyze the impacts of removing wild horses to the Appropriate Management Levels in the two HMA's.

Please submit any comments you may have to the Bureau of Land Management, Surprise Field Office, Post Office Box 460, Cedarville, CA 96104. Comments must be received by November 3, 2003.

Thank you for your interest in our wild horse and burro program.

Sincerely,

Owen Billingsley
Surprise Field Manager

Enclosures

**BUCKHORN and COPPERSMITH
WILD HORSE HERD MANAGEMENT AREAS
CAPTURE PLAN
ENVIRONMENTAL ASSESSMENT**

CA-370-03-27

September 2003

SURPRISE FIELD OFFICE

Purpose and Need for Action

The Buckhorn HMA is located in Washoe County, Nevada and Lassen County, California on the tables from Duck Flat in Nevada west to Cottonwood Mountain in California. The HMA consists of approximately 67,500 acres of public lands and 9,275 acres of private lands for a total of approximately 76,775 acres. Elevations range from 4700 feet on Duck Flat to 7240 feet on Cottonwood Mountain. The Twin Peaks Herd Management Area is located to the south of the Buckhorn HMA. The Tuledad Allotment fence separates the two areas.

The Coppersmith HMA is located in Lassen County, California and Washoe County, Nevada on the slopes and tables from Duck Lake west to the Warner Mountains. The HMA consists of approximately 61,850 acres of public lands and 11,720 acres of private lands for a total of approximately 73,570 acres. Elevations range from 4700 feet on Duck Lake to 8000 feet on the south end of the Warner Mountains. The Twin Peaks Herd Management Area is located to the south of the Buckhorn HMA. The Tuledad Allotment fence separates the two areas.

The purpose of this environmental assessment is to analyze the impacts of the potential methods that may be used to meet the established wild horse appropriate management level on the resources within the Buckhorn and Coppersmith Wild Horse Herd Management Areas (HMA). Appropriate Management Levels (AML) of a maximum of 85 wild horses in the Buckhorn HMA and 75 wild horses in the Coppersmith HMA were established through the Wild Horse Gather and Removal, Buckhorn and Coppersmith Herd Management Areas decision of November 1995, as assessed in environmental assessment #CA-370-94-08. The AML's for the Buckhorn and Coppersmith HMA's were established using monitoring and observations of conditions since 1987. No additional information has been found that would indicate a need to adjust the established appropriate management level for the Buckhorn or the Coppersmith HMAs.

The chief goal of managing wild horses within Appropriate Management Levels is to achieve a thriving natural ecological balance of resources, while maintaining a healthy and viable population of wild horses. The key limiting factors for wild horses within this HMA's are: 1) the increasingly heavy use of public and private riparian areas by wild horses, and 2) the egress of wild horses from the Coppersmith HMA into areas not identified in the land use plan as areas where wild horses are to be managed. Wild horses from the two HMAs were last gathered in 1997. A total of 48 horses (29 adults and 19 foals) were removed from the Buckhorn HMA and a total of 30 horses (19 adults and 11 foals) were removed from the Coppersmith HMA. The last aerial census of the Buckhorn and Coppersmith Wild Horse Herd Management Areas was conducted in May of 2001. A total of 162 horses were seen in the Buckhorn HMA, and a total of 92 horses were seen in the Coppersmith HMA. See Appendix A.

Additional objectives include: collecting information on herd characteristics, determining herd health, and conducting fertility control research. All activities would be conducted according to a specified set of standardized operating procedures (SOP's) (Appendix B).

Conformance with Existing Land Use Plans

The Tuledad/Home Camp Management Framework Plan (MFP)/Final Grazing Environmental Impact Statement (EIS) and Record of Decision directs the management of the project area. The MFP requires the BLM to protect and maintain no less than 100 horses in the Tuledad Planning Unit (including both the Buckhorn and Coppersmith HMA's), and to ensure that this population is viable and self-sustaining.

The Proposed Action is in conformance with these plans and consistent with federal, state, and local laws, regulations, and plans to the maximum extent possible.

Relationship to Statutes, Regulations, Policies, Plans, or Other Environmental Analysis

The Buckhorn and Coppersmith Herd Management Area Plans (HMAP) were signed in 1984. These documents, the November 1995 decision, and the Tuledad/Home Camp Management Framework Plan guide the management of the two HMAs. The Management Framework Plan provides general management direction, the November 1995 decision established the AML, and the HMAP provides specific management parameters on such variables as conformation, color of animal to be managed, and sex and age structure.

The Surprise Field Office is supporting research aimed at controlling the reproduction rate of wild horses through a collaborative effort to develop an immuno-contraceptive 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. Studies have been conducted on a varied group of HMAs in Nevada and these studies will be utilized to develop management strategies implementing fertility control treatment. The analysis of the use of this vaccine on wild horses in the Buckhorn and Coppersmith HMAs is part of Alternative 1.

The Tuledad/Home MFP; the Wild Horse Gather and Removal, Buckhorn and Coppersmith Herd Management Areas decision of November 1995; environmental assessment #CA-370-94-08; and the Buckhorn and Coppersmith Herd Management Area Plans are available in the Surprise Field Office for public review.

Alternatives

The Proposed Action and the Alternatives represent a reasonable range of alternatives based on the issues and goals identified. Common to all alternatives, except the No Action Alternative, is the collection of genetic information from animals captured. This data would be used to determine if actions are necessary to increase genetic variability in the herd. Actions may include the periodic introduction of new animals into the population to expand the genetic base of the herd. It is anticipated that the Action Alternatives, if selected, would be implemented in the fall of 2003. Complete removal of wild horses was considered; however, this would not be in conformance with the Tuledad/Home Camp Land Use Plan or the Wild Horse and Burro Act of 1971 (PL 92-195, as amended).

The Wild Horse Population Model Version 3.2, developed by Dr. Steven Jenkins, Associate Professor, University of Nevada, Reno was used to predict populations under each alternative considered in this document.

Alternative 1 (Proposed Action)

The Proposed Action is based on the BLM's 2001 Wild Horse Strategy and includes gathering all HMA's to reach AML's over a ten- year period. The plan outlines a four- year gather cycle to manage wild horses Bureau wide. The Strategy is to implement population management for each HMA where wild horses will be managed in a range from 40% below AML, to AML. The AML is the maximum number of wild horses for the HMA. For the Buckhorn and Coppersmith Herds, it is planned to implement a three to four year gather cycle, with each removal reducing the population of animals down to 40% below AML.

Part of the Proposed Action would be to capture approximately 90% of the wild horses from the two HMA's. All of the approximately 424 animals gathered would be examined to determine sex, age, and color, acquire blood samples for genetic analysis, and assess herd health (pregnancy, parasite loading, physical condition, etc.). Of the 424 animals that are captured, approximately 362 would be permanently removed from the HMA's, and approximately 62 animals would be selected to be returned to the HMA's to meet the minimum recommended numbers. The age, sex, temperament, and physical condition of the returned animals would be recorded to track future population trends. Determination of which horses would be returned to the range would be based on an analysis of existing population characteristics and post gather data for age, sex ratio, and colors. A balanced representation of age classes would be returned to the range. The excess wild horses would be prepared for adoption.

The following Table 1 shows the current population estimate obtained from 1989, 1995, and 1997 gather data. This data was used to determine the estimated number of wild horses to be removed from the HMA's.

Table I – Buckhorn and Coppersmith HMA's

HMA	Estimated 2003 Population	Estimated Number to Remove	Appropriate Management Level	Estimated Number to Remain
Buckhorn	219	160	85	59
Coppersmith	252	202	75	50

Multiple capture sites (traps) may be used to capture wild horses from this HMA. Whenever possible, capture sites would be located in previously disturbed areas. All capture and handling activities would be conducted in accordance with the Standard Operating Procedures (SOP's) described in Appendix B. Selection of capture techniques would be based on several factors such as the season of removal, condition of animals, herd health, and environmental considerations.

In addition, the BLM would conduct immuno-contraceptive research. Of the 62 animals that would be selected for return to the HMA, approximately 9 (15%) would be foals, 26 would be studs, and 27 would be mares. The Proposed Action would include the treatment of all of the released mares that are 2 years and older with a revised immuno-contraceptive vaccine, Porcine Zona Pellucida (PZP). It is anticipated that this vaccine would inhibit reproduction of captured, treated, and released mares for approximately two breeding seasons. All treated mares would be freeze marked on the left shoulder to enable researchers to positively identify animals in the research project during the data collection phase. Monitoring would include, as a minimum helicopter flights to be conducted in Years 2 through 4 to locate treated mares and determine efficacy. The flight to be scheduled in year 4 has an objective of determining the percentage of mares that have returned to fertility. In addition, field monitoring will be routinely conducted as part of other regular monitoring activities.

The Surprise Field Office will assure that treated mares (as identified by the shoulder freeze marking) do not enter the adoption market for a minimum of three years following treatment. A field data sheet will be forwarded to the field from the National Program Office (NPO) prior to treatment. This form will be used to record all pertinent data relating to identification of each mare (including a photograph when possible), date of treatment, type of treatment (1yr, 2yr- and Adjuvant used) Herd Management Area (HMA), etc. The form and any photos will be maintained at the field office and a copy of the completed form will be sent to Ron Hall at NPO.

A tracking system will be maintained by NPO detailing the quantity of PZP issued, the quantity used, the disposition of any unused PZP, and the number of treated mares by HMA, FO and State along with the freeze-mark applied, by HMA. In the vast majority of cases, the released mares will never be gathered sooner than the mandatory three-year holding period. In those rare instances when, due to unforeseen circumstances, treated mare(s) are removed from an HMA they will be maintained either in a BLM facility or a contracted Long Term Holding Facility until the expiration of the three-year holding period. In the event that it is necessary to remove treated mares, their removal and disposition will be coordinated through NPO. After expiration of the three-year holding period, treated animals may be placed in the adoption system.

As there is a limited amount of mixing between the Buckhorn and Coppersmith HMA's and the Twin Peaks HMA to the south, it is not anticipated that there would be a need to augment the genetic pool by the introduction of animals from other herds. However, under the Proposed Action and the Action Alternatives, data from blood drawn for genetic analysis would be used to determine actions necessary to keep the populations viable and self-sustaining. Any animals introduced into the herd would meet the general characteristics (color, size, type, etc.) as the existing population.

Alternative 2 (Proposed Action without the use of Immuno-contraceptives)

This alternative would be the same as the Proposed Action; however, BLM would not conduct immuno-contraceptive research. None of the captured and released mares would be treated to inhibit reproduction.

Alternative 3 (Selective Removal)

Wild horse management under this alternative would be to remove animals utilizing a Selective Removal Strategy based on previously established age selective removal criteria (i.e. 0-5 year olds), using the various capture techniques and processing protocols identified in the Proposed Action. Selective removal objectives target removal efforts for excess animals, based on specific segments of a given wild horse population. Selective removal under this alternative however, would not only be age based, but could also be based on other critical population variables as well (sex ratios/historic characteristics/ genetic viability/etc.). Criteria can be structured to reduce the effects of specific population issues. Issues which may be addressed with selective removal strategies include: correction of unusual population variables (skewed sex ratio, unbalanced age structure), maintenance of herd structure and composition, and maintenance of long term herd viability.

Selective removal under this alternative would be primarily aged based, removing only the younger, adoptable animals, and negating the need to place un-adoptable animals in long term holding.

Table II shows an example of selective removal using 1989, 1995, and 1997 gather data to determine current population levels and estimated removal for 0-5 age classes. For the purpose of this example, achieving AML is the major objective.

Table II – Buckhorn and Coppersmith HMA's

HMA	Current Population Estimate	AML	No. Animals 5 years & younger to remove *	Estimated Population after gather
Buckhorn	219	85	145	74
Coppersmith	252	75	171	81

*This estimate of animals that would be 0-5 years of age is derived from the age structure that remained following the gathers of this herd in 1989, 1995, and 1997. See Appendix A.

Alternative 4 (No Action)

This alternative consists of no direct management of wild horse numbers. Wild horses would be allowed to regulate their numbers naturally through predation, disease, and forage, water, and space availability.

This alternative is not in compliance with the Tuledad/Home Camp Land Use Plan and the requirements of the Wild Free-Roaming Horse and Burro Act of 1971 which mandates the Bureau to protect the range from the deterioration associated with overpopulation, and to preserve and maintain a thriving natural ecological balance and multiple-use relationship in that area. However, for comparative purposes, the No Action Alternative will be included in this analysis.

Environmental Consequences (Proposed Action & Alternatives)

Critical Elements	Affected	Critical Elements	Affected
Air Quality	Yes	Soil	Yes
Areas of Critical Environmental Concern (ACEC)	No	Waste, Hazardous or Solid	No
Cultural Resources	Yes	Water Quality, Surface and Ground	Yes
Environmental Justice	No	Wetlands/Riparian Zones	Yes
Farmlands, Prime or Unique	No	Wild and Scenic Rivers	Yes
Flood plains	No	Wilderness/WSA	Yes
Invasive, Non-native Species	Yes	Wildlife	Yes
Native American Concerns	No	Wild Horses and Burros	Yes
Recreation	Yes	Vegetation	Yes
Social and Economic	Yes	Threatened and Endangered Species	Yes

A. Watershed and Water Quality, surface and ground

Affected Environment

The majority of the Coppersmith and Buckhorn HMA's drain north and east into Duck Flat. One small portion of the Coppersmith HMA (Boot Lake, in the extreme southwest corner of the HMA) drains south into Dodge. Two small portions of the Buckhorn HMA (Rowland Spring in the extreme south and the Buffalo Hills on the extreme southeast corner of the HMA) drain into the Smoke Creek Desert.

Water sources for wild horses are well distributed in the Coppersmith and Buckhorn HMA's on most years. Ephemeral lakes and reservoirs are scattered across the areas, there are a multitude of seeps and springs, and there are several perennial creeks. Water supply is not a limiting factor for wild horses in the two HMA's. However, on the driest years, the lakes, reservoirs, and some of the seeps and springs go dry and the number watering sites become limited.

Water quality within the two HMA's is generally adequate for the identified benefit of livestock, wildlife, and wild horse water.

Environmental Consequences

Indirect, long-term impacts are related to the wild horse population sizes and growth rates associated with each of the Alternatives. Wild horses are large ungulates with few natural predators. They are present in native plant communities within the two HMA's year-round, and they congregate around water sources and trail along drainages. They utilize primarily herbaceous vegetation and trample and compact soils, especially when soils are wet. As wild horse numbers increase, utilization of vegetation and trampling/compaction of soils increases. These impacts are greatest where wild horses tend to congregate; however, when wild horse numbers become excessive, the impacts become noticeable on the slopes and tables at greater distances from water and trail corridors. When vegetation is heavily used and soils are trampled and compacted, soil erosion increases and water quality and quantity are reduced.

Implementation of Alternative #1, the Proposed Action, would result in the slowest wild horse population growth rates, and the greatest period of time when wild horse numbers are at or below maximum AML's. As a result, Alternative #1 would have the least negative impact on watershed health and water quality. Implementation of Alternative #4, the No Action Alternative, would result in the most rapid increase in wild horse numbers. Population modeling shows there would likely be an increase to over 1700 horses in the two HMA's within 10 years (see Appendix A). As a result, Alternative #4 would have the greatest negative impact on watershed health and water quality. Implementation of either Action Alternative #2 or #3 would have a slightly higher negative impact on watershed health and water quality than implementation of the Proposed Action.

B. Soils and Vegetation, including Riparian/Wetlands and T&E Plant Species

Affected Environment

The Buckhorn and Coppersmith HMA's are included in the area described in the Surprise Valley-Home Camp Soil Survey, issued in April of 1974. Soils are primarily loams and clay loams from volcanic parent material on the mid and higher elevations, and droughty sandy loams on the old lake and river terraces on the lowest elevations.

The lowest elevations (below 5500') in the HMA's occur on the eastern and northern portions of the area around Surprise Valley, Duck Lake, Duck Flat, and in Tuledad Canyon. These areas are primarily deep loamy soils that support basin and Wyoming big sagebrush/Thurber's needlegrass dominated communities on the slopes, and alkali tolerant greasewood and saltgrass dominated communities on the lake flats. Wild horses winter in these areas on unusually cold and snowy winters. Large portions of these areas are private, and many are fenced, irrigated, and used for hay production.

The mid elevations (5500' to 6800') occupy the largest portion of the HMA's. These areas are loams and clay loams that support a complex mosaic of mountain big sagebrush/Idaho fescue/bluebunch wheatgrass/Thurber's needlegrass, low sagebrush/Sandberg's bluegrass, and western juniper dominated communities. Included on these elevations are small areas of heavy clay soils with rabbitbrush communities, ephemeral lakebeds with silver sagebrush and herbaceous dominated communities, rims with mountain mahogany, and a few small stands of

quaking aspen. Wild horses spend the majority of the year at these elevations, from early spring to late fall, and they often winter on these sites during warm and open winters.

The highest elevations of the HMA (6800'-8000') are limited to the upper reaches of Cottonwood Mountain and the steep slopes on the east side of the Warner Mountains. The soils on these elevations support productive mountain big sagebrush and low sagebrush communities with strong mountain brush components, including bitterbrush, serviceberry, chokecherry, bittercherry, oceanspray, snowbrush, and mountain mahogany. Some timber (white fir and ponderosa pine) and larger aspen stands are also found at these elevations.

The majority of the drainages and springs in the HMA's support herbaceous plant communities, including grasses, forbs, sedges, and rushes. Many of these systems also contain some woody riparian vegetation, including willow, rose, aspen, and chokecherry.

Wild horses from the Coppersmith HMA are also known to winter in areas outside of and to the north of the HMA on the rabbitbrush and low sagebrush tables around Snake Lake.

There are no known populations of federally listed Endangered, Threatened, Proposed, or Candidate plant species in the HMA's. However, two federally listed sensitive species do occur here, including Baker's globemallow (*Iliamna bakeri*) and Schoolcraft's cryptantha (*Cryptantha schoolcraftii*). Baker's globemallow has been found following wildfire in mountain mahogany communities in the Coppersmith Hills and around Boot Lake in the Coppersmith HMA. This species thrives for several years following wildfire before it is out-competed by other vegetation. It is suspected to be present, but dormant, in many other portions of the two HMA's that have not burned. Wild horses, as well as livestock and many species of wildlife, are known to eat this species. Schoolcraft's cryptantha occurs in both of the HMA's on very dry, nearly barren soils in Tuledad Canyon and south of Duck Lake. Wild horses do not appear to be impacting this species particularly.

Environmental Consequences

Direct, short-term impacts to vegetation and soils with implementation of the Action Alternatives (#1, #2, and #3) would include disturbance of native vegetation and soils immediately in and around temporary trap sites, holding, and processing facilities. These impacts would be a result of vehicle traffic, and the hoof action of penned horses, and can be locally severe in the immediate vicinity of the corrals or holding facilities. Generally, these activity sites would be small (less than one half acre) in size, outside of riparian and wetland zones, and away from populations of sensitive plant species. Since most trap sites are re-used during recurring wild horse gather operations, any impacts would remain site specific and isolated in nature. In addition, most trap sites are selected to enable easy access by transportation vehicles and logistical support equipment and would therefore generally be adjacent to or on roads, pullouts, water haul sites, or other flat spots that were previously disturbed. There would be no impacts of trapping or transportation activities on soils or vegetation under the No Action (Alternative #4).

Indirect, long-term impacts are related to the wild horse population sizes and growth rates associated with each of the Alternatives. Wild horses are large ungulates with few natural

predators. They are present in native plant communities within the two HMA's year-round, and they congregate around water sources and trail along drainages. They utilize primarily herbaceous vegetation and trample and compact soils, especially when soils are wet. As wild horse numbers increase, utilization of vegetation and trampling/compaction of soils increases. These impacts are greatest where wild horses tend to congregate; however, when wild horse numbers become excessive, the impacts become noticeable on the slopes and tables at greater distances from water and trail corridors. When vegetation is used continuously, heavily, and annually, and soils are trampled and compacted, plant vigor, production, and diversity are reduced and overall ecological site conditions are reduced.

Implementation of Alternative #1, the Proposed Action, would result in the slowest wild horse population growth rates, and the greatest period of time when wild horse numbers are at or below maximum AML's. As a result, Alternative #1 would have the least negative impact on soils and vegetation, including riparian and wetland sites and sensitive plant species populations. Implementation of Alternative #4, the No Action Alternative, would result in the most rapid increase in wild horse numbers. Population modeling shows there would likely be an increase to over 1700 horses in the two HMA's within 10 years (see Appendix A). As a result, Alternative #4 would have the greatest negative impact on soils and vegetation, including riparian and wetland sites and sensitive plant species populations. Implementation of either Action Alternative #2 or #3 would have a slightly higher negative impact on soils and vegetation, including riparian and wetland sites and sensitive plant species populations, than implementation of the Proposed Action.

C. Noxious Weeds and Invasive Non-Native Species

Affected Environment

Noxious weed and invasive non-native species introduction and proliferation is a growing concern among local and regional interests. Noxious weed surveys, including invasive and non-native species, are ongoing in the HMA. Several small populations of noxious weeds have been found within the HMA's, including Scotch thistle, Russian knapweed, and yellow starthistle. With a few exceptions, these populations are associated with heavily disturbed areas along roads, around stock water areas, and around dams. All of these populations are being actively treated. The presence of several heavily traveled routes (Nevada highway 447, the Buckhorn Road, the Tuledad Canyon Road, and the Bare Creek Road), both within and adjacent to the two HMA's, increase the risk of populations of noxious weeds becoming established in the area. Vehicles and heavy equipment traveling on these routes, and crossing the associated drainages along these routes, is increasing the likelihood that Russian knapweed and several other species of noxious weeds, including Dyer's woad, yellow starthistle, perennial pepperweed, Mediterranean sage, bull thistle, and Canada thistle, will become established in the HMA's in the near future.

In addition to noxious weeds, there are growing populations of invasive non-native species, including hoary cress along jeep trails, ephemeral drainages, and in campsites; medusahead on heavy, shrink/swell clay soils; and cheatgrass in burned areas and in communities with weakened perennial understories. Most of these populations are not being actively treated.

Environmental Consequences

Direct, short-term impacts associated with the Action Alternatives include the potential to import or transport non-native species (noxious weeds) and/or spread existing noxious weed seeds and plant parts to new areas in the two HMA's. These impacts would potentially occur if contractor vehicles are carrying noxious weed seeds and plant parts when they arrive on site, or if they drive through existing infestations and spread seed into previously weed free areas, or if they feed contract horses contaminated hay before arriving on site and the seeds pass through the horses' digestive system. Feeding contaminated hay to wild horses, which are released back into the HMA's before the seeds pass through their digestive systems, could also spread noxious weeds. There are no direct impacts associated with the No Action Alternative.

Indirect, long-term impacts are related to the wild horse population sizes and growth rates associated with each of the Alternatives. Wild horses are large ungulates with few natural predators. They are present in native plant communities within the two HMA's year-round, and they congregate around water sources and trail along drainages. They utilize primarily herbaceous vegetation and trample and compact soils, especially when soils are wet. As wild horse numbers increase, utilization of vegetation and trampling/compaction of soils increases. These impacts are greatest where wild horses tend to congregate; however, when wild horse numbers become excessive, the impacts become noticeable on the slopes and tables at greater distances from water and trail corridors. When vegetation is used continuously, heavily, and annually, and soils are trampled and compacted, plant vigor, production, and diversity are reduced and overall ecological site conditions are reduced. Disturbed areas and areas in poor ecological condition are much more susceptible to having noxious weeds and invasive non-native species populations establish and expand in size.

Implementation of Alternative #1, the Proposed Action, would result in the slowest wild horse population growth rates, and the greatest period of time when wild horse numbers are at or below maximum AML's. As a result, Alternative #1 would be the least likely to result in increased populations of noxious weeds and invasive non-native species. Implementation of Alternative #4, the No Action Alternative, would result in the most rapid increase in wild horse numbers. Population modeling shows there would likely be an increase to over 1700 horses in the two HMA's within 10 years (see Appendix A). As a result, Alternative #4 would have the greatest negative impact on soils and vegetation, and would be the most likely to result in increased populations of noxious weeds and invasive non-native species. Implementation of either Action Alternative #2 or #3 would have a slightly higher negative impact on soils and vegetation, and a slightly higher risk of increased populations of noxious weeds and invasive non-native species, than implementation of the Proposed Action.

D. Wildlife

Affected Environment

The wide range of elevation and habitat types in the HMA's results in a wide variety of wildlife habitat types. The mosaics of low sagebrush and big sagebrush communities provide spring, summer, and fall habitat for pronghorn antelope and greater sage-grouse. The big sagebrush, mountain brush, and aspen communities on Cottonwood Mountain, the Coppersmith Hills, and

the Warner Mountains provide spring, summer, and fall habitat for mule deer and for neotropical bird species. The canyons support several species of raptors, as well as chukar and quail. The riparian systems are important for all species of wildlife, with the perennial, low elevation systems being particularly important due to their scarcity.

The Newland Reservoir/Bare Creek system in the north end of the Coppersmith HMA supports a cold-water trout fishery. Newland Reservoir, Boot Lake, Pilgrim Reservoir, and, when they have water, the numerous ephemeral lakebeds provide significant waterfowl habitat. In addition, several of the perennial to intermittent streams, including Tuledad Creek, Express Canyon, Post Canyon, and Worland Canyon, support populations of warm-water fish (dace).

There are no known federally listed Endangered, Threatened, Proposed, or Candidate wildlife species using the areas in the HMA's. However, bald eagles have been seen near Newland Reservoir in the Coppersmith HMA. In addition, greater sage-grouse, a species which has been petitioned for federal listing throughout its range, use the low sagebrush, riparian, and mountain big sagebrush communities for year-round habitat.

Environmental Consequences

Direct, short-term impacts to wildlife with implementation of the Action Alternatives (#1, #2, and #3) would consist primarily of disturbance and displacement to wildlife by the low-flying helicopter. Typically, the natural survival instinct response of wild animals to this type of disturbance results in fleeing from the perceived danger. Some mammals, reptiles, and birds may be temporarily displaced by the construction and use of temporary gather sites and holding facilities. These impacts would be temporary, with short duration, and minimal. A slight possibility exists that non-mobile or site-specific animals would be trampled. No direct impacts are associated with the No Action Alternative.

Indirect, long-term impacts are related to the wild horse population sizes and growth rates associated with each of the Alternatives. Wild horses are large ungulates with few natural predators. They are present in native plant communities within the two HMA's year-round, and they congregate around water sources and trail along drainages. Wild horses compete directly with wildlife for available cover, space, forage, and water. As wild horse numbers increase, utilization of cover, space, forage, and water increases. These impacts are greatest where wild horses tend to congregate; however, when wild horse numbers become excessive, the impacts become noticeable on the slopes and tables at greater distances from water and trail corridors. When vegetation is used continuously, heavily, and annually, and soils are trampled and compacted, plant vigor, production, and diversity, and the value of plant communities for wildlife habitat are reduced. Excessive wild horse numbers also have impacts on greater sage-grouse by consuming herbaceous cover needed in nesting sites, and by reducing the diversity and quantity of forbs available on uplands in the early spring and on riparian areas season-long.

Implementation of Alternative #1, the Proposed Action, would result in the slowest wild horse population growth rates, and the greatest period of time when wild horse numbers are at or below maximum AML's. As a result, Alternative #1 would have the least negative impact on wildlife habitat, including sensitive animal species populations. Implementation of Alternative #4, the

No Action Alternative, would result in the most rapid increase in wild horse numbers. Population modeling shows there would likely be an increase to over 1700 horses in the two HMA's within 10 years (see Appendix A). As a result, Alternative #4 would have the greatest negative impact on wildlife habitat, including sensitive animal species populations. Implementation of either Action Alternative #2 or #3 would have a slightly higher negative impact on wildlife habitat, including sensitive animal species populations, than implementation of the Proposed Action.

E. Wild Horses

Affected Environment

The Tuledad/Homecamp Management Framework Plan established the Buckhorn and Coppersmith HMA's and specified a planned management level of at least 50 wild horses for each herd. Current populations are estimated to be approximately 471 wild horses, based on a helicopter census conducted in May 2001, adjusted for the 2002 and 2003 foaling seasons. Gathers and census information indicates that the Buckhorn and Coppersmith wild horse herds increase at a fairly consistent rate of about 15% per year (See Appendix A)

The Buckhorn and Coppersmith HMA's have undergone several removals since passage of the Act. These removals have incorporated all of the removal strategies identified in the proposed action, with the exception of fertility control. The last full gather of the two HMA's was conducted in 1995.

Environmental Consequences

Long-term, the impacts of maintaining an AML designed to achieve a thriving, natural ecological balance would be a benefit to the wild horses in both the Buckhorn and the Coppersmith HMA. Under the population range derived from the AML, wild horses would be assured adequate forage and water during even the hottest and driest periods of the year.

Direct impacts to wild horses under the Action Alternatives may occur to either individual animals or the population as a whole. These impacts include handling stress associated with the herding, capture, processing, and transportation of animals from temporary trap sites to temporary holding facilities (if used), and from the trap sites or temporary holding facilities to an adoption preparation facility. Following administration of the immuno-contraceptive fertility control vaccines, as called for in the Proposed Action, minor swelling may occur at the injection site and/or an injection site injury may occur, however this is rare. The intensity of these impacts varies by individual, and is indicated by behaviors ranging from nervous agitation to physical distress. Mortality of wild horses captured during a gather does occur, however it is infrequent and typically is no more than one half to one percent of the animals captured.

Impacts that can occur after the initial stress may include spontaneous abortion in mares, and increased social displacement and conflict in studs. Spontaneous abortion following capture is very rare. Traumatic injuries that may occur typically involve biting and/or kicking that may result in bruises and minor swelling which normally does not break the skin. These impacts are

known to occur intermittently during wild horse gather operations. The frequency of occurrence of these impacts among a population varies with the individual.

Population-wide impacts can occur during or immediately following implementation of the Action Alternatives. They include the displacement of bands during capture and the associated re-dispersal, modification of herd demographics (age and sex ratios), temporary separation of members of individual bands of horses, re-establishment of bands following releases, and the removal of animals from the population. With the exception of changes to herd demographics, direct population-wide impacts over the last 20 years have proven to be temporary in nature with most, if not all, impacts disappearing within hours to several days of release. No observable effects associated with these impacts would be expected within one month of release except a heightened shyness toward human contact. Observations of animals following release have shown horses relocate themselves back to their home ranges within 12 to 24 hours of release.

The effect of removing wild horses from the population would not be expected to have a significant impact on herd dynamics or population variables, as long as the selection criteria for removal ensured a typical population structure was maintained. Obvious potential impacts on horse herds and populations from exercising poor selection criteria not based on herd dynamics include modification of age or sex ratios to favor a particular class of animal.

Selective removal as called for in Alternative 3, would remove most, if not all, of the younger animals from the population, leading to an atypical age structure for the herd. As future removals occur using selective removals, the age of the population would continue to be skewed toward the older age classes. This could be somewhat mitigated by the selection and release of younger animals during the initial and each subsequent gather.

Under the Action Alternatives, blood would be drawn for genetic analysis. This data would be used to determine actions necessary to keep the populations viable. The Proposed Action, including the use of immuno-contraception would limit the numbers of mares that would conceive and deliver foals. This would reduce the genetic variability entering the population for the two years after treatment, and after each subsequent treatment. Animals from other HMAs in Nor-Cal East, or adjacent states could be used to add to the breeding population if necessary to ensure genetic viability. Animals selected for population augmentation would be selected to adhere to the type and colors characteristic of the herd.

The Proposed Action would mitigate the potential adverse impacts on wild horse populations by establishing a procedure for determining what selective removal criteria is warranted for the herd. The flexible procedures (Appendix B SOP's) would allow for correction of any existing discrepancies in herd demographics that could predispose a population to increased chances for catastrophic impacts. The Proposed Action would also establish a standard for selection that would minimize the possibility for developing negative age or sex based selection effects to the population in the future.

Population-wide indirect impacts would not appear immediately as a tangible effect and are more difficult to quantify. Population wide indirect impacts would be associated primarily with the

use of fertility control drugs and involve reductions in short term fecundity of initially a large percentage of mares in a population, increasing herd health as AML's are achieved, and potential genetic issues regarding the control of contributions of mares to the gene pool, especially in small populations

Implementation of the Proposed Action or Alternative 2 would allow immediate achievement of AML. Alternative 3, Selective Removal, would not achieve AML during the initial gather, or within the next ten years.

If forage and available water was unlimited, it is projected that the No Action alternative would allow the populations to increase dramatically during the next 10 years (projected to over 1700 head). However, water and forage would limit this growth, and could possibly lead to large-scale die-offs, especially during drought or severe winters.

In an attempt to predict population dynamics, a computer simulation was run using the wild horse population model developed by Dr. Stephen Jenkins of the University of Nevada, Reno (Jenkins 1996). For each alternative, populations were predicted for the next 5, 10, and 15 years (see Appendix A).

F. Cultural Resources

Affected Environment

There are numerous cultural resource sites throughout the Buckhorn and Coppersmith HMA's. These range from prehistoric temporary and permanent loci to historic ranching, homesteading and trail sites. The abundance of water in seeps, springs, ephemeral lakes, and creeks resulted in the area of the two HMA's being heavily utilized by both Native American peoples and European settlers.

Environmental Consequences

Direct impacts to cultural resources are not anticipated to occur due to implementation of any of the Action Alternatives because gather sites and temporary holding facilities would be inventoried for cultural resources prior to construction. The Surprise Field Office archeologist would review all proposed and previously used gather sites and temporary holding facility locations to determine if these have had a cultural resources inventory and/or if a new inventory is required. If cultural resources were encountered at proposed gather sites or temporary holding facilities, these locations would not be utilized unless they could be modified to avoid impacts. No direct impacts are associated with Alternative #4.

Indirect impacts to cultural resources occur from increased erosion and from trampling damage in areas where there are concentrations of animals. Adverse impacts to cultural resource sites from overgrazing and trampling include modification and displacement of artifacts and features as well as erosion of organic middens containing valuable information. Areas in the vicinity of permanent and intermittent water sources (i.e., riparian areas) have the highest potential for cultural resource sites. Since wild horses concentrate in these areas, these areas are most likely to be impacted by trampling and erosion. Indirect impacts associated with each of the Alternatives

would be related to wild horse population size. Impacts would be the least with implementation of Alternative #1, the Proposed Action. Impacts are anticipated to increase with each successive Alternative, with the No Action Alternative likely to have the most negative impacts.

G. Social and Economic

Affected Environment

The Buckhorn and Coppersmith HMA's are located within the Tuledad livestock grazing allotment. This allotment is divided into two large pastures – the North Pasture, which includes all of the Coppersmith HMA, and the South Pasture, which includes all of the Buckhorn HMA. There are seven grazing permittees who are authorized to utilize up to 9,591 Animal Unit Months (AUMs) during a six-month season of use (April 1 to September 30). Cattle and sheep are rotated through nine use areas and distributed to stay within the carrying capacity of each of two pastures.

Environmental Consequences

Indirect, long-term impacts are related to the wild horse population sizes and growth rates associated with each of the Alternatives. Wild horses are large ungulates with few natural predators. They are present in native plant communities within the two HMA's year-round, and they congregate around water sources and trail along drainages. Wild horses compete directly with livestock for available forage and water. As wild horse numbers increase, utilization of forage and water increases. These impacts are greatest where wild horses tend to congregate; however, when wild horse numbers become excessive, the impacts become noticeable on the slopes and tables at greater distances from water and trail corridors. When vegetation is used continuously, heavily, and annually, and soils are trampled and compacted, plant vigor, production, and diversity are reduced, and the potential carrying capacity for livestock production is reduced.

Implementation of Alternative #1, the Proposed Action, would result in the slowest wild horse population growth rates, and the greatest period of time when wild horse numbers are at or below maximum AML's. As a result, Alternative #1 would have the least negative impact on livestock operations, and on the social and economic values associated with livestock grazing.

Implementation of Alternative #4, the No Action Alternative, would result in the most rapid increase in wild horse numbers. Population modeling shows there would likely be an increase to over 1700 horses in the two HMA's within 10 years (see Appendix A). As a result, Alternative #4 would have the greatest negative impact on livestock operations, and on the social and economic values associated with livestock grazing. Implementation of either Action Alternative #2 or #3 would have a slightly higher negative impact on livestock operations, and on the social and economic values associated with livestock grazing, than implementation of the Proposed Action.

H. Wilderness and Wilderness Study Area (WSA)

Affected Environment

There are no wilderness areas in either of the HMA's. However, approximately 8,000 acres on

the south end of the Buckhorn HMA is in the Buffalo Hills Wilderness Study Area. In addition, the South Warner Wilderness Area is northeast of the Coppersmith HMA.

Environmental Consequences

Direct, short-term impacts to the wilderness values within the Buffalo Hills WSA with implementation of the Action Alternatives (#1, #2, and #3) would consist of the sight and noise of the helicopter used to herd wild horses to gather sites located outside of wilderness study area. During the time frame of the proposed gather, solitude and primitive recreation may be negatively impacted for recreationists who would be subjected to the sight and sound of the helicopter. This impact would be temporary and relatively short term in nature.

Indirect, long-term impacts are related to the wild horse population sizes and growth rates associated with each of the Alternatives. Wild horses are large ungulates with few natural predators. They are present in native plant communities within the two HMA's year-round, and they congregate around water sources and trail along drainages. They utilize primarily herbaceous vegetation and trample and compact soils, especially when soils are wet. As wild horse numbers increase, utilization of vegetation and trampling/compaction of soils increases. These impacts are greatest where wild horses tend to congregate; however, when wild horse numbers become excessive, the impacts become noticeable on the slopes and tables at greater distances from water and trail corridors. When vegetation is used continuously, heavily, and annually, and soils are trampled and compacted, plant vigor, production, and diversity are reduced and overall ecological site conditions are reduced. Ecological sites in degraded condition detract from the natural character of wilderness areas.

Implementation of Alternative #1, the Proposed Action, would result in the slowest wild horse population growth rates, and the greatest period of time when wild horse numbers are at or below maximum AML's. As a result, Alternative #1 would have the least negative impact on wilderness values in the Buffalo Hills HMA. Implementation of Alternative #4, the No Action Alternative, would result in the most rapid increase in wild horse numbers. Population modeling shows there would likely be an increase to over 1700 horses in the two HMA's within 10 years (see Appendix A). As a result, Alternative #4 would have the greatest negative impact on wilderness values in the Buffalo Hills HMA. Implementation of either Action Alternative #2 or #3 would have a slightly higher negative impact on wilderness values in the Buffalo Hills HMA, than implementation of the Proposed Action.

I. Wild and Scenic Rivers

Affected Environment

Portions of the Bare Creek system, of which approximately 4 miles are located in the north end of the Coppersmith HMA, have been nominated to be declared wild and scenic river reaches.

Environmental Consequences

Indirect, long-term impacts are related to the wild horse population sizes and growth rates associated with each of the Alternatives. Wild horses are large ungulates with few natural predators. They congregate around water sources and trail along drainages. They utilize

primarily herbaceous vegetation and trample and compact soils, especially when soils are wet. As wild horse numbers increase, utilization of vegetation and trampling/compaction of soils increases. When vegetation is used continuously, heavily, and annually, and soils are trampled and compacted, plant vigor, production, and diversity are reduced and overall ecological site conditions are reduced. Streambanks are weakened and become subject to accelerated erosion.

Implementation of Alternative #1, the Proposed Action, would result in the slowest wild horse population growth rates, and the greatest period of time when wild horse numbers are at or below maximum AML's. As a result, Alternative #1 would have the least negative impact on wild and scenic river values along the Bare Creek system. Implementation of Alternative #4, the No Action Alternative, would result in the most rapid increase in wild horse numbers. Population modeling shows there would likely be an increase to over 900 horses in the Coppersmith HMA within 10 years (see Appendix A). As a result, Alternative #4 would have the greatest negative impact on wild and scenic river values along the Bare Creek. Implementation of either Action Alternative #2 or #3 would have a slightly higher negative impact on wild and scenic river values along the Bare Creek system, than implementation of the Proposed Action.

J. Recreation

Affected Environment

The two HMA's are popular destinations for hunters from both California and Nevada. The Buckhorn HMA is located in Nevada hunt zone #015 and in California hunt zone #X5b. The Coppersmith HMA is located in California hunt zones #X5b and #X3b and in Nevada hunt zone #015. Fishing occurs in the Coppersmith HMA in the Bare Creek system. Both HMA's are popular for upland game bird (chukar, quail, dove, and sage-grouse), mule deer, and pronghorn antelope hunting. There are several mule deer seasons in August, September, October, and December. Pronghorn antelope are hunted in August and September. Upland game birds have several hunting seasons between September and February.

The two HMA's are also popular for off-highway driving, camping, and wildlife/wild horse viewing. The three main roads that cross the HMA's (Buckhorn, Tuledad Canyon, and Bare Creek) are well maintained and accessible to two-wheel drive vehicles and camp trailers. These roads reach the some of the higher elevation areas and, as a result, they afford recreational users the opportunity to view mule deer, pronghorn antelope, and wild horses in their summer use areas.

Environmental Consequences

Direct, short-term impacts to recreation with implementation of the Action Alternatives (#1, #2, and #3) would consist primarily of disturbance of hunting activities by the low-flying helicopter. These impacts would be temporary, with short duration, and minimal. No direct impacts are associated with the No Action Alternative.

Indirect, long-term impacts are related to the wild horse population sizes and growth rates associated with each of the Alternatives. Wild horses are large ungulates with few natural predators. They are present in native plant communities within the two HMA's year-round, and they congregate around water sources and trail along drainages. Wild horses compete directly

with wildlife for available cover, space, forage, and water. As wild horse numbers increase, utilization of cover, space, forage, and water increases. These impacts are greatest where wild horses tend to congregate; however, when wild horse numbers become excessive, the impacts become noticeable on the slopes and tables at greater distances from water and trail corridors. When vegetation is used continuously, heavily, and annually, and soils are trampled and compacted, plant vigor, production, and diversity, and the value of plant communities for wildlife habitat are reduced. As the amount and quality of habitat is reduced, wildlife populations are also reduced, and opportunities for hunting and wildlife viewing are reduced. Conversely, as wild horse numbers increase, the likelihood of recreational users seeing wild horses from the main roads and trails increases.

Implementation of Alternative #1, the Proposed Action, would result in the slowest wild horse population growth rates, and the greatest period of time when wild horse numbers are at or below maximum AML's. As a result, Alternative #1 would have the least negative impact on recreation involving hunting and wildlife viewing. However, wild horse viewing opportunities would be decreased. Implementation of Alternative #4, the No Action Alternative, would result in the most rapid increase in wild horse numbers. Population modeling shows there would likely be an increase to over 1700 horses in the two HMA's within 10 years (see Appendix A). As a result, Alternative #4 would have the greatest negative impact on recreation involving hunting and wildlife viewing and the greatest positive impact on recreation involving wildhorse viewing. Implementation of either Action Alternative #2 or #3 would have a slightly higher negative impact on hunting and wildlife viewing, than implementation of the Proposed Action.

K. Air Quality

Affected Environment

Air quality in the two HMA's is normally very good. Travel on the roads, especially along the relatively high-speed Buckhorn, Tuledad Canyon, and Bare Creek gravel roads, causes dust seasonally (May through November). In addition, smoke from wild fires is occasionally present, generally in August and September.

Environmental Consequences

Direct impacts associated with the Action Alternatives, would consist of an increase in dust as wild horses are herded to temporary gather site(s) and transported by stock trailer(s) to a temporary holding facility. Dust caused by a concentration of animals at the temporary gather site(s) and at the temporary holding facility would be controlled by watering the areas as needed, to keep dust to a minimum. In addition, there would be an increase in vehicle traffic as excess wild horses are transported from the temporary holding site to a BLM adoption preparation/holding facility. These impacts would be temporary, with a short duration, and minimal. No direct or indirect impacts would occur with Alternative #4.

Cumulative Impacts (Proposed Action & Alternatives)

Cumulative impacts are impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless

of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Implementation of the Action Alternatives would reduce the wild horse population to AML in the Buckhorn and Coppersmith HMA's which would help promote a thriving natural ecological balance. With implementation of the Proposed Action and Alternative 2, this effect would be immediate. With implementation of Alternative 3, this would occur within 10 to 15 years. The achievement and maintenance of AML would result in an increase in vegetation density, vigor, reproduction, productivity, diversity, and forage availability. Subsequent removals would maintain animal populations in a thriving natural ecological balance and would contribute to maintaining ecological sites in good condition.

Adverse impacts to vegetation with implementation of the Action Alternatives would include disturbance of small quantities of native vegetation and soils immediately in and around temporary trap sites, holding, and processing facilities. Impacts created by vehicle traffic, and hoof action of penned horses, can be locally severe in the immediate vicinity of these facilities, and the impacts would re-occur each time horses were gathered. Since most trap sites and holding facilities are re-used during recurring wild horse gather operations, any impacts would remain site specific and isolated in nature. In addition, most trap sites or holding facilities are selected to enable easy access by transportation vehicles and logistical support equipment and would therefore generally be adjacent to or on roads, pullouts, water haul sites, or other flat spots that were previously disturbed. These common practices would minimize the cumulative effects of these impacts.

The removal of animals to and the subsequent maintenance of AML would allow reduced utilization of riparian and upland habitats on a year-long basis. This management coupled with a livestock grazing program which is based on the physiological needs of the vegetation would result in improved rangeland health.

Under the No Action Alternative, the cumulative impacts of large numbers of wild horses would increase each year that horses are not gathered. These impacts would affect all of the resources that depend on stable soils and intact vegetative communities, including wildlife, wildlife viewing, and hunting, wilderness and wild and scenic rivers, cultural resources, water quality, and the social and economic values associated with livestock grazing.

The Surprise Field Office would continue to identify any adverse impacts as they occur, and mitigate them as needed on a project specific basis to maintain habitat and herd quality. The Proposed Action would contribute to the cumulative impacts of future actions by maintaining the herd at AML, and establishing a process whereby biological and/or genetic issues associated with herd or habitat fragmentation would become apparent sooner and mitigating measures implemented more quickly.

Mitigation Measures

The Proposed Action and Alternatives incorporate proven standard operating procedures that

have been developed over time. These SOP's (Appendix B) represent the "best methods" for reducing impacts associated with gathering, handling, and transporting wild horses, and collecting herd data.

Additional mitigation measures have been incorporated into the alternatives.

Consultation and Coordination

List of Preparers

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Tuledad Allotment Grazing Permittees: Ray Page, Dale and Anita Goodwin, Wes Cook,
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Modoc Cattlemen's Association, c/o Dennis Smith
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Northwest Great Basin Association

APPENDIX A

Summary of Population Modeling of Wild Horses

Population Model Overview

WinEquus is a computer software program designed to simulate population dynamics based on various management alternatives concerning wild horses. It was developed by Stephen H. Jenkins of the Department of Biology, University of Nevada at Reno. For further information about the model, please contact Stephen H. Jenkins at the Department of Biology/314, University of Nevada, Reno, NV 89557.

The following data was summarized from the information provided within the WinEquus program. It will provide background about the use of the model, the management options that may be used, interpretation of modeling results, and the types of output that may be generated.

The population model for wild horses was designed to help wild horse and burro specialists evaluate various management strategies that might be considered for a particular area. The model uses data on average survival probabilities and foaling rates of horses to project population growth for up to 20 years. The model accounts for year-to-year variation in these demographic parameters by using a randomization process to select survival probabilities and foaling rates for each age class from a distribution of values based on these averages. This aspect of population dynamics is called environmental stochasticity, and reflects the fact that future environmental conditions that may affect a wild horse population's demographics can not be established in advance. Therefore, each trial will give a different pattern of population growth. Some trials may include mostly "good" years, when the population grows rapidly; other trials may include a series of several "bad" years in succession. The stochastic approach to population modeling uses repeated trials to project a range of possible population trajectories over a period of years, which is more realistic than predicting a single specific trajectory.

The model incorporates both selective removal and fertility treatment as management strategies. A simulation may include no management, selective removal, fertility treatment, or both removal and fertility treatment. Wild horse and burro specialists can specify many different options for these management strategies such as the schedule of gathers for removal or fertility treatment, the threshold population size which triggers a gather, the target population size following a removal, the ages and sexes of horses to be removed, and the effectiveness of fertility treatment.

To run the program, one must supply an initial age distribution (or have the program calculate one), annual survival probabilities for each age-sex class of horses, foaling rates for each age class of females, and the sex ratio at birth. Sample data are available for all of these parameters. Basic management options must also be specified.

Population Data: Age-Sex Distribution

An important point about the initial age-sex distribution is that it is NOT necessarily the starting population for each of the trials in a simulation. This is because the program assumes that the initial age-sex distribution supplied on this form or calculated from a population size that the user enters is not an exact and complete count of the population. For example, if the user enters an initial population size of 100 based on an aerial survey, this is really an estimate of the population and not a census. Furthermore, it is likely to be an underestimate because some horses will be missed in the survey. Therefore, the program uses an average sighting probability of approximately 90% (Garrott et al. 1991) to "scale-up" the initial population estimate to a starting population size for use in each trial. This is done by a random process, so the starting population sizes are different for all trials. An option does exist to consider the initial population size to be exact and bypass this scaling-up process.

Population Data: Survival Probabilities

A fundamental requirement for a population model are data on annual survival probabilities of each age class. The program contains files of existing sets of survival or it is possible to enter a new set of data in the table. In most cases, Wild Horse and Burro Specialists do not have data on survival probabilities for their herd populations, so the sample data files provided with WinEquus are used and assume that average survival probabilities in the populations are similar. These data are more difficult to get than is often assumed, because they require keeping track of known individuals over time. A "snapshot" of a population, providing information on the age distribution at a single gather, can NOT be used to estimate survival probabilities without assuming a particular growth rate for the population (Jenkins, 1989). More data from long-term studies of marked horses are needed to develop estimates of survival in various habitats.

Population Data: Foaling Rates

Foaling rates are the proportions of females in each age class that produce a foal at that age. Files are available within the program that set foaling rates or the user may enter a new set of data in the table. The user may also enter the sex ratio at birth, another necessary parameter for population simulation.

Environmental Stochasticity

For any natural population, mortality and reproduction vary from year to year due to unpredictable variation in weather and other environmental factors. This model mimics such environmental stochasticity by using a random process to increase or decrease survival probabilities and foaling rates from average values for each year of a simulation trial. Each trial uses a different sequence of random values to give different results for population growth. Looking at the range of final population sizes in many such trials will give the user an indication of the range of possible outcomes of population growth in an uncertain environment.

How variable are annual survival probabilities and foaling rates for wild horses? The longest study reporting such data was done at Pryor Mountain, Montana by Garrott and Taylor (1990).

Based on 11 years of data at this site, survival probability of foals and adults combined was greater than 98% in 6 years, between 90 and 98% in 3 years, 87% in 1 year, and only 49% in 1 year of severe winter weather. These values clearly are not normally distributed, but can be approximated by a logistic distribution. This pattern of low mortality in most years but markedly higher mortality in occasional years of bad weather was also reported by Berger (1986) for a site in northwestern Nevada. Therefore, environmental stochasticity in this model is simulated by drawing random values from logistic distributions. If desired, different values can be entered to change the scaling factors for environmental stochasticity.

Because year-to-year variation in weather is likely to affect foals and adults similarly, this model makes foal and adult survival perfectly correlated. This means that when survival probability of foals is high so is the survival probability of adults, and vice versa. By contrast, the correlation between survival probabilities and foaling rates can be adjusted to any value between -1 and +1. The default correlation is 0 based on the Pryor Mountain data and the assumption that most mortality occurs in winter and winter weather is not highly correlated with foaling-season weather.

The model includes another form of random variation called demographic stochasticity. This means that mortality and reproduction are random processes even in a constant environment (i.e., a foaling rate of 40% means that each female has a 40% chance of having a foal). Because of demographic stochasticity, even if scaling factors for both survival probabilities and foaling rates were set equal to 0, different runs of the simulation would produce different results. However, variation in population growth due to demographic stochasticity will be small except at low population sizes.

Gathering Schedule

There are three choices for the gather schedule: gather at a regular interval, gather at a minimum interval (the default), or gather in specific years. Gathering at a minimum interval means that gathers will be conducted no more frequently than a prescribed interval (e.g., 3 years), but will not be conducted if the time interval has passed unless the population is above a threshold size that triggers a gather.

Gather Interval

This is the number of years between gathers.

Gather for fertility treatment regardless of population size?

If this option is selected (the default), then gathers occur according to the gathering schedule specified regardless of whether or not the population exceeds a threshold population size. One effect of this is that a minimum-interval schedule really functions as a regular interval.

Continue gather after reduction to treat females?

Continuing a gather after a reduction to treat females (with fertility control management options)

means that, if a gather for a removal has been triggered because the population has exceeded a threshold population size, then horses will continue to be processed even after enough have been removed to reduce the population to the target population size. As additional horses are processed, females to be released back will be treated with an immunocontraceptive according to the information specified in the Contraceptive Parameters form.

Threshold for Gather

The threshold population size for triggering a gather is the actual population size in a particular year estimated by the program. This is NOT the same as the number of horses counted in an aerial census, but closer to an estimate of population size taking into account the fact that an aerial census typically underestimates population size.

Target Population Size

This is the goal for the population size following a gather and removal. Horses will be removed until this target is reached, although it may not be possible to achieve this goal, depending on the removal parameters (percentages of each age-sex class to be removed) and gathering efficiency.

Are foals included in AML?

In most districts, foals are counted as part of the appropriate management level (AML).

Gathering Efficiency

Typically, some horses will successfully resist being gathered, either by hiding in habitats where they can not be seen or moved by a helicopter, or by following escape routes that make it dangerous or un-economical for them to be herded from the air. These horses are not available for removals or fertility treatment. The default gathering efficiency is 80%, meaning that the program assumes that 20% of the population will successfully resist being gathered. This value may be changed.

Note that the program assumes that horses of all age-sex classes are equally likely to be gathered. This is an unrealistic assumption because bachelor males, for example, may be more likely to successfully avoid being gathered than females or foals or band stallions.

Sanctuary-bound Horses

Age-selective removals typically target younger age classes such as 0 to 5 year-olds or 0 to 9 year-olds because these horses are more easily adopted. However, it may not be possible to reduce the population to a target size by restricting removals to these younger age classes, especially if age-selective removals have been conducted in the past. In this case, an option is available to remove older animals as well, who may be destined for permanent residence in a long term holding facility rather than for adoption. The minimum age of these long term holding facility horses is specified for this element. When older age classes as well as younger age classes are identified for removal on the Removal Parameters form, horses of these older age

classes are selected along with younger age class horses as the population is reduced to the target value. If a minimum age for long term holding facility horses is specified, then older animals are only removed if the population can not be reduced to the target population size by removing the younger ones.

Percent Effectiveness of Fertility Control

These percentages represent the percentage of treated females that are in fact sterile for one year, two years, etc. (i.e., the efficacy or effectiveness of fertility treatment). The default values are 90% efficacy for one year. However, the user may specify the effectiveness year by year for up to five years.

Removal Parameters

This allows the user to determine the percentages of horses in each sex and age class to be removed during a gather. The program uses these percentages to determine the probabilities of removing each horse that is processed during a gather. If the percentage for an age-sex class is 100%, then all horses of that age-sex class that are processed will be removed until the target population size is reached. If the percentage for an age-sex class is 0%, then all horses of that age-sex class will be released. If the percentage for an age-sex class is greater than 0% but less than 100%, then the proportion of horses of that age-sex class removed will be approximately equal to the specified percentage.

Contraception Parameters

This allows the user to specify the percentage of released females of each age class that will be treated with an immunocontraceptive. The default values are 100% of each age class, but any or all of these may be changed.

Most Typical Trial

This is the trial that is most similar to each of the other trials in a simulation

Population Size Table

The default is both sexes and all age classes, but summary results may also be chosen for a subset of the population. The table identifies some key numbers such as the lowest minimum in all trials, the median minimum, and the highest minimum. Thinking about the distribution of minima for example, half of the trials have a minimum less than the median of the minima and half have a minimum greater than the median of the minima. If the user was concerned about applying a management strategy that kept the population above some level because the population might be at risk of losing genetic diversity if it were below this level, then one might look at the 10th percentile of the minima, and argue that there was only a 10% probability that the population would fall below this size in x years, given the assumptions about population data, environmental stochasticity, and management that were used in the simulation.

Gather Table

The default is both sexes and all age classes, but summary results may be for a subset of the population. The table shows key values from the distribution of the minimum total number of horses gathered, removed, and (if one elected to display data for both sexes or just for females) treated with a contraceptive across all trials. This output is probably the most important representation of the results of the program in terms of assessing the effects of your management strategy because it shows not only expected average results but also extreme results that might be possible. For example, only 10% of the trials would have entailed gathering fewer animals than shown in the row of the table labeled "10th percentile", while 10% of the trials would have entailed gathering more than shown in the row labeled "90th percentile". In other words, 80% of the time one could expect to gather a number of horses between these 2 values, given the assumptions about survival probabilities, foaling rates, initial age-sex distribution, and management options made for a particular simulation

Growth Rate

This table shows the distribution of the average population growth rate. The direct effects of removals are not counted in computing average annual growth rates, although a selective removal may change the average foaling rate or survival rate of individuals in the population (e.g., because the age structure of the population includes a higher percentage of older animals), which may indirectly affect the population growth rate. Fertility control clearly should be reflected in a reduction of population growth rate.

Results - Population Modeling of the Buckhorn and Coppersmith HMA's

Objectives of Population Modeling

To complete the population modeling for the Buckhorn and Coppersmith HMA's, version 1.40 of the WinEquus program, created April 2, 2002, was utilized. Review of the data output for each of the simulations provided many useful comparisons of the possible outcomes for each Alternative. The developer, Stephen Jenkins, recommends thinking about the range of possible outcomes and not just focusing on one average or typical trial. Some of the questions that need to be answered through the modeling include:

- Do any of the Alternatives “crash” the population?
- What effect does fertility control have on population growth rate?
- What effect do the different Alternatives have on the average population size?
- What effect do the different Alternatives have the number of horses handled and/or removed from the HMA's?

Population Data, Criteria, and Parameters utilized for Population Modeling

The initial age structure for the 2003 herds was developed from age structure data collected during the 1989, 1995, and 1997 Buckhorn and Coppersmith wild horse gathers. The age distribution of the horses that were returned to the HMAs, coupled with assumptions (based on the 1989 age distribution) that were made about the animals that were not captured, result in the following estimate of herd structure as of 1997:

Initial Age Structure 1997 – Buckhorn and Coppersmith HMAs

Age Class	Horses remaining in the HMA, following the 1997 gather					
	Buckhorn HMA			Coppersmith HMA		
	Females	Males	Total	Females	Males	Total
Foals	2	2	4	4	9	13
1	2	0	2	4	8	12
2	0	0	0	1	2	3
3	0	0	0	0	2	2
4	1	0	1	2	2	4
5	1	1	2	1	2	3
6	2	2	4	2	2	4
7	5	3	8	3	4	7
8	5	5	10	3	4	7
9	5	4	9	4	4	8
10-14	8	9	17	7	5	12
15-19	5	4	9	8	3	11
20+	3	2	5	4	2	6
Total	39	32	71	43	49	92

A simulation, using the estimated 1997 post gather population as the initial age structure was then run for the years 1997 to 2003 under the “no management” management option. The most typical trial obtained from this simulation was used to represent the 2003 age structure of the herd. This model was used to represent the current age structure of the Buckhorn and Coppersmith HMAs for all of the Alternatives.

Initial Age Structure 2003 – Buckhorn and Coppersmith HMAs

Age Class	Buckhorn HMA			Coppersmith HMA		
	Females	Males	Total	Females	Males	Total
Foals	14	18	32	17	22	39
1	14	17	31	16	20	36
2	11	14	25	13	18	31
3	10	13	23	12	15	27
4	8	11	19	9	12	21
5	6	8	14	7	10	17
6	2	2	4	4	6	10
7	4	2	6	3	5	8
8	4	4	8	3	4	7
9	5	5	10	5	5	10
10-14	12	11	23	11	10	21
15-19	7	7	14	8	6	14
20+	5	5	10	7	4	11
Total	102	117	219	115	137	252

Note: A census conducted in the Coppersmith HMA revealed only 92 horses in May of 2001. This is well below the approximately 166 horses that were expected to be in the HMA. However, the Coppersmith HMA is heavily wooded with juniper and mahogany trees. Horses frequent these stands of trees for thermal cover during very cold and very warm weather. This makes counting horses in the Coppersmith HMA from the air more difficult than most HMAs.

All simulations used the survival probabilities and foaling rates supplied with the WinEquus population model for the Granite Range HMA. Survival and foaling rate data were extracted from, *Wild Horses of the Great Basin*, by J. Berger (1986, University of Chicago Press, Chicago, IL, xxi + 326 pp.). Rates are based on Joel Berger’s 6 year study in the Granite Range HMA in northwestern Nevada.

Survival probabilities and foaling rates utilized in the population model for each Alternative are as follows:

Survival Probabilities and Foaling Rates

Age Class	Survival Probabilities		Foaling Rates
	Females	Males	
Foals	.917	.917	--
1	.969	.969	--
2	.951	.951	.35
3	.951	.951	.40
4	.951	.951	.65
5	.951	.951	.75
6	.951	.951	.85
7	.951	.951	.90
8	.951	.951	.90
9	.951	.951	.90
10-14	.951	.951	.85
15-19	.951	.951	.70
20+	.951	.951	.70

Removal criteria utilized in the population model for Alternatives #1 and #2:

Removal Criteria - Standard

Age	Percentages for Removals		Age	Percentages for Removals	
	Females	Males		Females	Males
Foal	100%	100%	7	100%	100%
1	100%	100%	8	100%	100%
2	100%	100%	9	100%	100%
3	100%	100%	10-14	100%	100%
4	100%	100%	15-19	100%	100%
5	100%	100%	20+	100%	100%
6	100%	100%			

Removal criteria utilized in the population model for Alternatives #3:

Removal Criteria - Standard

Age	Percentages for Removals		Age	Percentages for Removals	
	Females	Males		Females	Males
Foal	100%	100%	7	0	0
1	100%	100%	8	0	0
2	100%	100%	9	0	0
3	100%	100%	10-14	0	0
4	100%	100%	15-19	0	0
5	100%	100%	20+	0	0
6	0	0			

Population Modeling Criteria

The following summarizes the population modeling criteria that are common to all of the Alternatives (as applicable):

- Starting Year: 2003
- Sex ratio at birth: 57% male
- Foals are included in the AML
- Simulations were run for four, nine, and fourteen years with 100 trials each
- Initial gather year: 2003
- Gather interval: minimum interval of three years
- Gathers to be triggered by the population reaching maximum AML's (75 for the Coppersmith HMA, 85 for the Buckhorn HMA).
- Percent of the population that can be gathered: 90%
- Target population size following gathers is the minimum AML's (50 for the Coppersmith HMA, 59 for the Buckhorn HMA). Target may not be reached at each gather, depending upon the Alternative.
- For Alternative #1, fertility control effectiveness for treated mares is assumed to be 90% the first year and 60% the second year after treatment.
- For Alternative #1, the HMA's would not be gathered for fertility control regardless of population size. However, ongoing gathers would continue after population goals are met to secure additional mares for fertility treatment.

Population Modeling Results

Population size in five, ten, and fifteen years

Out of 100 trials in each simulation, the model tabulated minimum, average, and maximum population sizes. The model was run for four, nine, and fourteen years to determine what the potential effects would be on population size for all Alternatives (I-IV). These numbers are useful to make relative comparisons of the different Alternatives and of the potential outcomes under different management options. The data displayed within the tables are broken down into different levels. The lowest trial, highest trial, and several percentile trials are displayed for each simulation completed. According to the model developer, this output is probably the most important representation of the results in terms of assessing the effects of proposed management. The trials show not only the expected average results, but also extreme high and low results of the modeling scenario.

Buckhorn HMA

Population sizes in 5 years

Trial	Alternative #1			Alternative #2			Alternative #3			Alternative #4		
	min	med	max	min	med	max	min	med	max	min	med	max
Lowest	47	86	220	43	85	219	54	116	219	218	269	307
10%	57	100	225	55	104	224	80	142	226	222	296	376
25%	63	104	231	62	107	228	87	152	232	227	315	398
Median	66	109	236	66	111	236	109	162	241	236	341	434
75%	70	112	245	70	115	248	119	173	252	252	358	488
90%	73	116	262	73	120	264	127	187	278	268	384	516
Highest	79	126	307	78	130	306	146	220	335	288	488	711
Gather years	03, 06			03, 06			03, 06			n/a		

Population sizes in 10 years

Trial	Alternative #1			Alternative #2			Alternative #3			Alternative #4		
	min	med	max	min	med	max	min	med	max	min	med	max
Lowest	31	61	219	32	83	220	28	66	221	173	316	470
10%	54	88	222	52	89	224	66	118	225	224	397	581
25%	58	89	228	60	92	229	74	129	234	230	449	726
Median	63	92	236	63	96	237	88	144	242	238	506	852
75%	66	94	246	66	100	247	104	154	256	253	560	1002
90%	69	97	266	68	102	265	113	166	276	275	611	1126
Highest	74	106	332	76	106	318	153	239	382	346	787	1435
Gather years	03, 06, 10			03, 06, 09, 12			03, 06, 09, 12			n/a		

Population sizes in 15 years

Trial	Alternative #1			Alternative #2			Alternative #3			Alternative #4		
	min	med	max	min	med	max	min	med	max	min	med	max
Lowest	32	69	220	32	80	220	48	98	219	203	421	793
10%	48	81	223	50	85	224	58	105	223	224	569	1146
25%	55	83	229	56	88	231	64	113	227	230	654	1348
Median	59	86	238	62	90	238	68	120	237	238	767	1609
75%	63	88	250	64	93	256	75	131	249	247	898	1944
90%	66	90	268	66	95	272	84	144	272	270	1002	2366
Highest	69	94	308	70	103	311	113	162	313	303	1179	3034
Gather years	03, 06, 10, 14			03, 06, 09, 12, 15			03, 06, 09, 12, 15			n/a		

Coppersmith HMA

Population sizes in 5 years

Trial	Alternative #1			Alternative #2			Alternative #3			Alternative #4		
	min	med	max	min	med	max	min	med	max	min	med	max
Lowest	31	94	253	30	93	252	61	140	253	254	300	339
10%	49	101	257	48	101	257	88	157	257	259	340	402
25%	52	104	262	52	105	262	106	167	264	266	359	461
Median	56	108	273	55	109	271	115	177	277	276	391	512
75%	59	111	288	58	113	296	128	186	285	292	419	562
90%	62	115	306	61	116	314	136	193	306	313	449	614
Highest	64	134	392	66	124	346	160	225	367	397	529	765
Gather years	03, 06			03, 06			03, 06			n/a		

Population sizes in 10 years

Trial	Alternative #1			Alternative #2			Alternative #3			Alternative #4		
	min	med	max	min	med	max	min	med	max	min	med	max
Lowest	32	67	253	35	77	254	38	96	254	211	314	460
10%	42	80	258	45	84	260	64	126	258	258	439	628
25%	48	83	264	48	87	266	80	138	265	263	499	827
Median	52	86	273	53	89	278	94	150	276	274	551	930
75%	55	88	286	56	91	293	103	160	286	288	629	1097
90%	58	91	300	57	94	317	114	174	306	304	700	1224
Highest	65	95	355	60	98	376	143	200	347	433	807	1555
Gather years	03, 06, 11			03, 06, 10			03, 06, 09, 12			n/a		

Population sizes in 15 years

Trial	Alternative #1			Alternative #2			Alternative #3			Alternative #4		
	min	med	max	min	med	max	min	med	max	min	med	max
Lowest	28	64	252	30	67	253	48	87	252	176	445	825
10%	44	76	260	44	77	260	54	105	258	257	660	1238
25%	46	78	265	47	79	268	58	112	262	262	745	1480
Median	51	80	274	51	81	273	66	125	270	276	844	1808
75%	54	81	291	54	84	287	75	139	286	290	994	2244
90%	56	83	308	55	85	305	90	146	306	316	1113	2660
Highest	59	85	350	59	90	365	122	186	350	415	1530	3741
Gather years	03, 08, 13, 16			03, 06, 09, 12, 15			03, 06, 09, 12, 15			n/a		

Average Growth Rates

Average Growth Rate (%) in 4 years

Trial	Buckhorn HMA				Coppersmith HMA			
	Alt. #1	Alt. #2	Alt. #3	Alt. #4	Alt. #1	Alt. #2	Alt. #3	Alt. #4
Lowest	-3.1	-5.0	0.2	4.9	-4.3	-12.0	5.5	3.3
10%	4.2	7.7	11.6	10.4	7.2	6.8	13.0	9.6
25%	9.4	12.0	16.6	13.2	9.5	10.9	18.5	12.8
Median	13.2	15.4	21.8	16.1	12.7	14.4	21.6	15.4
75%	16.3	19.7	25.3	19.1	16.7	18.7	24.5	18.9
90%	19.9	22.0	27.9	21.5	19.1	20.4	26.5	21.7
Highest	25.8	26.4	33.6	25.3	22.6	26.8	30.8	24.5

Average Growth Rate (%) in 9 years

Trial	Buckhorn HMA				Coppersmith HMA			
	Alt. #1	Alt. #2	Alt. #3	Alt. #4	Alt. #1	Alt. #2	Alt. #3	Alt. #4
Lowest	-1.6	4.6	-5.2	7.6	0.2	5.4	7.3	5.1
10%	7.2	9.0	13.2	9.5	6.7	8.6	13.4	9.8
25%	8.9	11.7	16.6	12.6	8.9	11.6	17.0	11.9
Median	11.0	14.9	19.6	15.1	11.7	14.0	19.2	14.4
75%	13.0	17.6	22.0	17.1	13.7	16.8	21.0	15.9
90%	14.4	20.3	23.5	17.9	15.7	19.3	22.8	17.9
Highest	16.7	22.7	24.6	20.9	18.4	21.6	25.8	21.2

Average Growth Rate (%) in 14 years

Trial	Buckhorn HMA				Coppersmith HMA			
	Alt. #1	Alt. #2	Alt. #3	Alt. #4	Alt. #1	Alt. #2	Alt. #3	Alt. #4
Lowest	4.3	8.1	10.8	9.0	3.2	4.2	10.2	8.3
10%	7.4	10.4	12.9	11.4	7.8	9.4	13.1	11.2
25%	9.2	12.3	15.9	12.9	9.5	11.4	16.1	12.8
Median	10.8	14.6	18.5	14.3	11.4	13.8	17.9	14.0
75%	12.3	17.0	20.8	16.0	13.0	16.0	20.7	15.9
90%	13.4	18.4	22.2	17.6	14.4	17.3	22.2	17.3
Highest	16.8	22.7	25.4	20.0	16.4	24.6	25.7	19.1

Historic Reproductive Rates

Gather/Census	Buckhorn HMA			Coppersmith HMA		
	Adult	Foal	Rate (%)	Adult	Foal	Rate (%)
1989	61	29	32.2	38	14	26.9
1992	74	11	12.9	66	8	10.8
1995	149	31	17.2	136	25	15.5
1997	108	19	15.0	85	16	15.8
2001	132	30	18.5	78	14	15.2

Number of Horses Gathered, Removed, and Treated

Buckhorn HMA

Number of horses Gathered (G), Removed (R), and Treated (T) in 5 years

Trial	Alternative #1			Alternative #2			Alternative #3			Alternative #4		
	G	R	T	G	R	T	G	R	T	G	R	T
Lowest	186	138	5	153	139	0	266	185	0	0	0	0
10%	194	149	8	178	163	0	308	202	0	0	0	0
25%	242	166	12	190	174	0	327	222	0	0	0	0
Median	273	180	20	201	186	0	344	233	0	0	0	0
75%	284	188	25	212	197	0	366	252	0	0	0	0
90%	297	200	29	230	212	0	396	272	0	0	0	0
Highest	339	246	37	272	252	0	472	315	0	0	0	0

Number of horses Gathered (G), Removed (R), and Treated (T) in 10 years

Trial	Alternative #1			Alternative #2			Alternative #3			Alternative #4		
	G	R	T	G	R	T	G	R	T	G	R	T
Lowest	201	155	8	184	172	0	220	152	0	0	0	0
10%	278	184	19	210	194	0	466	304	0	0	0	0
25%	303	194	22	227	211	0	494	324	0	0	0	0
Median	345	207	30	241	225	0	568	376	0	0	0	0
75%	360	219	36	278	259	0	618	404	0	0	0	0
90%	376	233	42	304	282	0	656	436	0	0	0	0
Highest	497	311	49	328	307	0	962	635	0	0	0	0

Number of horses Gathered (G), Removed (R), and Treated (T) in 15 years

Trial	Alternative #1			Alternative #2			Alternative #3			Alternative #4		
	G	R	T	G	R	T	G	R	T	G	R	T
Lowest	284	190	15	215	205	0	444	292	0	0	0	0
10%	350	208	31	256	238	0	502	334	0	0	0	0
25%	408	224	38	283	262	0	562	360	0	0	0	0
Median	428	238	45	296	278	0	632	408	0	0	0	0
75%	450	259	51	322	303	0	696	455	0	0	0	0
90%	469	272	57	340	321	0	766	489	0	0	0	0
Highest	556	321	77	422	390	0	880	589	0	0	0	0

Coppersmith HMA

Number of horses Gathered (G), Removed (R), and Treated (T) in 5 years

Trial	Alternative #1			Alternative #2			Alternative #3			Alternative #4		
	G	R	T	G	R	T	G	R	T	G	R	T
Lowest	218	181	2	193	177	0	326	214	0	0	0	0
10%	229	192	5	217	202	0	350	236	0	0	0	0
25%	256	208	8	228	214	0	368	249	0	0	0	0
Median	293	221	15	241	224	0	383	263	0	0	0	0
75%	309	235	18	258	243	0	402	278	0	0	0	0
90%	322	250	21	274	257	0	422	292	0	0	0	0
Highest	407	333	26	318	297	0	498	348	0	0	0	0

Number of horses Gathered (G), Removed (R), and Treated (T) in 10 years

Trial	Alternative #1			Alternative #2			Alternative #3			Alternative #4		
	G	R	T	G	R	T	G	R	T	G	R	T
Lowest	229	194	10	225	209	0	349	248	0	0	0	0
10%	295	218	12	246	230	0	498	340	0	0	0	0
25%	315	236	17	266	248	0	572	378	0	0	0	0
Median	362	246	24	288	270	0	605	408	0	0	0	0
75%	377	260	29	309	290	0	648	432	0	0	0	0
90%	389	272	32	320	302	0	693	462	0	0	0	0
Highest	439	328	47	374	350	0	842	570	0	0	0	0

Number of horses Gathered (G), Removed (R), and Treated (T) in 15 years

Trial	Alternative #1			Alternative #2			Alternative #3			Alternative #4		
	G	R	T	G	R	T	G	R	T	G	R	T
Lowest	284	203	8	236	219	0	445	299	0	0	0	0
10%	363	246	22	267	248	0	569	378	0	0	0	0
25%	386	261	27	292	274	0	612	404	0	0	0	0
Median	428	278	32	313	295	0	680	448	0	0	0	0
75%	456	298	39	342	322	0	750	482	0	0	0	0
90%	472	310	43	372	350	0	787	535	0	0	0	0
Highest	520	357	66	408	385	0	1018	668	0	0	0	0

Population Modeling Summary

To summarize the results obtained by simulating the range of Alternatives for the Buckhorn and Coppersmith HMA's wild horse gather, the original questions can be addressed.

- Do any of the Alternatives "crash" the population?

None of the Action Alternatives indicate that a crash is likely to occur in either the Buckhorn or the Coppersmith population. The minimum population levels of each herd was 28 horses under the extreme lowest trials. Median growth rates are all within reasonable levels, and adverse impacts to the population are not likely. The No Action Alternative #4 could result in a crash. If no horses are removed from the HMA's, the populations would be expected to reach nearly 1000 animals each by 2012. By that time, horses would be causing serious impacts on soil stability, vegetation, water sources (springs and creeks), wildlife habitat, and livestock operations. Horses would begin running out of forage and water, and would be in poor shape going into winter. At some point the populations would crash, probably during an unusually cold or snowy winter.

- What effect does fertility control have on population growth rate?

The alternative implementing fertility control along with gate-cut gathers (Alternative #1, Proposed Action) reflects the lowest overall growth rates. Growth rates for Alternative #1 ranged from 10.8 to 13.2, as compared to Alternative #2 and the No Action Alternative #4 which ranged from 13.8 to 16.1. The highest expected growth rates occurred under Alternative #3, because selectively removing only the youngest horses leaves behind a herd in which nearly all of the mares would be expected to foal the following year.

- What effect do the different Alternatives have on the median population size?

Implementation of Alternative #1 or #2 would result in stable median population numbers that are close to AML's over the long term. The impacts of these two Alternatives on long term populations are virtually identical. Implementation of Alternative #3 would make it impossible to bring the two populations down to AML's for approximately 10 years. As a result, overall median population levels would be more than 140% of maximum AML's for 15 years. Implementation of Alternative #4 would result in population sizes that would exceed the carrying capacity of the HMA's within 10 years (probably by 2012).

- What effect do the different Alternatives have the number of horses handled and/or removed from the HMA's?

Implementation of the No Action Alternative #4 would result in the fewest numbers of horses being handled or removed. Under this Alternative no horses would be gathered, removed, or treated for fertility control.

Of the Action Alternatives (#1, #2, and #3), implementation of Alternative #1 would result in the fewest number of horses being removed from the two HMA's (516 horses vs. 573 horses

under Alternative #2 and 856 horses under Alternative #3). In addition, Alternative #1 would require four gathers over the next 15 years to meet AML's, versus the five gathers needed under Alternatives #2 and #3. Implementation of Alternative #2 would result in the fewest number of horses being handled (609 horses vs. 856 horses under Alternative #1 and 1,088 horses under Alternative #3).

APPENDIX B

STANDARD OPERATING PROCEDURES

Gathers will be conducted by contractors or agency personnel. The same procedures for gathering and handling wild horses and burros apply, whether a contractor or BLM personnel are used. The following stipulations and procedures will be followed to ensure the welfare, safety and humane treatment of the wild horses and burros (WH&B) in accordance with the provisions of 43 CFR 4700.

Gathers are normally conducted for one of the following reasons:

1. Regularly scheduled gathers to obtain or maintain the Appropriate Management Level (AML).
2. Drought conditions that could cause mortality to WH&B due to the absence of water or forage, and where continued grazing may result in a downward trend to the vegetative communities due to plant mortality and reduced vigor and productiveness.
3. Fires that remove forage to the extent that there is inadequate forage to sustain the population or to allow recovery of native vegetation.
4. Utilization levels that reach a point where a continued increase in utilization would cause a downward trend in the plant communities and impede meeting standards for rangeland health.
5. Monitoring indicates that WH&B use would begin to cause a downward trend in riparian function or not permit the recovery of riparian vegetation determined to be in undesirable condition.

CAPTURE METHODS USED IN THE PERFORMANCE OF A GATHER

Contract Operations

1. **Helicopter - Drive Trapping.** Capture attempts may be accomplished by utilizing a helicopter to drive animals into a temporary trap. If this method is selected the following applies:
 - a. A minimum of two saddle horses shall be immediately available at the trap site to accomplish roping if necessary. Roping shall be done as determined by the BLM. Under no circumstances shall animals be tied down for more than one hour.

- b. The contractor/BLM shall assure that bands remain together, and that foals shall not be left behind.
 - c. A domestic saddle horse(s) may be used as a pilot (or "Judas") horse to lead the wild horses into the trap site. Individual ground hazers may also be used to assist in the gather.
- 2. **Helicopter – Roping.** Capture attempts may be accomplished by utilizing a helicopter to drive animals to ropers. If this method is selected the following applies:
 - a. Under no circumstances shall animals be tied down for more than one hour.
 - b. The contractor shall assure that bands remain together, and that foals shall not be left behind.
- 3. **Bait Trapping.** Capture attempts may be accomplished by utilizing bait (feed or water) to lure animals into a temporary trap. If this method is selected the following applies:
 - a. Finger gates shall not be constructed of materials such as "T" posts, sharpened willows, etc., that may be injurious to animals.
 - b. All trigger and/or trip gate devices must be approved by the BLM prior to capture of animals.
 - c. Traps shall be checked a minimum of once every 10 hours

CAPTURE METHODS USED IN THE PERFORMANCE OF A GATHER
BLM Operations

- 1. Gather operations will be conducted in conformance with the Wild Horse and Burro Aviation Management Handbook (March 2000).
- 2. Two-way radio communication between the helicopter and the ground crew will be maintained at all times during the operation.

SAFETY AND COMMUNICATION

1. The Contractor shall have the means to communicate with the BLM and all contractor personnel engaged in the capture of wild horses and burros utilizing a VHF/FM Transceiver or VHF/FM portable Two-Way radio. If communications are ineffective the government will take steps necessary to protect the welfare of the animals.
 - a. The proper operation, service and maintenance of all contractor furnished property is the responsibility of the Contractor. The BLM reserves the right to remove from service any contractor personnel or contractor furnished equipment which, in the opinion of the BLM violate contract rules, are unsafe or otherwise unsatisfactory. In this event, the Contractor will be notified in writing to furnish replacement personnel or equipment within 48 hours of notification. All such replacements must be approved in advance of operation by the BLM.
 - b. The Contractor shall obtain the necessary FCC licenses for the radio system.
 - c. All accidents occurring during the performance of any delivery order shall be immediately reported to the BLM.
2. Should the helicopter be employed, the following will apply:
 - a. The Contractor must operate in compliance with all applicable Federal, State, and Local laws and regulations.
 - b. Fueling operations shall not take place within 1,000 feet of the animals.

TRAPPING AND CARE

1. The primary concern of the contractor is the safe and humane handling of all animals captured. All capture attempts shall incorporate the following:
 - a. All trap and holding facilities locations must be approved by the BLM prior to construction. The Contractor may also be required to change or move trap locations as determined by the BLM. All traps and holding facilities not located on public land must have prior written approval of the landowner.
2. The rate of movement and distance the animals travel shall not exceed limitations set by the BLM who will consider terrain, physical barriers, weather, condition of the animals and others factors.

3. All traps, wings, and holding facilities shall be constructed, maintained and operated to handle the animals in a safe and humane manner and be in accordance with the following:
 - a. Traps and holding facilities shall be constructed of portable panels, the top of which shall not be less than 72 inches high for horses and 60 inches for burros, and the bottom rail of which shall not be more than 12 inches from ground level. All traps and holding facilities shall be oval or round in design.
 - b. All loading chute sides shall be a minimum of 6 feet high and shall be fully covered with plywood (without holes) or like material.
 - c. All runways shall be a minimum of 30 feet long and a minimum of 6 feet high for horses, and 5 feet high for burros, and shall be covered with plywood, burlap, plastic snow fence or like material a minimum of 1 foot to 5 feet above ground level for burros and 1 foot to 6 feet for horses. The location of the government furnished portable restraining chute to restrain, age, or provide additional care for animals shall be placed in the runway in a manner as instructed by or in concurrence with the BLM.
 - d. All crowding pens including the gates leading to the runways shall be covered with a material which prevents the animals from seeing out (plywood, burlap, etc.) and shall be covered a minimum of 1 foot to 5 feet above ground level for burros and 2 feet to 6 feet for horses. Eight linear feet of this material shall be capable of being removed or let down to provide a viewing window.
 - e. All pens and runways used for the movement and handling of animals shall be connected with hinged self-locking gates.
4. No fence modifications will be made without authorization from the COR/PI. The Contractor/BLM shall be responsible for restoration of any fence modification which he has made.
5. When dust conditions occur within or adjacent to the trap or holding facility, the Contractor/BLM shall be required to wet down the ground with water.
6. Alternate pens, within the holding facility shall be furnished by the Contractor to separate mares or jennies with small foals, sick and injured animals, and estrays from the other animals. Animals shall be sorted as to age, number, size, temperament, sex, and condition when in the holding facility so as to minimize, to the extent possible, injury due to fighting and trampling. Under normal conditions, the government will require that animals be restrained for the purpose of determining an animal's age or other similar practices. In these instances, a portable restraining chute will be provided by the government. Alternate pens

shall be furnished by the Contractor to hold animals if the specific gathering requires the animals be released back into the capture area(s). In areas requiring one or more satellite traps, and where a centralized holding facility is utilized, the Contractor may be required to provide additional holding pens to segregate animals transported from remote locations so they may be returned to their traditional ranges. Either segregation or temporary marking and later segregation will be at the discretion of the BLM.

7. The Contractor/BLM shall provide animals held in the traps and/or holding facilities with a continuous supply of fresh clean water at a minimum rate of 10 gallons per animal per day. Animals held for 10 hours or more in the traps or holding facilities shall be provided good quality hay at the rate of not less than two pounds of hay per 100 pounds of estimated body weight per day.
8. It is the responsibility of the Contractor/BLM to provide security to prevent loss, injury or death of captured animals until delivery to final destination.
9. The Contractor/BLM shall restrain sick or injured animals if treatment is necessary. A veterinarian may be called to make a diagnosis and final determination. Destruction shall be done by the most humane method available. Authority for humane destruction of wild horses (or burros) is provided by the Wild Free-Roaming Horse and Burro Act of 1971, Section 3(b)(2)(A), 43 CFR 4730.1, BLM Manual 4730 - Destruction of Wild Horses and Burros and Disposal of Remains, and is in accordance with BLM policy as expressed in Instructional Memorandum No. 98-141.

Any captured horses that are found to have the following conditions may be humanely destroyed:

- a. The animal shows a hopeless prognosis for life.
 - b. Suffers from a chronic disease.
 - c. Requires continuous care for acute pain and suffering.
 - d. Not capable of maintaining a body condition rating of one.
 - e. The animal is a danger to itself or others.
10. Animals shall be transported to final destination from temporary holding facilities within 24 hours after capture unless prior approval is granted by the BLM for unusual circumstances. Animals to be released back into the HMA following gather operations may be held up to 21 days or as directed by the BLM. Animals shall not be held in traps and/or temporary holding facilities on days when there is no work being conducted except as specified by the BLM. The Contractor shall schedule shipments of animals to arrive at final destination between 7:00 a.m. and 4:00 p.m. No shipments shall be scheduled to arrive at final destination on Sunday and Federal holidays, unless prior approval has been obtained by the BLM. Animals shall not be allowed to remain standing on trucks while not in

transport for a combined period of greater than three (3) hours. Animals that are to be released back into the capture area may need to be transported back to the original trap site. This determination will be at the discretion of the BLM.

MOTORIZED EQUIPMENT

1. All motorized equipment employed in the transportation of captured animals shall be in compliance with appropriate State and Federal laws and regulations applicable to the humane transportation of animals. The Contractor shall provide the BLM with a current safety inspection (less than one year old) for all motorized equipment and tractor-trailers used to transport animals to final destination.
2. All motorized equipment, tractor-trailers, and stock trailers shall be in good repair, of adequate rated capacity, and operated so as to ensure that captured animals are transported without undue risk or injury.
3. Only tractor-trailers or stock trailers with a covered top shall be allowed for transporting animals from trap site(s) to temporary holding facilities, and from temporary holding facilities to final destination(s). Sides or stock racks of all trailers used for transporting animals shall be a minimum height of 6 feet 6 inches from the floor. Single deck tractor-trailers 40 feet or longer shall have two (2) partition gates providing three (3) compartments within the trailer to separate animals. Tractor-trailers less than 40 feet shall have at least one partition gate providing two (2) compartments within the trailer to separate the animals. Compartments in all tractor-trailers shall be of equal size plus or minus 10 percent. Each partition shall be a minimum of 6 feet high and shall have a minimum 5 foot wide swinging gate. The use of double deck tractor-trailers is unacceptable and shall not be allowed.
4. All tractor-trailers used to transport animals to final destination(s) shall be equipped with at least one (1) door at the rear end of the trailer that is capable of sliding either horizontally or vertically. The rear door(s) of tractor-trailers and stock trailers must be capable of opening the full width of the trailer. Panels facing the inside of all trailers must be free of sharp edges or holes that could cause injury to the animals. The material facing the inside of all trailers must be strong enough so that the animals cannot push their hooves through the side. Final approval of tractor-trailers and stock trailers used to transport animals shall be held by the BLM.
5. Floors of tractor-trailers, stock trailers, and the loading chute shall be covered and maintained with wood shavings to prevent the animals from slipping.
6. Animals to be loaded and transported in any trailer shall be as directed by the BLM and may include limitations on numbers according to age, size, sex,

temperament, and animal condition. The following minimum square feet per animal shall be allowed in all trailers:

- 11 sq. ft. per adult horse (1.4 linear ft. in an 8ft. wide trailer);
- 8 sq. ft. per adult burro (1.0 linear ft. in an 8ft. wide trailer);
- 6 sq. ft. per horse foal (.75 linear ft. in an 8ft. wide trailer);
- 4 sq. ft. per burro foal (.50 linear ft. in an 8ft wide trailer);

7. Prior to any gathering operations, the BLM will provide for a pre-capture evaluation of existing conditions in the gather areas. The evaluation will include animal condition, prevailing temperatures, drought conditions, soil conditions, road conditions, and a topographic map with location of fences, other physical barriers, and acceptable trap locations in relation to animal distribution. The evaluation will determine the level of activity likely to cause undue stress to the animals, and whether such stress would necessitate a veterinarian be present. If it is determined that capture efforts necessitate the services of a veterinarian, one would be obtained before capture would proceed. The Contractor will be apprised of all the conditions and will be given directions regarding the capture and handling of animals to ensure their health and welfare is protected.
8. If the BLM determines that dust conditions are such that animals could be endangered during transportation, the Contractor will be instructed to adjust speed.
9. Trap sites will be located to cause as little injury and stress to the animals, and as little damage to the natural resources of the area, as possible. Sites will be located on or near existing roads. Additional trap sites may be required, as determined by the BLM, to relieve stress caused by specific conditions at the time of the gather (i.e. dust, rocky terrain, temperatures, etc.).

ANIMAL CHARACTERISTICS AND BEHAVIOR

Releases of wild horses would be near available water. If the area is new to them, a short- term adjustment period may be required while the wild horses become familiar with the new area.

PUBLIC PARTICIPATION

It is BLM policy that the public will not be allowed to come into direct contact with WH&B being held in BLM facilities. Only BLM personnel, or contractors may enter the corrals or directly handle the animals. The general public may not enter the corrals or directly handle the animals at anytime or for any reason during BLM operations.

RESPONSIBILITY AND LINES OF COMMUNICATION

If a contractor is used for gathering operations, the Contracting Officer's Representative, Rob Jeffers, and Project Inspectors, Steve Surian, and Jerry Bonham from Nor-Cal East, have the direct responsibility to ensure the Contractor's compliance with the contract stipulations. The Surprise Field Office Manager will take an active role to ensure that appropriate lines of communication are established between the field, Field Office, State Office, and National Program Office. All employees involved in the gathering operations will keep the best interests of the animals at the forefront at all times.

All publicity, formal public contact and inquiries will be handled through the Surprise Field Manager.

The contract specifications require humane treatment and care of the animals during removal operations. These specifications are designed to minimize the risk of injury and death during and after capture of the animals. The specifications will be vigorously enforced.

Should the Contractor show negligence and/or not perform according to contract stipulations, he will be issued written instructions, stop work orders, or defaulted.

APPENDIX B

STANDARD OPERATING PROCEDURES

Gathers will be conducted by contractors or agency personnel. The same procedures for gathering and handling wild horses and burros apply, whether a contractor or BLM personnel are used. The following stipulations and procedures will be followed to ensure the welfare, safety and humane treatment of the wild horses and burros (WH&B) in accordance with the provisions of 43 CFR 4700.

Gathers are normally conducted for one of the following reasons:

1. Regularly scheduled gathers to obtain or maintain the Appropriate Management Level (AML).
2. Drought conditions that could cause mortality to WH&B due to the absence of water or forage, and where continued grazing may result in a downward trend to the vegetative communities due to plant mortality and reduced vigor and productiveness.
3. Fires that remove forage to the extent that there is inadequate forage to sustain the population or to allow recovery of native vegetation.
4. Utilization levels that reach a point where a continued increase in utilization would cause a downward trend in the plant communities and impede meeting standards for rangeland health.
5. Monitoring indicates that WH&B use would begin to cause a downward trend in riparian function or not permit the recovery of riparian vegetation determined to be in undesirable condition.

CAPTURE METHODS USED IN THE PERFORMANCE OF A GATHER

Contract Operations

1. **Helicopter - Drive Trapping.** Capture attempts may be accomplished by utilizing a helicopter to drive animals into a temporary trap. If this method is selected the following applies:
 - a. A minimum of two saddle horses shall be immediately available at the trap site to accomplish roping if necessary. Roping shall be done as determined by the BLM. Under no circumstances shall animals be tied down for more than one hour.

- b. The contractor/BLM shall assure that bands remain together, and that foals shall not be left behind.
 - c. A domestic saddle horse(s) may be used as a pilot (or "Judas") horse to lead the wild horses into the trap site. Individual ground hazers may also be used to assist in the gather.
2. **Helicopter – Roping.** Capture attempts may be accomplished by utilizing a helicopter to drive animals to ropers. If this method is selected the following applies:
- a. Under no circumstances shall animals be tied down for more than one hour.
 - b. The contractor shall assure that bands remain together, and that foals shall not be left behind.
3. **Bait Trapping.** Capture attempts may be accomplished by utilizing bait (feed or water) to lure animals into a temporary trap. If this method is selected the following applies:
- a. Finger gates shall not be constructed of materials such as "T" posts, sharpened willows, etc., that may be injurious to animals.
 - b. All trigger and/or trip gate devices must be approved by the BLM prior to capture of animals.
 - c. Traps shall be checked a minimum of once every 10 hours

CAPTURE METHODS USED IN THE PERFORMANCE OF A GATHER BLM Operations

- 1. Gather operations will be conducted in conformance with the Wild Horse and Burro Aviation Management Handbook (March 2000).
- 2. Two-way radio communication between the helicopter and the ground crew will be maintained at all times during the operation.

SAFETY AND COMMUNICATION

1. The Contractor shall have the means to communicate with the BLM and all contractor personnel engaged in the capture of wild horses and burros utilizing a VHF/FM Transceiver or VHF/FM portable Two-Way radio. If communications are ineffective the government will take steps necessary to protect the welfare of the animals.
 - a. The proper operation, service and maintenance of all contractor furnished property is the responsibility of the Contractor. The BLM reserves the right to remove from service any contractor personnel or contractor furnished equipment which, in the opinion of the BLM violate contract rules, are unsafe or otherwise unsatisfactory. In this event, the Contractor will be notified in writing to furnish replacement personnel or equipment within 48 hours of notification. All such replacements must be approved in advance of operation by the BLM.
 - b. The Contractor shall obtain the necessary FCC licenses for the radio system.
 - c. All accidents occurring during the performance of any delivery order shall be immediately reported to the BLM.
2. Should the helicopter be employed, the following will apply:
 - a. The Contractor must operate in compliance with all applicable Federal, State, and Local laws and regulations.
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 - b. All loading chute sides shall be a minimum of 6 feet high and shall be fully covered with plywood (without holes) or like material.
 - c. All runways shall be a minimum of 30 feet long and a minimum of 6 feet high for horses, and 5 feet high for burros, and shall be covered with plywood, burlap, plastic snow fence or like material a minimum of 1 foot to 5 feet above ground level for burros and 1 foot to 6 feet for horses. The location of the government furnished portable restraining chute to restrain, age, or provide additional care for animals shall be placed in the runway in a manner as instructed by or in concurrence with the BLM.
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6. Alternate pens, within the holding facility shall be furnished by the Contractor to separate mares or jennies with small foals, sick and injured animals, and estrays from the other animals. Animals shall be sorted as to age, number, size, temperament, sex, and condition when in the holding facility so as to minimize, to the extent possible, injury due to fighting and trampling. Under normal conditions, the government will require that animals be restrained for the purpose of determining an animal's age or other similar practices. In these instances, a portable restraining chute will be provided by the government. Alternate pens

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