Apache-Sitgreaves National Forests
Black Mesa Ranger District
P.O. Box 640
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Attention: Heber Wild Horse Territory Comment

April 20, 2021

To Whom it May Concern:

1. After submitting comments in good faith, to the Apache-Sitgreaves National Forests' (ASNFs) Heber Wild Horse Territory Management Plan (Plan) Scoping letter, we had hoped for an Environmental Impact Statement which incorporated thoughtful and informed input. In general, though there is some evidence of an attempt to consider the needs of the wild horses, the Draft Environmental Assessment (EA) and Territory Management Plan were disappointing.

Since the EA disclosed very little of the substance and gravity of the 2007 Stipulation Agreement, the context of this inaugural Territory Plan is lost. In truth, it is 50 years after the Wild Free Roaming Horses and Burros Act (WFRHBA) and the ASNFs are only now, and only because of a court order, embarking on a Territory Management Plan. But this threshold can be appreciated for the benchmark opportunities created by circumstances, rather than the judgment it may deserve.

This place and time should be seen as the ASNFs' "1971". Nearly a half-century ago, a cursory assessment, based on hearsay rather than investigation, determined a population of seven and a Territory of 19,700 acres of cross-fenced cow pastures. The EA admits the fences predated the WFRHBA and the cattle had grazed the area for decades. It also states (EA p.71):

"Although most susceptible to overgrazing due to foraging preference, riparian habitats within the territory are departed from reference conditions due to past grazing and water diversion for agriculture. In addition, changes in vegetation species composition has shifted to be more determined by conifers instead of riparian species and this does not currently meet recovery habitat."

It can be reasonably inferred from this statement that the legacy of cattle grazing's long history in the Territory is one of at-risk streams and struggling riparian habitat. This can hardly be attributed to wild horses when the ASNFs have insisted there were virtually no wild horses.

While documented accounts of wild horse residence beyond the designated Territory boundary were available in 1971 and are available today, the ASNFs maintain the erroneous boundary in this EA and Plan.

Census results are, literally, all over the map. In timber, aerial surveys are essentially worthless, and statistical adjustments can only be as accurate as the number of horses seen as compared to a factor of horses actually, contemporaneously, documented on the ground, and that over a period of years of verification without significant other variables such as human-caused mortality or ingress from nearby privately-owned herds. None of this has occurred on the ASNFs, ever.

The ASNFs have never known how many horses resided on the Forests; where they came from; where the Territory boundary should rightfully be drawn; how many horses can be supported while maintaining a Thriving Natural Ecological Balance; what a Thriving Natural Ecological Balance materially is; or that the WFRHBA is a real and enforceable Congressional mandate. The EA itself states (p.1) *"Due to a lack of understanding in administrative procedures, the Black Mesa Ranger District and Sitgreaves National Forest determined the Heber Wild Horse Territory should be closed and ceased all activities associated with monitoring as well as the development of a management plan."*

Astonishingly, that "lack of understanding" was not remedied through the acquisition of understanding. Instead, the corporate lack of understanding compounded on itself until in 2005, the ASNFs would have rounded up and sold hundreds of wild horses; without any knowledge of jurisdiction or ownership; without any concern for their certain fate at Mexican slaughter plants.

Litigation resulted in the Stipulation Agreement of 2007, which, in part, required the development of a Territory Management Plan; fourteen years ago. Instead of acquiring understanding at this juncture, the ASNFs appear to resent the constraints placed upon them, which prohibit the removal of horses, but not the projections of "16,000 horses" to serve as a frantic alarm in one of *only two* Alternatives presented in this EA.

The EA also states (p.2):

"While the source of the current population of horses in uncertain, the Forest Service has nonetheless decided to manage horses inhabiting the territory or nearby areas as wild under the Act, unless particular horses are branded, claimed, or shown to be introduced onto the National Forest System by accident, negligence, or willful disregard of private ownership."

The sins of the past don't necessarily follow in perpetuity, and the above statement offers hope for a new era, and a new attitude. This *IS* the ASNFs' 1971.

2. Since the ASNFs have shown willingness to manage wild horses inhabiting the Territory or nearby areas according to the WFRHBA, we believe there is an authentic desire to accurately determine the number of horses in question. We offer nearly 20 years of experience in providing this service to the Ochoco National Forest.

Aerial surveys, as noted, have little value in timber-dominated, variable terrain. In winter, we (privately) flew the Territory in three consecutive years to determine areas of use in winter. We knew where horses were in every other season. This was not intended to census the population, but to document tracks in snow as well as sightings. Attempts by the Forest Service in the past, using both helicopter and fixed-wing aircraft, failed to produce sightings that equated to population estimates. Wildlife agencies occasionally reported wild horse sightings during annual elk surveys, but again, this showed only areas of use; not numbers. To validate elk population estimates, numbers of filled tags in the following hunting seasons provided some correlation to the estimates.

In 2019, the Ochoco National Forest commissioned an infrared flight over the Wild Horse Territory and surrounding areas. Combined with knowledge of horses not in the flight area, the results approximated the ground census total for the same year. We noted the flight pattern included cross-gridding, or perpendicular flight lines, which has the potential for double-counting due to horse movement while the aircraft covers the full distance of the area. Still, and especially if accurate ground counts can substantiate findings, infrared technology may be a viable option.

In approximately 2000, the Ochoco National Forest began to contemplate better ways to count the wild horses of the Big Summit herd. The Territory is approximately 27,000 acres, with that much again in additional areas of potential use. Ponderosa Pine, with thickets of decadent fir on north slopes, scab lands, wet meadows, ridges and canyons, describe the ecosystem types and may compare coarsely to the Heber Territory for this purpose. Previously, the count was accomplished with around 20 riders, in the month of May which is typically snowy, muddy, or both, riding in one direction and moving horses out ahead of them. At the end of the count, a figure was added to the rider's total to account for the unseen, in a kind of stone-age statistical analysis.

We sought the input of mounted Search and Rescue experts. We agreed the best approach would be to position small rider units across the area, with the intent to ride in a modified grid pattern conforming to logical terrain influences. Riders would cover their unit for three days, while other units across the Forest did the same; this compensated for one unit potentially moving horses to another unit. This proved to be the right methodology, but volunteer expertise and knowledge of the area and horses' habits took some years to fully develop. We now typically use 70-90 Forest Service volunteers, most of whom have at least ten years of experience in, and "ownership" of their assigned ride units. The majority camp in their units (Forest Service can reserve dispersed sites per *36 CFR Subpart B – Prohibitions in Areas Designated by Order §261.50 Orders (a) and §261.51 Posting*) and come from distances well outside the area. They are committed to the Big Summit wild horses, and look forward to the annual census as their contribution to the horses' future in the Ochocos. The census (canceled 2020, 2021 due to Covid-19) takes place during the third week of June; foals are typically strong and integrated; weather is moderate; fewer holidays and hunting seasons; and the counting officially encompasses Thursday – Saturday to assure campsite possession and to minimize additional weekend disturbance to the horses. Volunteers also include hikers, drivers, and camp security; we find a role for everyone expressing a desire to help. A Saturday picnic provides the opportunity to compare notes and photos, and to tally unit totals. The counting process often takes considerably more time to review photos and information, and is finalized in a census report which we compile and submit to the Forest Service. Depending on the level of Forest Service involvement, the annual census is accomplished at little or no cost to the Forest Service.

Sightings and photographs throughout the year are helpful to provide additional documentation regarding individual identification, foaling dates, band affiliation, gender, areas and seasons of use, condition of horses and habitat, and attrition. But this information should supplement a full area census; not replace it. Horses move, and band compositions change. The 3-day "blitz" approach has prove to be a dependable means of determining population size in rough terrain and timber cover, and we are very willing to share lessons learned over the course of two decades.

Without accurate knowledge of population size, a management plan is useless. Without knowledge of the herd's "genetic hoofprint", a management plan is disingenuous. Very little is known about BLM or Forest Service herds, in terms of ancient lineage as opposed to supposed modern breed influence, or the succession of events which planted horses in particular locations. In 1971, speculation served as the requisite origin story, which characterized wild horse herds as the by-product of European expansion, and little more. DNA now places the Horse in an ecological context, and is able to distinguish between populations when management hinges on segregating managed horses from interlopers. Genetic profiles can inform wild horse management beyond the requirement to maintain minimum heterozygosity.

The Forest Service blindly follows BLM policy to merely maintain genetic diversity through testing for heterozygosity alone. In a few cases, breed influence testing has shown a partial snapshot of modern breed markers (though this can be misleading as many modern breeds recently emerged from wild

horse herds, such as the American Quarter Horse). Both tests fail to return a complete picture of genetic health or herd heritage. The ASNFs have the opportunity, and the responsibility, to take advantage of available equine genetic technology, which can measure allelic richness as well as heterozygosity – to provide a broader spectrum of baseline data needed to establish the new core population This is also recommended in "Using Science to Improve the BLM Wild Horse and Burro Program; A Way Forward" (2013 NAS Report) (Chapter 5, p. 143) and a body of research on mammalian populations, especially for small herds. The ASNFs are in the unique and somewhat defensive position of close proximity to privately-owned wild horses potentially encroaching on the Territory, while quite possibly sharing the same origins dating to hundreds or thousands of years ago. As herds are separated to re-create the Heber herd, they will each evolve into definable genotypes, and perhaps associated phenotypes which will have great value to future managers. Guesswork and presumption have no place in decisions affecting the treasured natural resources of the ASNFs, particularly when options exist.

The genetic study resources normally utilized by BLM and Forest Service may or may not have the capacity or willingness to test at this deeper level. However, our connections with other genetic research facilities may be of value. Florida International University originally became involved with the Ochoco National Forest and the Central Oregon Wild Horse Coalition several years ago, commissioned and guided by the then-Forest Service Wild Horse and Burro Program Lead. The objective was to determine the utility of extracting DNA from fecal samples either for censusing or other analysis. The equine digestive system complicates the process as compared to ruminants, but ultimately Dr. DeEtta Mills was able to isolate the horses' genetic material from microbial interference. Though hair or blood samples are preferred, fecal material could yield the information needed; non-invasively and in advance of critical decisions.

The Heber Territory does have timber, in abundance, which may obstruct aerial survey success. But trees can also be excellent repositories for mane and tail hair. Though this opportunistic sample collection method does not necessarily associate DNA with individuals, it may be very useful in the ASNFs' situation. Hair deposits will likely reflect the current population, even if every horse is not represented in the study, and this can be accomplished now as opposed to waiting until post-decisional implementation. As previously stated, we will assist with collection protocol, engaging Florida International University, or in any other aspect of genetic evaluation where we could potentially be of help. At the present time, we are co-writing our application with Florida International University to the BLM Research division, to obtain hair samples from an untested small Oregon herd with the same general objective; separating older populations from numerous, recent, domestic horse additions, and hopefully associating a phenotype with genetic markers to aid in future management.

We still have the major additional concern of the Heber Territory boundary as presently defined. It certainly appears that the boundary can be, and should be, adjusted. We understand that the ingress of wild horses from a specific direction/source may be influencing the current areas of use. This may be different from use in 1971, or it may be similar to former use patterns. When local interests are empowered to "reduce" the wild horse population, prior to and since 1971, the record of historic use is blurred or eliminated. When documentation is offered which affirms a broader horse range than was delineated in the 1970s is ignored, the horses' rightful and ecologically-established range is diminished to the point of dysfunction. Fences seem to be limiting full access within the Territory, by the ASNFs' own admission, while horses are claiming logical and more accessible country outside the Territory. Water sources, as recent occurrences have demonstrated, are neither adequate nor dependable. These are all resolvable issues; if the ASNFs' willingness to abide by the tenets of the WFRHBA is authentic. The ASNFs have the authority and the imperative to set an AML at a genetically-viable level, and to possibly re-draw the boundary; not where it was drawn following the WFRHBA, but "where wild horses

were found in 1971", the standard in accordance with the WFRHBA. There is every reason to imagine wild horses once used areas far in excess of the existing Territory. And, the ASNFs have the responsibility to assign resources equitably, recognizing that the Territory is the sole habitat for wild horses, important habitat for wildlife, but an extractive, temporary, discretionary use for transient domestic livestock.

3. We sincerely and respectfully hope the ASNFs will ultimately view this situation for the positive, lasting changes it can bring about; with innovation and integrity in wild horse management.

Initially, we found it surprising that an Environmental Impact Statement was not prepared for this proposed action from the outset. The decisions in the balance have widespread implications and the potential for significant impacts in terms of both complexity and intensity. At issue is the development of a wild horse management strategy which commences at a time when data can be scientifically derived and analysis considers 50 years of effects and interrelationships rather than assumptions. Population regulation tools are available, genetic study has expanded practical application, and climate change is now a significant factor in prioritizing natural resource planning elements.

An Environmental Impact Statement would be appropriate for the full evaluation of non-conventional approaches necessary for this non-conventional situation. At a minimum, an Environmental Impact Statement is needed to develop and meaningfully evaluate additional Alternatives which must be considered since the ASNFs have presented only two management options; neither of which is realistic.

Since it appears the greatest predatory impact on the Heber wild horse herd is human, through direct killings and pervasive livestock use, Alternative 1 is unlikely to result in a humanely, naturally self-regulating, self-sustaining wild horse population.

Alternative 2 does not allow for adequate genetic diversity over time or sufficient resiliency in the face of extreme weather events or disease outbreak. The proposed AML perpetuates the perceived insignificance or "invasive" stigma of wild horses, while failing to recognize the ecological benefits of wild equines when population and habitat are managed in *natural* balance.

The AML Determination (p.34) which supports Alternative 2, alludes to the recognized minimum population size of 150-200, but defaults to the currently-practiced genetic remedy of translocating horses from other HMAs or Territories. Accurate reading of the 2013 NAS Report distinguishes geographically and genetically-similar herds from those more isolated as it describes "metapopulations" and prescribes translocation. Since the Heber herd, particularly the contemporary Heber herd, has never undergone genetic profiling, it falls outside the 2013 NAS Report's Appendix F; the relatedness matrix comparing Fixation indices between 183 wild herds. Due to the probable origin of the present Heber horses, the relatedness/geographic adaptation coefficient between BLM/Forest Service herds and the Heber herd may not be conducive to successful translocation. The risks of translocation are heightened for many Forest Service-managed herds, simply by virtue of higher elevations, forested environments, and likelihood of greater historic distance to other herds as compared to most BLM wild herds. The metapopulation doctrine may apply to certain BLM herds, as the 2013 NAS Report suggests. But other studies have indicated a higher risk of loss of specific adaptations as well as out-breeding depression when translocated and importing populations are environmentally and genetically dissimilar. This is summarized in the following advice which we stated previously in our Scoping comments:

Isolated, unrelated HMAs should not necessarily be considered as a metapopulation, according to the NAS report and the Strategic Research Plan, Wild Horse and Burro Management (2005). Under D. Ge-

netic Conservation Strategies: "*Similar or closely-related herds of horses should be identified for any genetic augmentation of wild horse herds*." This same Report also admonishes under Goals 1: *Manage to minimize the need for augmentation, if possible."*

It must also be mentioned that without solid and accurate genome study and integrated historical data, every wild horse population is potentially invaluable in terms of preserving unique and significant ancient DNA. Robert C. Lacy, Department of Conservation Biology, Daniel F. and Ada L. Rice Center, Brookfield Zoo, states in *Importance of Genetic Variation to the Viability of Mammalian Populations*:

Exchange with other populations can restore variation, but only with the risk of losing genetic variants that had been unique to the local population.

The time to determine whether translocation may be advisable in the future needs to be made *now*, during the continuing analysis process, rather than when the herd has been reduced irreparably to 50 total individuals.

Further, the 2013 NAS Report does not state, or even suggest, that translocation of outside stock will eliminate the need for a Censused Population Size of 150-200 in order to maintain an Effective Population Size of 50 breeding individuals of 6-10 years of age. Again, translocation is recommended as a possible means of maintaining genetic diversity between related and similar herds, when the entire discussion in the 2013 NAS Report is understood. It does not obviate the need for 50 breeding adults, even if some are imported, in most herds; particularly when the genetic situation is entirely unknown. Too, the Forest Service tends to establish AML without consideration of the individuals in the herd below one year of age. A BLM AML, which counts only adults, is different from a Forest Service AML in this regard. This should be factored into genetic futuring as well as forage allocation and population regulation. For the purpose of maintaining Effective Population Size, census size must consider the number and survival prospects of current-year foals.

On page 46 of the AML Determination, several options are suggested in acknowledgment of Effective Population Size, with translocation among them. It is also suggested that the proportion of breeding adults could be manipulated to favor breeding-age animals. The first challenge will be to monitor the herd closely enough to determine age composition, when estimates of total population range from 270-420 owing to the ASNFs' inability to overcome the most fundamental management problem. This again places existential decisions at the trap site. As young horses reach the point of maturity when the wisdom of their elders can be passed down, they will be selected for removal. Agencies have used this as a strategy to ensure adoptability as well, in that one to five year-olds are, of course, more desirable. It must be said that although the merit of both motivations may seem self-evident, no aspect of wild horse management can be based on "adoptability" when adoption success is becoming increasingly rare. Climate change, as we also previously stated, is already reducing pasture and hay production (we just received word that irrigation allocations will be 25% of normal in Crook County); gentrification of rural land is occurring everywhere; the horse-centric demographic is shrinking; rural economies are precarious at best. The $1000 adoption incentive has resulted in countless wild horses, some managed by the Forest Service, being shipped to slaughter plants as soon as the checks are in hand if not before. Agencies claim to have insufficient staff to provide oversight, including the basic post-adoption compliance check. We find no discussion of ASNFs' precise plan to address this.

We also hope the ASNFs will reject the recommendation to alter the natural gender ratio within the resident wild horse herd. The obvious consequences of a stallion/mare imbalance are related to behaviors outside natural relationships, such as escalated aggression and competition for mares, but also the

forced breeding of yearling fillies. This has been seen in many herds, which do not necessarily suffer from gender imbalance. It is thought that general trauma, caused by events such as helicopter roundups, can also result in this behavior. On the Ochoco National Forest, most of us have witnessed the breeding of young fillies, though we have neither gender ratio manipulation or helicopter gathers. We are currently awaiting the birth of a foal to a captured filly whose age can be verified. She is barely two years of age with foaling imminent. She was reported by public when observed alone and unable to move, and subsequently the Forest Service captured and transported her to an adoptive home. Injuries to her hindquarters are profound, and noting the date of foaling will determine whether she may have been injured during breeding. We bring this to the attention of the ASNFs as a cautionary observation. Although gender ratio adjustment is not the only causal factor in filly breeding, it will almost certainly contribute to "babies having babies". This is something the ASNFs should strive to prevent if possible.

For the reasons discussed, we cannot support Alternative 2. We strongly believe additional Alternatives must be developed, with honest, open, and objective consideration, which will result in little compromise of other uses while allowing for a more sustainable and genetically-viable wild horse population.

The following are aspects of the proposed action which we would ask the ASNFs to reconsider:

Allotment Fences. The ASNFs admits the wild horses are not accessing their entire Territory due to existing pasture fences. The proposed solution of widening gates or adding new gates is unlikely to change the situation. It would be helpful if the ASNFs could fully analyze more innovative solutions. For example, would it be possible to eliminate internal fences in the Black Canyon allotment within the Territory? Would it be possible to convert selected sections to let-down fencing? Would it be possible for the majority of the Heber allotment pastures to absorb the 6% use currently within the Territory? Could permit reduction/AUM buyouts be negotiated? If solutions to fence obstruction can be found, it may be a number of years until wild horse use patterns change. Studies of large ungulate migrations show that removing obstructions or creating new corridors are unlikely to immediately alter travel routes, but can take up to 90 years to have significant effects. Still, the ASNFs recognize this as an ongoing problem for the horses, and undoubtedly for other wildlife, and regardless of the Alternative selected this needs to be seriously addressed.

Forage Allocations. We do not find in the EA any clear reference to the amount of forage allocated to wildlife in the Territory. It is stated in the AML Determination (p.33) *"...that is, 65 percent of the forage that occurs on grazable slopes within two miles of a water source remains for wildlife, plant and watershed health."* This would seem to explain that big game forage needs are considered in the remaining 65%, as grazers grazing grazable slopes. But the next sentence includes wildlife in the *"combination of livestock, wildlife, and free-roaming horse use of the forage within the territory is well within the established use level."* This muddles our understanding of which forage utilization group big game are assigned to. The paragraph's last sentence does not clarify: *"...there would still be an additional 483,063 pounds of the available forage for wildlife (beyond that currently utilizing the area) or for future adjustments in the livestock grazing level."* Presuming the forage needs of all large ungulates are accounted for without the *"additional 483,063 pounds"*, we have concerns about its potential allocation.

Importantly, we are not aware of *any* wild horse advocacy organization which has ever insisted that a designated Wild Horse Territory (or BLM HMA) should ever be *"designated exclusively for wild horse use"* (EA p.14). Such an assertion would be contrary to the WFRHBA. This Congressional mandate, instead, does state that lands so designated will be devoted principally but not necessarily exclusively to wild horse and burro welfare. Implementing regulations of both BLM and Forest Service have con-

veniently interpreted the word “range” to be a special, zoo-like preserve and the only areas where wild horses are to be managed as the principal “use”. The correct and contextual reading of the WFRHBA absolutely does not support this interpretation, nor does the Multiple-Use Sustained Yield Act of 1960 preclude the management of Territories principally for the welfare of wild horses therein. Again referencing our Scoping letter comments, the WFRHBA does not contain the words “cow”, “cattle”, “sheep”, or “livestock”. At a minimum, therefore, the WFRHBA requires agencies to manage wild horse and burro herds as viable populations, and at the Minimal Feasible Level practicable. The most equitable means of achieving this on the ASNFs would be to assure resources are made available to support an Effective Population Size of at least 50 breeding adults; without the introduction of outside stock or any other synthesized manipulation of natural herd dynamics. By allocating 300,000 lbs. of the “additional” forage, 30 horses could be added to the AML of 104. Allocating 483,063 lbs. would support 50 additional horses. Even at 134, and counting only adult horses in the total, this would likely equate to the recommended Effective Population Size. Adaptive Management principles would allow the ASNFs to assess resource condition and genetic sustainability. Since the “upper/lower” range expression of AML is common practice, but is not required by statute, the ASNFs can then evaluate the appropriateness of this population level by using the actual, real-time AML determination process (level 2) from the BLM Wild Horse and Burro Handbook, to include weighted average utilization. Optimally, the trial population level would then become the “low” AML, with the remaining “additional available forage” providing an ecological buffer while limited, reversible fertility control is administered; if needed.

Boundary Adjustment. We feel very strongly that the ASNFs are within their authority under the WFRHBA to redraw the Heber Territory to include areas of current use. The ASNFs’ actions of the past are irrefutably reprehensible, and it was during those past decades that the herd’s history and future were obliterated. The 2007 Stipulation Agreement recalibrated the ASNFs’ responsibilities under the WFRHBA, and current staff are free to set new directions. The circumstances are unique and solutions must be commensurate with the importance of correct decisions going forward. Obviously, this course would require the highest level of effort, to objectively analyze actual effects of the wild horses on their re-claimed home range. It is likely that more robust population control would be required. To that point, we would offer that organizations exist which have the capacity to deliver reversible fertility control in the field, without capture. We are also prepared to assist the ASNFs should they wish to initiate an All-Veterans team which would perform this and other wild horse-related tasks. The concept has the support of multiple organizations and agencies; all that remains is for the end-user to accept the service.

4. As we, and many others, have clearly said, an Environmental Impact Statement with a full range of Alternatives is badly needed. The reasons given by the ASNFs (EA pgs.13,14) for rejecting viable Alternatives do not hold up to laws and statutes.

“Expanding the Territory” was rejected because the interdisciplinary team wished to adhere to the *“established Forest Service policy to manage horses and burros on territories as established in 1971 to the extent possible while adhering to all land management acts.”* While the Forest Service policy does indeed say this, the policy is in conflict with *36 CFR Subpart D §222.60 Authority and Definitions (15) “Wild horse and burro territory means lands of the National Forest System which are identified by the Chief, Forest Service, as lands which were territorial habitat of wild free-roaming horses and/or burros at the time of the passage of the Act.”* as well as the preamble of the WFRHBA itself: *“It is the policy of Congress that wild free-roaming horses and burros shall be protected from capture, branding, harassment, or death; and to accomplish this they are to be considered in the area where presently found, as an integral part of the natural system of the public lands.”* As we continue to state, the Territory boundary as originally drawn is NOT the reference point for wild horse management; the area

where wild horses were found in 1971 *IS* their legal area. If, and only if, these two areas happened to exactly overlap, then the original Territory could be cited. Further, it is unlikely that a single Territory or BLM Herd Management Area was established in 1971. Official boundaries, generally inaccurate, were established years later, after both agencies had time and self-appointed authority to reduce numbers and locations which would later be recorded as the formal population and areas of residence. By all accounts, this occurred on the ASNFs. Given the special circumstances culminating in the 2007 Stipulation Agreement, expanding the Territory needs to be seriously considered as a basis for additional Alternatives.

"Reducing Livestock" was also summarily rejected by the interdisciplinary team. Though we are not necessarily proposing livestock reduction for the sake of livestock reduction, we would certainly recommend the ASNFs consider this when doing so would assure sustainable habitat and wild horse population health as part of a well-developed and holistic strategy to satisfy the provisions of the WFRHBA. Since livestock reduction was an "off the table" option regardless of our comments to the Scoping letter, we will reiterate here. Reduction of livestock and/or cancellation of livestock permits are authorized for a number of reasons, one of which is found in *36 CFR §222.4 Changes in grazing permits (a) "The Chief, Forest Service, is authorized to cancel, modify, or suspend grazing and livestock use permits in whole or in part as follows: (1) Cancel permits where lands grazed under the permit are to be devoted to another public purpose including disposal. In these cases, except in an emergency, no permit shall be cancelled without two years prior notification."*

The historical context (EA pgs.13,14), framing livestock use as predating the Heber Wild Horse Territory and therefore establishing it as the predominate and primary use, is incongruous with the earliest precepts of managed public lands grazing, as well as the Multiple-Use Sustained Yield Act of 1960. Grazing is a "use" of public lands, while Federally-protected wild horses and burros are a wildlife resource reliant on designated public lands as their sole habitat. Additional Alternatives must be developed which examine the effects of livestock grazing in depth, in relation to the truthful carrying capacity of the Territory, and both the needs and contributions of wild horses and other wildlife species. Numbers of horses, and numbers of cows, should be viewed as a starting point in the complex evaluation of Thriving Natural Ecological Balance. If thorough and unbiased review of effects demonstrate that reductions in livestock grazing are warranted, such actions are not exempt from consideration in additional Alternatives.

5. Summarizing our comments, we are encouraged by plans to enhance conditions for the wild horses, and hopeful that substantive changes can be made in the form of an Environmental Impact Statement to include a valid range of Alternatives. We are impressed with mitigative measures such as the intent to create a genuine emergency response plan; to attempt to meet the WFRHBA requirement to define "excess" wild horses as those whose removal would achieve Thriving Natural Ecological Balance rather than simply "any horses over AML"; to limit acreage under prescribed burns at a given time; to manage forest vegetation to attain a mosaic of forage production and cover; to assure adequate, dependable water sources; and to explore means of improving access to under-utilized areas. At the same time, these measures will have limited value if the AML is less than sustainable in terms of genetic viability and general resiliency. AML is, of course, the pivotal issue on which the entire future of the Territory Management Plan, and this wild herd, depend.

Other residual concerns are:

- Allegiance to the flimsy Forest Service policy that wild horses can never, under any circumstances, be provided life-saving emergency feed. We are enclosing the legal opinion of McDermott, Will, and Emery.

- We do not find detailed information as to the disposition of captured horses: What adoption facility (BLM/FS) will process captured horses? Who will approve facilities for adopted horses? Who will conduct compliance checks on adopted horses? If processed by BLM, will Heber horses be subjected to the ill-fated $1000 adopter incentive program? If processed by Forest Service, are qualified staff available? What database will be used? Will horses be freeze-branded as required by FS regulations, or microchipped, or both? What titling process will be used? What is the capacity of the ASNFs to rescue or repossess horses in the event of failed adoptions?

- Shootings continue to occur. With no prosecutions to date, there is a pervasive undercurrent of suspicion that the ASNFs are not genuinely concerned for the horses' welfare, and this, in turn, severely undermines the public's trust in the proposed management plan for the Heber wild horses. This situation is compounded by reports that horses are still not being provided adequate water, except through the efforts of private citizens and not without considerable "red tape" and actual obstruction. Reports also indicate riparian exclosures in severe disrepair, whereas streams do need protection in order for resources to thrive, and wild horses do need to drink. These matters generate some doubt as to the ASNFs sincere desire to manage wild horses humanely and in concert with a healthy environment.

Much of this response reiterates our statements made in reply to the original Scoping letter. Though we have repeated many of those statements here, our responses to the Scoping letter remain in full force and are to be considered as part of these Comments. In the section following, since our Comments are tedious enough without the addition of research citations, we have compiled selected passages from research cited by the Forest Service and/or the Central Oregon Wild Horse Coalition to provide background to referenced "studies" or "research". Actual cited studies, where available, will be sent as separate documents due to the limitations of the CARA program.

Respectfully submitted,

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The following section is to be considered as part of our formal Comments the Heber Wild Horse Territory Draft EA and Territory Management Plan:

1. Findings of Research Frequently Cited by Forest Service Wild Horse Territory Managers

Few, if any, Forest Service Wild Horse Territories are predominately sagebrush steppe or semi-arid, barren landscapes, yet much "research" is cited (partially due to a compilation of such research provided by the Forest Service Washington Office) which is meant to scientifically validate assertions of the wild horses' threats to natural ecosystems. Nonetheless, we have made a number of observations from the standard Forest Service research citations which might be of assistance to Agency wild horse

managers. We have also included passages from other relevant research, which is not found in Forest Service Wild Horse Management planning documents.

1) Davies et al. (2014) which is presumably K.W. Davies, G. Collins, and C.S. Boyd.
Effects of feral free-roaming horses on semi-arid rangeland ecosystem from the sagebrush steppe.

p. 2 "Without rigorous experimental control there are undoubtedly some unaccounted for confounding variables and cause and effect relationships cannot be determined."

"In addition, plant species diversity was slightly greater in horse grazed compared to ungrazed sites in the Pryor Mountain lowlands (Fahnestock and Detling 1999). The inconsistency in the reported effects of feral horse grazing suggests that vegetation response likely varies by site characteristics."

p. 6 "Our results suggest that feral horse grazing can affect some aspects of semi-arid ecosystems."

p. 7, 8 "One limitation of our study was that our study sites were relatively close to riparian areas with permanent springs or small creeks that can concentrate horse use (Crane et al 1997) and thus, horse effects may dissipate further from water sources. However, Ganskopp and Vavra (1986) reported that feral horses rapidly vacate watering areas after drinking."

p. 9 "Arid and semi-arid plant communities can be relatively slow to recover from disturbances. For example, sagebrush steppe plant communities can take several decades once a disturbing agent is removed for even partial recovery (Sneva et al. 1980, West et al. 1984)."

"Differences between de Villalobos and Zalba's (2010) and our results could also have been the result of different plant community and site characteristics."

"Consumption of sagebrush may also be influencing its recruitment as feral horses will consume small quantities of sagebrush, though they primarily consume grass (Krysl et al. 1984, McInnis and Vavra 1987)"

p. 10 "Our results suggest effects of feral horses on species richness and diversity may vary by plant community and site characteristics (grazing-plant coevolution, climate, soils, etc)"

"Other studies have found that feral horse grazing exclusion promoted a decline in species richness in montane grasslands in Argentina (Loydi et al. 2012) and plant diversity in the Pryor Mountain Wild Horse Range (Fahnestock and Detling 1999). (meaning is unclear as p. 2 reference from same authors indicate increase in plant diversity, Pryor Mountains)

To synopsize, this study found that wild horses increase plant diversity in some ecosystems; it may take decades to see appreciable improvement in riparian ecosystems, following disturbance (past overgrazing by non-equids); it's challenging to identify all cause-and-effect relationships.

Davies is fond of studying the Sheldon-Hart Mountain National Wildlife Refuge Complex. Another study, published by Society for Range Management, appeared to tier off the first study, with the same authors. We have seen several such studies presented by Davies and others, depicting exclosures restricting wild horses use. All are conducted in sagebrush steppe ecosystems, and all limit water availability and fail to disclose other factors such as historic use and other amenities in relation to distance to other water/feed sources. Is this study, effects were mixed, thought to benefit some species

while negatively impacting others. In the end, "*Effects of horse grazing on riparian habitat will be density dependent and associated with landscape features and herd management practices that influence horse distribution across the landscape.*" In other words, whether Forest Service Territory or Sheldon Wildlife Refuge (horses were eliminated from the Refuge with most going to slaughter), engaged management, not merely non-viable population levels, is paramount.

Society for Range Management (BLM/Forest Service surrogate and active member of anti-wild horse and burro National Horse and Burro Rangeland Management Coalition) provides another slant on "wild horse damage" in Impacts of Wild Horses, Cattle, and Wildlife on Riparian Areas in Idaho, Kawek et al (2018). This study takes place in two different areas with several BLM Herd Management Areas. Photos show open, rolling terrain and, instead of Ponderosa pine and Grand fir; lots of sagebrush. The study was meant to show intensity of damage caused by horses, as compared to cattle. We note two observations of the researchers; (p. 4) "*Though free-roaming horses are generally smaller than modern rangeland cattle, they may have a greater than expected influence on riparian vegetation*." and "*In addition, because many breeds of wild horses can go longer without water than can cattle, they often spend less time per day within riparian zones than individual cows do.*" We found these statements interesting, as agencies consider one "modern range cow" and her calf as one AUM, while a wild horse as of January 1 following its birth is considered 1 AUM (and 1.2 by Forest Service in some applications). Also, apparently horses don't typically tarry long at water sources, at least on sagebrush steppe, and this researcher has observed more than one "breed" of wild horse, which is incongruous with the "metapopulation" theory.

This study used game cameras to document wild horse, cow, and wildlife presence at designated watering sites. However, (p. 7) "*We did not identify individual animals, but rather the total number of occurrences of each group resulting in an index of intensity of use rather than a population estimate*." This factor makes the study's usefulness in building the case for "too many horses" virtually nil. But in the interest of establishing superiority between cattle and wild horses, the researchers used a "greenline" system which theoretically measured the size of each hoof disturbing the streambank. We are not certain what "breeds" of modern range cattle or wild horses were present, but we can easily predict that width of imprint would not provide a basis for any credible research of this type. The most useful result of this study is found on p. 10. *"Our analysis did not show any evidence that use of riparian areas by one species of animal caused other species to avoid the area. In fact, there was a slightly positive relationship between horses and wildlife ($p = 0.24$, $P < 0.01$) and between horses and cattle ($p = 0.25$, $P< 0.01$), indicating that these species of animals were using riparian areas during similar times." "We did not observe any relationship between cattle and wildlife use at our study sites ($p = -0.05$, $P = 0.60$)."*

We found interesting research in the Forest Service Library: Effects of feral horse herds on plant communities across a precipitation gradient, L. Baur (2016)

The author's premise is that wild horse interaction with habitat west of the Rocky Mountains has received very little study. (p. 1) "*However, most studies of feral horse grazing effects in North America have been conducted in salt marches of the East Coast (Wood et al. 1987, Turner 1987, Turner 1988, Furbish and Albano 1994, Seliskar 2003, De Stoppelaire et al. 2004) and the Pryor Mountain Wild Horse Range of northern Wyoming/Southern Montana (Detling 1998, Gerhardt 2000, Gerhardt and Detling 2000, Fahnestock and Detling 2000), with a limited number of studies conducted in the Great Basin (Beever and Brussard 2000, Beever et al. 2003, Beever et al. 2008, Davies et al. 2014) or other western rangelands. Thus, we still lack basic understanding of the effects of feral horse grazing on*

rangelands of the western US, despite the fact that this represents a critical knowledge gap for effective rangeland management."

The study sought to compare effects on a spectrum of ecosystem types, varying in precipitation and elevation. Those sites were Clan Alpine HMA (Nevada), Sulphur HMA (Utah/Nevada border), Spring Creek Basin HMA, (SW Colorado), Pryor Mountain Wild Horse Range (Wyoming/Montana border), and Theodore Roosevelt National Park (North Dakota). We are somewhat familiar with aspects of the Pryor Mountain, Sulphur, and Spring Creek Basin HMAs and found this study to be very interesting. Essentially, the researcher found that variables were too numerous to provide definitive results, and that much more research is needed. Findings did indicate that results varied little by site, which is incongruous with other studies; (p. 20) "*Thus, our hypothesis that grazing effects would vary by site, according to precipitation levels, was not supported*." None of the study sites closely resembled the typical Forest Service Territory, but the author did make an interesting observation based on the research of others: (p. 2) "*Although Crane et al. (1997) found that feral horses in Wyoming spent proportionately more time in riparian habitat than in other habitat types, Ganskopp and Vavra (1986) did not observe such a preference among feral horses in Oregon. Horses also show a preference for higher elevation habitats (Ganskopp and Vavra 1986, Crane et al. 1997).*" Of course, these are studies of sagebrush steppe environments; not Forest Service Territories, since little to no such research exists.

Other findings of value to natural resource managers are, for example, that legacy grazing impacts will likely influence assumptions; (p. 21) "*...we have assumed that comparing plant communities inside and outside exclosures constitutes an observation of the effects of 'horses' or of 'grazing.' However, because vegetation recovery is rarely a simple reversal of grazing-induced changes, 'effects of grazing' and 'effects of protection from grazing' may not be equivalent (Fleischner 1994, Sarr 2002). Past or current grazing may have caused changes that are not detectable purely through the use of exclosures."*

The author also affirms what we have repeatedly stated concerning the application of AML; (p. 22) "*The BLM defines the upper AML as the 'maximum number...which...avoids a deterioration of the range'. (BLM 2010). However, whether AMLs accurately reflect such a threshold is questionable (NRC 2013), so it is possible that a herd could be above AML but still too small to cause plant community shifts. Additionally, horse density in the site as a whole may not directly correspond to horse use of the specific plots we sampled."* Also, (p. 26) "*Moreover, given that feral horse grazing often occurs in tandem with cattle, sheep, and native ungulate grazing, there is a pressing need for studies that separate the effects of feral horses from those of other herbivores*." This observation is consistent with 2017 USGS findings:

July 2017 GAO report, Animal Welfare: Information on the U.S. Horse Population:

According to USGS officials and documentation, research that evaluates and separates cattle and wildlife impacts from wild horse impacts has not been conducted, and studies on horse grazing effects are needed. And, *BLM and USFS monitor vegetation on public rangeland but do not assign causes to changes in or damage to vegetation. According to BLM documentation, BLM is implementing its Assessment, Identification, and Monitoring (AIM) strategy to track environmental condition of BLM lands and establish a baseline for further analysis.*

Another study, Aboveground and belowground mammalian herbivores regulate the demography of deciduous woody species in conifer forests, Endress, Naylor, Pekin, and Wisdom (2016), designed by Marty Vavra, suggested that density of herbivore populations is not necessarily correlated to herbivory

levels, and that below-ground mammalian herbivores deserve much credit for their influence over riparian plant growth. This Starkey Experimental Forest and Range study was conducted in the Blue Mountains, so some similarity in elk interaction with willow and cottonwood could potentially exist.

2. Genetic Diversity, Translocation, and Censused/Effective Population Size

"*Does population size affect genetic diversity? A test with sympatric lizard species" Hague & Routman 2015.* (see Appendix B)

This study shows the expected correlation between population size and genetic diversity, but also highlights the complexity of the equation and the variables impacting it; such as Genetic Draft as opposed to Genetic Drift. For example, the study states (p. 15) "*A population's genetic variation at a particular locus is dictated by its effective population size and the gene's mutation rate*."

"*Boosting genetic diversity may save vanishing animal populations. But it may also backfire" Pennisi, 2019*

This short article looks at the benefits of new blood, but cautions that in one study group of guppies, (p.2) "*the rapid infusion of new fish almost completely eliminated pure residents*." In the scrub jay study, outside populations were less-diverse than the resident population, and although diversity was achieved based on the infusion, when newcomer influx declined, the residing population failed to maintain diversity. In the Island Fox study, Santa Catalina foxes were known to have a high incidence of cancer affecting the ears. Genetic rescue was contemplated but researchers found that because of more variation throughout the genome, they actually had an advantage over the cancer gene, and were also genetically adapted to the hot, dry climate as compared to foxes from cooler, wetter surrounding islands.

"*Effects of Population Control Strategies on Retention of Genetic Diversity in National Park Service Bison*" Gross & Wang; report submitted to Yellowstone Research Group USGS-BRD Department of Biology Montana State University, Bozeman, MT 2005.

Since the massive herds of American Bison were all but exterminated, reconstruction of pure, non-hybrid strains of bison comprised a total residual population of approximately 1000 animals. These bison were distributed across multiple National Parks and managers were faced with the classic challenge of maintaining genetic viability while keeping populations commensurate with finite habitat carrying capacity. This study combines real-time evidence with an extensive modeling program to help in anticipating genetic impacts of various management strategies. (p. 3) "*Over the 200-year period of the simulations, herd size accounted for more variation in retention of Ho and loss of alleles than any other factor.*" The simulations also indicated that variations on how population control strategies were implemented would likely have an influence on the rate of loss of genetic variation in small bison populations.

The study also speaks to the value of allelic diversity: (p. 11) "*High allelic diversity will virtually always be correlated with the occurrence of many alleles that have a low frequency in the population. These rare alleles are unlikely to contribute substantially to short-term population responses to selection, but they can be a very important limit to the response to selection over many generations (James 1971), Allendorf 1986). Allelic diversity is thus considered important to the long-term survival of a species, especially where there may be substantial environmental changes, range expansions, or*

(re)introduction into new sites." The study recommends translocation between herds, but it is unknown whether the practice has been implemented or if opinions within the Park Service have adjusted to research such as Pennisi's (above), especially considering occurrences of deleterious maladies such as brucellosis.

It should also be noted, importantly, that the American Bison Herd is indeed a metapopulation, as each of the members derives from known survivors of the former hoards. By contrast, the American Mustang is the product of ancient, yet-to-be identified donor populations; Tribal herds not associated with Spanish conquest; Spanish stock; working horses moving Westward with early European settlers; and additions of contemporary "breeds", all in disparate combinations. Wide variation between herds and individuals exist phenotypically and genotypically, and only limited numbers of the Mustang genome have been adequately analyzed. Too, a "small" bison herd, in this study, is considered to be 200 animals.

"Patterns of genetic variations in US federal bison herds" Halbert & Derr (2008)

The purpose of this study was to prepare agencies for the practical application of theoretical population genetics; the principles contemplated in the 2005 study (above) were next being subjected to full analysis of specific herds in terms of future translocation and germplasm conservation. (p. 4964) "*Most US federal bison have been managed in closed herds over the past 40 – 100 years, but management of these bison as a single metapopulation has been recently considered (Halbert et al. 2007) as a means to prevent the erosion of genetic diversity (Margan et al. 1998). Clearly, a broad range of issues should be considered before any decision to emulate migration among wildlife populations, including the genetic, environmental, demographic, and health consequences of such manipulation.*"

Of course, heterozygosity was only one of the measures of different herds' genetic identity and health for the purpose of developing profiles of appropriate donor and migrant groups. Observed heterozygosity, expected heterozygosity, allele frequency, and allele richness, as well as known history and environmental factors, all provided information to begin to form a future translocation and germplasm conservation strategy. Of particular note, one of the initial objectives was to determine most likely divisions of the metapopulation; (p. 4969) different herds clustered into two different sub-populations, with 1268 and 1111 individuals respectively.

Though bison apparently have responded to the known bottleneck event of the late 19th century in better fashion than other mammals, the study mentions that (p. 4970) "*While it has long been presumed that bottleneck events will lead to reduced genetic diversity (Nei et al. 1975), many exceptions have been noted (Amos & Balmford 2001).*" and in the case of bison (p. 4971) "*The census size of the bison population rapidly increased following the bottleneck (Coder 1975), which limited the potential for genetic drift and inbreeding (Nei et al. 1975). Rapid population growth has been linked to the maintenance of high levels of genetic diversity following bottleneck events (Zenger et al. 2003), while slow population growth likely contributed to the loss of genetic variation in other cases (Williams et al 2002).*" Censused Population Size does matter.

A warning about low population size is also given as the study sought to explain low diversity in a certain herd; (p. 4972) "*For example, while the SUH herd was derived from several sources (Table 1), the herd has low levels of diversity (Table 2) compared with other herds founded with similar numbers of individuals and fewer sources (FN, WC), most likely due to the continuous maintenance of the SUH herd with a small number of bison (C. Dixon, personal communication).*"

Another concern regarding the BLM and Forest Service trend toward using translocation, under the banner of "metapopulation", to justify unviably-low AMLs, is that wild herds have been un-naturally selected to feed the adoption market. Adopters like color and size, which are not necessarily traits suited well to long-term success in an increasingly uncertain natural environment, and this practice has almost certainly led to a narrowing of the once-diverse wild horse genome. This worked in the negative as well, before and since the Wild Free-Roaming Horses and Burros Act, as settlers and "sportsmen" actively eliminated "undesirable" phenotypes from the wild horse landscape. This same circumstance is addressed in this study; (p. 4973) "*The comparison of these two herds is indicative of the importance of culling strategies on the maintenance of genetic variation; both herds were founded around the same time (WC in 1916, FN in 1913) and have been maintained with similar census sizes (Table 1), but in this study we detected substantially higher levels of genetic variation in WC bison (Table 2). This finding is somewhat surprising considering that the WC herd has been a closed population for over 90 years while the FN herd received several supplementations through the 1950s (Halbert et al. 2007). The observed levels of diversity in these herds most likely reflect differences in management strategies. For instance, FN bison were artificially selected for size and conformation over a period of at least 20 years, which may have concomitantly reduced genetic diversity (Coltman 2008).*"

At this point in the study, it is also concluded that (p. 4973) "*classical calculations of effective population sizes among these herds are not feasible at this time (Lande & Barrowclough 1987)*, which would further emphasize that the Forest Service cannot assume the action of translocation will allow reduction in the generally-accepted, bare-minimum effective population size of 50 breeding adults.

As stated previously, wild horse management agencies, and indeed the anointed scribes of the 2013 NAS report, do not have the body of information necessary to proclaim the wild horse herds of 10 Western states to be a "metapopulation", especially when contrasted with the amount of research amassed in this study of a much smaller American bison population. Yet the authors of this study still find fault with past "supplementation" and freely express caution in regard to future translocation. Their findings are offered to managers of other species, since it is common knowledge that there is little knowledge. (p. 4973) "*With the continuous expansion of human populations and disruption of wildlife migration patterns, supplementation of existing wildlife populations has become an increasingly important conservation tool. However, the success of supplementations is rarely followed and reported (Fischer & Lindenmayer 2000). Bison represent a valuable case study in this regard, as multiple simultaneous experiments in population supplementation were performed and recorded over the past century. Based on the results of this study, translocation of bison among US federal herds has resulted in mixed levels of success...*" The study continues to discuss variables which must be considered when determining when, how, and even IF translocation should be accomplished.

In the end, it appears the researchers arrive at the conclusion that bison herds are not in critical need of translocation; (p. 4975) "*In fact, given the current body of scientific evidence, the management of the US federal bison herds as a metapopulation is not warranted.*" But, considering the identification and preservation of a living germplasm bank are critical objectives, the study affirms that (p. 4975) "*In fact, the identification of the genetic relationships among these herds exemplifies the importance of maintaining multiple small populations from a single source to counteract the effects of drift (Margan et al. 1998); without the replication of the FN lineage in the TRN and TRS herds, an estimated 5% of the allelic diversity of this lineage would be unrecoverable today since no other exclusive sources of FN germplasm are known*."

We would be remiss to exclude genetic guidance from the frequently-cited 2013 NAS Report. Comparing the intensity and breadth of existing studies on BLM-managed wild horse herds to those conducted on US federal bison herds, though there has been significant study, most of which has been attributed to Dr. Gus Cothran, the body of knowledge is still lacking. Too, Forest Service wild horse herds are likely to fall outside averages and norms, simply due to differing environments. While many, if not most Forest Service herds are jointly managed by both agencies, the Forest Service component persists because there is a habitat component of forest; generally more moist with variable vegetation types. This may contribute to significant snowfall, potential for standing water/insect disease vectors, and a number of other large ungulates which in turn invite predator species. Adaptation is key.

In addition to the much larger view presented as to what is meant by "metapopulation", the NAS report is also clear about the importance of allele variability as well as observed heterozygosity.

From NAS Chapter 5, p. 143:

At the population level, genetic diversity can be measured as the mean number of variants of a gene (alleles) or as the proportion of individuals that have different variants of a gene (heterozygosity). Theoretical and empirical studies have demonstrated substantial fitness costs associated with the loss of genetic diversity in both free-ranging and captive populations (Lacy, 1997; Saccheri et al., 1998; Crnokrak and Roff, 1999; Slate et al., 2000; Brook et al., 2002; Keller and Waller, 2002; Spielmanet al.,2004). In small populations or populations that suffer size bottlenecks, allelic diversity is lost relatively quickly through random genetic drift, but heterozygosity is less affected. In small populations that are isolated, inbreeding is inevitable and occurs within only a few generations. Whereas inbreeding does not change allele frequencies, it results in a change in the proportion of individuals that carry two alleles at a locus that are identical by descent and decreases heterozygosity. Thus, it is important to measure and monitor allelic diversity, observed and expected heterozygosity (Ho and He), and coefficients of inbreeding (Fis) in managed populations. (emphasis added)

It is also important to note the fallibility of the NAS Report, particularly where old paradigms persist which receive little scientific analysis because they are not considered critical to the management of wild horses and burros. NAS p. 145 states "*With regard to herd ancestry, the results were consistent with the hypothesis that herds originated from escaped or released domestic horses*." Not surprisingly, we take issue with this.

Using a singular breed to illustrate the fallacy of this "hypothesis", the American Quarter Horse Association traces origins of the breed to include Mustangs at the earliest point, and more recently as settlers and their horses moved westward: *"It wasn't long before the Colonial farmers down in the Carolinas and Virginia began to trade for a faster horse that was being bred by the Chickasaw Indians. These quick Indian ponies were Spanish Barbs, brought into Florida by early Spanish explorers and colonists*." and "*The final ingredient in the genetic formula that produced the Quarter Horse was to be found west of the Mississippi River. It was the Mustang, a free-roaming, far-ranging wild descendant of the Barb, introduced into the American Southwest by Spanish explorers, missionaries and settlers. These were the horses that made the Plains Indian into the toughest mounted warrior the world had ever seen."* Of course, we also believe the Chickasaw Horse and the Plains Indians' Mustang were not exclusively the product of European settlement, but for the sake of this discussion, it is clear the Quarter Horse is of Mustang lineage. Therefore, even if additional Quarter Horses were never reintroduced into wild herds, the DNA would still point to Quarter Horse influence.

Too, we find the NAS Report to lack objectivity, though it stems from pre-existing bias, when it concedes to certain herds essentially having more cultural value; NAS p. 151 "*Phenotypic similarities and historical records have suggested that several HMAs have high concentrations of old Spanish blood and thus may be assigned high priority for conservation*." This is entirely subjective, and devalues the historical significance of other herds. In truth, agencies are rapidly eliminating evidence of human and equine history, only to salvage those bearing the markers of a dark historical period for both Indigenous People and the flora and fauna originating on the North American continent.

The NAS Report has provided valuable insight, and some practical direction. But nowhere is it found that Effective Population Size is absolute, impervious to influences, or that it should be subjected to preventable reductions. Fertility control impacts Effective Population, as does skewing gender ratios (NAS p. 161). Translocation also influences Effective Population Size; (NAS p. 168) "*Which type of translocation is best to use will depend on a variety of factors, many of which can be tested with a modeling approach in the planning phase (see Chapter 6). Population size, fertility-control methods, and the effects of translocation on Ne, will need to be considered*." The NAS report is aware of the relationship between translocation and Effective Population Size, but provides no further insight. It should be assumed, without evidence to the contrary, that translocation does NOT equate to any excuse to reduce the Effective Population Size to the unknown quantity within an AML of 12-57, when the minimum of 50 breeding adults is thought to be the lowest acceptable number.

The NAS Report also perpetuates one of the greatest omissions of the translocation practice; how are recommended numbers of translocated individuals and the intervals of introduction altered by size of the target herd? This is not answered in the text. Obviously, the recommended translocation of 10 individuals every 10 years would not apply to a herd of 45 horses, though it might be appropriate for a herd of 300 horses. This factor is absent.

Additionally, agencies are cautioned regarding the risks of outbreeding depression. The NAS Report speaks to this on p. 167, and considers "different environments" to be a risk factor. Since this Report was commissioned by BLM, not jointly with the Forest Service, it is not unreasonable for the NAS report to point out that among BLM HMAs, the environmental differences may not be significant. But as we mentioned previously, differences between BLM and Forest Service wild horse areas could indeed be substantive enough to result in problematic translocations in this regard.

Lastly, the NAS Report genetics chapter concludes with more advice to agencies managing small populations (NAS p. 169): "*In small, isolated herds, inbreeding is inevitable and will occur within only a few generations. It is important to measure and monitor allelic diversity, observed and expected heterozygosity (Ho and He), and coefficients of inbreeding to detect the loss of diversity before the reduction in fitness that has been observed in many inbred populations becomes a problem*." (emphasis added)

(NAS p. 170) "*It is true that the existence of a few genetic markers may indicate Spanish origins, but the remainder of the genome may not; rather, it may reflect horses that are well adapted to local conditions. If the latter is the case, isolation of the herd to maintain purity may be mistaken and may lead to unnecessary loss of genetic diversity. The committee recommends that BLM examine in more depth the genetic constitution of these herds and share the findings with the public so that informed decisions about the sustainability of the populations can be made.*"

In other words, decisions affecting genetic viability need to be informed; beyond a few sentences in an employee handbook.