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Comments: Here are my scoping-comments on the Proposed Action. Throughout, emphasis [mdash] whether by italics, bold font, or both [mdash] has been added by me. Please note where I cite page-numbers, I mean the pdf, screen-page numbers as opposed to hard-copy page-numbers.

As a suggestion, I urge you to make the physical and screen-page numbers correspond to one another in future reports (the cover-page being page 1, for instance, just as it is in the pdf). Consider eliminating the confusing and flow-disrupting Roman numerals. Most reports are posted online nowadays; so, a consistent approach to pagination makes navigating documents simpler and faster.

### Crucial Questions for The Plan

Development of a management plan is an inflection point, a decisive moment to choose informed strategies going forward. Important questions must be asked.

First, to what uses are the Forests-in-question being put today, both by local residents and visitors, and in what direction are those uses headed? What is the current profile of the local economy, and what are the projections for it? Which uses are increasing? Which ones are in decline?

Second, what benefits [mdash] ecological, economic, and esthetic [mdash] do the Forests gain from the Heber herd of wild horses? Are those benefits significant?

Third, what resources do the wild horses need, as a healthy, viable, self-sustaining population, in order to thrive naturally, in ecological balance with their environment? What measures can ASNFs take to provide abundant habitat and resources? How can management-activities be at minimal-feasible levels? Can ASNFs let Nature right-size the herd from now-forward? How can management focus on studying how Nature achieves appropriate populations of animals with the least human involvement?

### Outlook for the Local Economy

Per the Arizona State Department of Commerce, in the Heber-Overgaard area

[hellip] retirement and tourism are an important part of the economy. Proximity to the Sitgreaves National Forest provides recreational opportunities, and timber is harvested for Precision Pine Sawmill and Stone Container Paper Mill. A mulch plant processes forest by-products. Service businesses provide employment and services for the predominant retirement community. Government and schools also contribute to the local economy. Retail trade is increasing. Construction is also a major factor in the area's gradually expanding economy.

Arizona State Department of Commerce. Heber-Overgaard, Arizona Vital Statistics. Principal Economic Activities. Accessed at <http://www.rimcountry.com/ho.htm>

Data USA reports that, as of 2017, the Heber-Overgaard population had dropped 12 percent, and that overall employment had declined nearly 2 percent. At that time, agriculture-related jobs composed just under 11 percent of the local economy.

Data USA. (2017 figures). Heber-Overgaard, Arizona. Accessed at <https://datausa.io/profile/geo/heber-overgaard-az/#about>

The most recent Census of Agriculture found that the average age of farmers / ranchers is 57.5 years (up 1.2 years from the previous Census).

Average age of U.S. farmer climbs to 57.5 years. (2019, April 11). Farm Progress. Informa Markets. [Note: [ldquo]farmer[rdquo] also means [ldquo]rancher.[rdquo] The USDA Census of Agriculture groups them together.] Retrieved from <https://www.farmprogress.com/farm-life/average-age-us-farmer-climbs-575-years>

Considering the [hellip]

- \* Ongoing uncertainty with regard to tariffs and trade,
- \* Vagaries of weather-conditions,
- \* Changes in consumer-demand,
- \* Decline in agricultural employment as a long-term historical trend, and the
- \* Upcoming retirement of ranchers with few new entrants to replace them,

[hellip] ranching activities will continue to diminish and may likely disappear within the next ten years. The upward trend is for more tourism and recreation, and likely, more retirement-community development on land that is now used for cattle-grazing.

Yet, the demand for grazing slots [mdash] animal unit months (AUMs) [mdash] by current public-lands ranchers is likely to remain strong, even as their cattle-operations wind down. This is because ranchers will wish to sell their property at the highest price to fund their retirement and to leave an inheritance for their children. To boost the sale-price, they will point to the AUMs as evidence of the property[rsquo]s value [mdash] even though ranching will probably not be the intended future use.

Yet, ASNF must look to its own future. It must plan for the time in the near-future when public-lands grazing will no longer be much of a factor in Forests management. ASNF will need to replace obsolete uses with ones that will be in demand.

As for the public lands that have been degraded by industrial-scale commercial grazing over the past century, there is hope. They can be redeemed and turned into a conservation-treasure for biodiversity, as discussed in the article cited below. As will be discussed later in these comments, wild horses contribute in many ways to the ecological health and repair of the Forests.

University of Queensland. (2019, December 11). Trashed farmland could be a conservation treasure. ScienceDaily. Retrieved December 12, 2019 from [www.sciencedaily.com/releases/2019/12/191211100313.htm](http://www.sciencedaily.com/releases/2019/12/191211100313.htm)

In planning forward, ASNFs administrators should recognize that environmental restoration, recreation and retirement-living [mdash] quality-of-life issues [mdash] are the future of the Forests. And the Heber herd fits right in [mdash] as a key component of [mdash] that future. Certainly, tourists as well as resident retirees will be drawn to visit the Forests, where they can easily find, observe, and photograph a vibrant herd of beautiful, free-roaming wild horses. Instead of focusing on managing the herd, ASNFs should be planning on maximizing its population and marketing the Heber wild horses as creatures of the Forests.

The District, and How Wild Horses Are of Benefit to It

According to the ASNF document cited below,

The Black Mesa Ranger District encompasses approximately 616,000 acres of mixed conifer, ponderosa pine and pi[n]on-juniper forests, and has within its boundaries five high elevation lakes, numerous scenic

canyons, 8 campgrounds offering about 400 campsites, mountain biking, hiking, fishing, hunting, OHV trails, non-motorized areas, three small communities and many developed inholdings. The District hosts many visitors year-round from the Phoenix metropolitan area, which is within 2 and 1/2 hours travel time.

Located on the Mogollon Rim, the district has a high incidence of lightning strikes during the summer, resulting in an active fire season from May through July. Threatened, endangered, and sensitive species include: Mexican spotted owl, northern goshawk, bald eagle, peregrine falcon, Little Colorado spinedace, and Bebb[rsquo]s willow. Wild game species include Rocky Mountain elk, mule deer, javelina, mountain lion, black bear, wild turkey and antelope [hellip].

Apache-Sitgreaves National Forests. (2009, May 7). Outreach Notice. United States Forest Service. Downloaded the pdf from outreachbm\_lakeside\_pressale0416

Combined with information on page 28 of the Scoping Notice regarding the presence of Mexican wolves, we can conclude that there is/are

1. Ample room for expansion of the WHT to include the entire Black Mesa District
2. High volume of tourists from Phoenix, a major metropolitan area relatively close-by
3. An active fire-season that could benefit from dry-forage grazing by wild horses
4. Suitable and abundant predators to right-size the herd.

In the absence of solid data regarding the extent of the wild horses[rsquo] presence in ASNF when the Wild Free-Roaming Horses and Burros Act of 1971 became law, it is doubtful that they were present on just 3 percent (19,700 acres) of the District[rsquo]s 616,000 acres. Restricting them so severely was likely a political accommodation to local ranchers. Now is the time to comply with the guidelines of the International Union for the Conservation of Nature (IUCN) by [hellip]

1. Making the WHT the entire District, thereby providing adequate habitat and connectivity as well as administrative convenience
2. Increasing the low-AML to 2,500 horses (242 acres per horse)
3. Increasing the high-AML to 3,080 horses (200 acres per horse)

Duncan, Patrick (Editor). 1992. Zebras, Asses, and Horses: An Action Plan for the Conservation of Wild Equids. International Union for the Conservation of Nature and Natural Resources. Retrieved from <http://data.iucn.org/dbtw-wpd/edocs/1992-043.pdf>

I also note that managing the horses[rsquo] habitat as a [ldquo]wildlife quiet area[rdquo] could have important benefits to the herd and to other animals. Those advantages were identified in a 2012 report prepared for the Forest Plan Revision. I urge ASNF to adopt that designation for the District / WHT. Here are salient passages:

This research and observations by Forest and AGFD biologists and wildlife managers have noted the on-going benefits of WQAs for wildlife, people, and other resources as follows:

- ? Improved wildlife population recruitment (more effective habitat).
- ? More acres of available and suitable habitat are used (more habitat).
- ? Peaceful nature viewing and greater chance of observing and photographing wildlife.
- ? Increased quality of the non-motorized hunt experience and, likely, hunter success (supported by ongoing hunter input).

? Healing of road related erosion and reduced user-created tracks.

? Improvement in soil and vegetation (improved habitat quality).

Forest and state biologist believe these benefits are likely the function of:

? Wildlife knowledge of, and site fidelity to, long-term security (core habitat) areas.

? Improved (more natural) predator prey functions (reduced human related disturbance to both predator and prey).

? Secure areas helping to provide habitat linkages across open, heavily human-utilized and managed areas.

There are additional benefits of having designated WQAs across the ASNFs. They provide a contextual framework for managing wildlife on a landscape scale providing longevity and continuity that simply closing or decommissioning roads does not provide. They lend themselves to assessing the impact of broad-scale treatments and the evaluation of species viability across the forest. They provide habitat linkages and help address the need for corridors that are especially important for highly interactive and mobile species like mountain lions and black bears. WQAs feature the importance of wildlife and their habitat on the ASNFs and reflect the value the public places on them; this has been strongly reiterated by the public in their comments during the forest planning process. WQAs also provide a benchmark of wildlife behavior and opportunities for research.

From page 8 [hellip]

The objective is to inform federal, state and private undertakings about the need to facilitate wildlife movement, remove barriers, and provide or preserve known linkages during project planning. When undertakings incorporate wildlife needs, both animals and the public are safer and the persistence of those species across the landscape will help be assured for future generations.

"[hellip] addressing the needs of wildlife across their entire habitat, regardless of land ownership.[rdquo]

From page 9 [hellip]

? Wildlife behavior changes notably in these areas, e.g., ungulates bedding down in the open during daylight (lack of stress).

? Many generations of wildlife have grown accustomed to using these areas.

? Wildlife numbers increase in even lesser quality habitat in the absence of motor vehicles (compensatory use) as demonstrated by current AZGFD research on the ASNFs.

? Some encompass riparian zones providing water and quality habitat free from human disturbance.

? Some provide wintering habitat free from the additional stress of motorized encounters during this critical life cycle with habitat limitations.

? A portion of the hunting public is pleased with nonmotorized hunting opportunities and they report observing more bull elk and black bear in these areas.

WhiteTrifaro, Linda. (April 2012). Wildlife Quiet Areas (WQAs) and Habitat Linkages Report. Apache-Sitgreaves National Forests. Accessed at stelprd3851962

#### Facilitation and Commensalism [mdash] Equids Enhance Livestock Production

Symbiosis (mutually-beneficial dependence) occurs with surprising regularity. Some species that were thought to compete actually facilitate one another's well-being as members of the same community. They interact positively and reduce physical stress.

Stachowicz, John J. (2001) Mutualism, Facilitation, and the Structure of Ecological Communities. *BioScience* (2001) 51 (3): 235-246. doi: 10.1641/0006-3568(2001)051[0235:MFATSO]2.0.CO;2. Retrieved from <http://bioscience.oxfordjournals.org/content/51/3/235.full>

Commensals are animals that eat "at the same table" without competing. Experiments have shown that cattle gain more weight [mdash] 60% more! [mdash] when grazed with equids, in this case, donkeys. Here are the pertinent excerpts:

Weight gain was significantly affected by mixed grazing, with cattle and donkeys gaining on average 60% and 51% more weight, respectively, under mixed species grazing than under single species grazing at both levels of stocking density. [Odadi et al., page 7]

... if the goal of livestock owners is to minimize risk and maintenance costs by getting beef to market at a target weight quickly, then grazing cattle with equids would be the most profitable strategy.

[Odadi et al., page 13]

... improvements in cattle performance facilitated by grazing in mixed species herds can produce financial gain under a variety of economic objectives. [Odadi et al., page 13]

Odadi WO, Jain M, Van Wierin SE, Prins HHT, and Rubenstein DI. (2011). Facilitation between bovids and equids on an African savanna. *Evolutionary Ecology Research* 13: 237-252 (2011). Accessed free download of pdf of the entire report, available at both of the following sites (check your download folder): <https://www.semanticscholar.org/paper/Facilitation-between-bovids-and-equids-on-an-Odadi-Jain/abf53f66b74856f6ca5a03929ed1655ccc17d510#paper-header> and/or <http://www.evolutionary-ecology.com/abstracts/v13/2646.html>

It is time to stop assuming that bovids and equids are competitive. Instead, recognize that they have a cooperative relationship, as the research shows. Forage-grazing is not a zero-sum game. Mixed herbivory [mdash] cattle with horses and/or burros [mdash] benefits all concerned.

#### Horses Graze Old Growth [mdash] Cattle Prefer New Growth

Wild horses happily graze on coarse, old-growth forage. (Think: Hay.) Horses are like lawn mowers. They take off the top growth [mdash] the dry, unpalatable layer. This grazing method enables plants to put down deeper roots, and it prevents weeds from maturing to produce seeds. The horses[rsquo] frequent [ldquo]mowing[rdquo] or [ldquo]topping[rdquo] prevents further flower-stalk development before seed-head emergence, when the stalks become woody and unpalatable to cattle. The mowing stimulates new shoots, which are of higher nutritional quality. As a result, cattle put on more weight. Thus, wild horses make the range better for livestock.

Grass Growth and Regrowth for Improved Management. (2020). Practical Applications. Topping Pastures. Oregon State University. Forage Information System. Department of Crop and Soil Science.

Retrieved from

<https://forages.oregonstate.edu/regrowth/how-does-grass-grow/developmental-phases/vegetative-phase/roots>

Livestock, in contrast to horses, prefer tender new growth. They will even return to patches previously grazed [mdash] not rested [mdash] to get at that new growth.

Hanselka CW, Lyons R, and Teague R. (2002, October) Patch Grazing and Sustainable Rangeland Production. AgriLife Communications and Marketing, Texas A&M University System. Retrieved from [http://www1.foragebeef.ca/\\$Foragebeef/frgebeef.nsf/all/frg30/\\$FILE/rangedistributionpatch.pdf](http://www1.foragebeef.ca/$Foragebeef/frgebeef.nsf/all/frg30/$FILE/rangedistributionpatch.pdf)

Heber WHT needs a lot more horses, even while cattle are still present.

Livestock and Horses Sharing pastures Is "Of Great Benefit" to All Concerned

When livestock and horses share [mdash] or rotate among [mdash] pastures, parasites are reduced. That is because, with one insignificant exception, horses and livestock ruminants are not afflicted by the same parasites. So, cattle and horses "serve as vacuum cleaners" [mdash] horses of cattle-parasites, cattle of horse-parasites. They "clean up" the pasture for one another. Such pasture-sharing is a holistic way to control parasites.

Please listen to the recorded interview on this topic-on-interest, linked below, with Ray M. Kaplan, DVM, PhD, Dipl. ACVIM, EVPC.

Run-time: 2minutes, 28 seconds

<https://thehorse.com/158246/can-horses-get-worms-from-cattle/>

Kaplan, Ray M. DVM, PhD, Dipl. ACVIM, EVPC. (2018, May 26). Internal Parasites: Can Horses Get Worms from Cattle? Sharing pastures with other species might be good for your horse. Find out why from Dr. Ray Kaplan. TheHorse.com. Accessed at <https://thehorse.com/158246/can-horses-get-worms-from-cattle/> Why a Holistic Approach to Parasite-Eradication Is Essential on Public Lands

Verd[uacute] et al. (2018) reported that chemical methods of reducing the parasite-load [mdash] ivermectin was singled out [mdash] are detrimental to dung beetles, which have an important role to fulfill in Nature.

Highlights of the Research

- \* At the short term, ivermectin residues cause a strong decrease in dung relocation and dung spreading by dung beetles.
- \* Conventional use of ivermectin disrupts diversity by affecting species richness, abundance and biomass of dung beetles.
- \* Reduction in the functional efficiency of dung degradation resulted in the long-term accumulation of manure.
- \* Use of ivermectin causes lower quality in soil organic C and the increase of the in-situ mineral N and P production.
- \* The results of this study highlight that the effects of ivermectin must be investigated from a global perspective.
- \* The use of this veterinary medical product must be monitored and controlled following a precautionary principle.

Verd[uacute] JR, Lobo JM, S[acute]nchez-Pi[n]tilde]ero F, Gallego B, Numa C, Lumaret JP, Cortez V, Ortiz AJ, Tonelli M, Garc[acute]a-Teba JP, Rey A, Rodr[acute]guez A, Dur[acute]n J. (2018). Ivermectin residues disrupt dung beetle diversity, soil properties and ecosystem functioning: An interdisciplinary field study. Science of The Total Environment. DOI: 10.1016/j.scitotenv.2017.10.331 Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/29128770>

With a robust population of wild horses in the District / Heber WHT, commensurate with the population of commercial cattle, the use of anthelmintics could be reduced or even eliminated. This approach would promote a thriving natural ecological balance.

#### A Heterogeneous Landscape Needs Grazing Animals

For several years now, I have had the opportunity, via teleconference, to audit the proceedings of the Modoc / Washoe Experimental Stewardship Program (ESP) quarterly meetings and to provide remarks during the public-comment periods. During the May 24, 2018 ESP meeting, the representative of the University of California Cooperative Extension Service pointed out that, to achieve the goal of a heterogeneous landscape, grazing animals are needed.

With cattle-grazing projected to wane, the Forests will need replacement grazers. ASNF should let the wild horses step up to exert their beneficial impact. Let them maintain the health and heterogeneity of the landscape now, and especially when the presence of cattle comes to an end.

#### Deer and Elk [mdash] Difficult for Their Populations to Replace Loss of Cattle

It is unlikely that AGFD would prohibit the hunting of deer and elk for a number of seasons in order for their herds to increase enough to replace cattle as grazers. But ASNF has a herd to do the job: Heber wild horses. Moreover, as non-ruminants, horses provide a different and complementary grazing strategy that will benefit the Forests.

#### Deer and Elk [mdash] Chronic Wasting Disease Depleting Them in Neighboring States

Although Arizona has not yet detected CWD [mdash] a deadly prion-disease [mdash] among its cervid-population, but bordering states have. AGFD is and has been taking proactive steps to keep CWD out of the state.

Arizona Game and Fish Department. (2019, August 16). Arizona Game and Fish Department enacting changes to protect Arizona's elk and deer from Chronic Wasting Disease. Retrieved at <https://www.azgfd.com/arizona-game-and-fish-department-enacting-changes-to-protect-arizonas-elk-and-deer-from-chronic-wasting-disease/>

Here again, horses are of benefit. Research by Dr. Mark Zabel [mdash] Associate Director of the Prion Research Center, Colorado State University, Fort Collins [mdash] disclosed that wild horses are resistant to prions. He believes that wild-horse grazing in infected areas could reduce the concentration of prions.

Schlossberg, Josh. (2018, February 27). Wild Horses May Hold a Solution to Slowing Spread of Fatal Chronic Wasting Disease in Deer, Elk. EnviroNews Colorado. Retrieved at <https://www.environews.tv/022718-wild-horses-may-hold-solution-slowing-spread-fatal-chronic-wasting-disease-deer-elk/#comments>

So, while they are keeping the landscape heterogeneous, wild horses are also likely protecting the deer from CWD.

#### ASNF Acknowledges the Dangers of Wildfire

On your Website, several priorities are identified. Among those, is the risk of wildfire, and that reducing it must be addressed.

The management concerns on the Apache-Sitgreaves include the health and restoration of the watersheds, sustaining the Forest's ecosystems, improving customer service in our recreation areas, reducing the dangers associated with wildfire in the urban interface, and maintaining the National Forest road system to desired standards.

Apache-Sitgreaves National Forests. About the Forest. United States Forest Service. Retrieved at <https://www.fs.usda.gov/main/asnf/about-forest>

#### Smoke-Free, Cost-Free, Ecologically-Safe Fire Prevention

Instead of intentionally setting fires to pre-burn areas of dried-out grass and brush, let wild horses graze down the overgrowth of those [ldquo]one-hour fuels.[rdquo] Wild horses thrive on marginal forage [mdash] that coarse dry stuff that cattle don't like. The horses' grazing-strategy helps reduce the fuel-load that would otherwise feed catastrophic wildfires. Wild horses are perfect for fire-prevention duty. In fact, there is a current proposal to deploy them to remote, rugged terrain [mdash] such as the Forests [mdash] where they will take up the slack left by the diminished cervid population. The idea is to have the dried-out forage feed wild horses instead of wildfires. The "Wild Horse Fire Brigade" plan and accompanying articles can be accessed at the site below. Simpson, William E. II. (No date). Natural Wildfire Abatement and Forest Protection Plan. Downloaded from <https://www.wildhorsefirebrigade.com/>

The award-winning short-documentary titled "Fuel, Fire, and Wild Horses" provides an overview of how wild horses prevent forest-fires.

Robin, Micah. (2019, March 29). Fuel, Fire, and Wild Horses. Run-time: 8minutes, 34seconds. Retrieved at <https://vimeo.com/327282987>

The article cited below provides a detailed description of the concept. Also note the analysis showing that horse-hooves have a lighter impact on turfs than cattle-hooves.

Simpson, William E. (2017, October 13). California wildfire disaster: New plan unveiled to save lives and natural resources. HorseTalk. Retrieved at <https://www.horsetalk.co.nz/2017/10/13/ecological-imbalance-wildfires-us-rangelands/>

#### Cost-Savings of \$72,000 per Wild Horse Deployed for Fire-Prevention

It is estimated that each wild horse that is free to graze down the dry, senescent forage [mdash] those one-hour fuels that might otherwise spark into a wildfire [mdash] would save taxpayers \$72,000. Instead of having staff pre-burn the forest, horses can pre-graze it. Simpson (2018) has crunched the numbers. Of course, millions of dollars of fire-fighting costs would be saved by the wild horses[rsquo] fire-prevention duty.

Simpson, William E. II. (2019, February 5). What Is The Value Of An American Wild Horse? Does \$72,000.00 sound right? Downloaded from <https://www.wildhorsefirebrigade.com/>

#### Fire Prevention [mdash] through Wild-Horse Grazing

Because wild horses happily graze on coarse, dry grasses as well as woody brush, twigs, and small branches, they remove what would otherwise become fodder for wildfires. As evidence the horses can reduce the one-hour fuels that feed wildfires, please watch the following short videos (Run-time: 1 minute, 22 seconds, each).

#### Video #1:

Simpson W and Simpson L. (No date). Shia Eating Grass.MOV. Documents a band of wild horses, with a close-up of one ([ldquo]Shia[rdquo]), grazing peacefully in a forested area of Northern California. Note that the forage is old and dry [mdash] senesced [mdash] essentially, hay. Such [ldquo]one-hour fuels[rdquo] can feed wildfires but instead, are feeding wild horses. Retrieved at <https://drive.google.com/file/d/0B5zON7zDatuqX0RsNgyLUNwZIk/view>

#### Video #2:



Simpson, William E. II. (No date). Wild horse eating oak branches, leaves. Video of a free-roaming horse feeding on downed oak twigs and leaves [mdash] evidencing that horses do graze on such dry, woody vegetation. Thus, horses reduce the one-hour fuels that could otherwise feed a wildfire. Retrieved at <https://drive.google.com/file/d/0B5zON7zDatuqZG9sOWFxdVFuNWc/view>

#### Wild Horse Fire Brigade [mdash] Saves Firefighters[rsquo] Health

Health-experts agree: Inhaling smoke is bad for your health. That includes the smoke generated from prescribed burns. Regardless of pre-burning being well-intentioned, the smoke it produces is bad for every creature [mdash] man or beast [mdash] that breathes it. Fire-setting staff and the animals of the Forests should not be subjected to smoke-inhalation when a superior, smoke-free way of consuming excess forage is available for free.

Burns, Jes. (2019, June 12). More Wildfires Bring Focus On How All That Smoke May Harm Firefighters. Oregon Public Broadcasting. National Public Radio. Retrieved from

<https://www.npr.org/2019/06/12/731435003/more-wildfires-bring-focus-on-how-all-that-smoke-may-harm-firefighters>

#### Fire Prevention [mdash] Saves Firefighters' Lives

Although fighting wildfires is dangerous work, the increasing number and severity of those fires and the lengthening of the fire season are having an adverse impact on firefighters. The incidence of suicides among firefighters is 38% higher than that of the general population.

Agrwal, Nina. (2019, March 1). Firefighter suicides reflect toll of longer fire seasons and increased stress. Los Angeles Times. [ldquo]The suicide rate among such workers has been estimated at 18 per 100,000 people, exceeding the rate in the general population of 13 per 100,000, according to a report by the Ruderman Family Foundation and federal data.[rdquo] Retrieved at

<https://www.latimes.com/local/lanow/la-me-ln-firefighter-suicides-20190302-story.html>

It is incumbent on USFS to use preventive methods to avoid burdening the already stressed fire-crews. Wild horses should be allowed to fulfil the fire-prevention function. They work for free [mdash] for food. They consume those one-hour fuels that need to be reduced.

#### Prescribed Burns Damage Soil-Structure and Organic Matter

New research has disclosed that low-intensity fires cause damage to soils, contrary to previously-held assumptions. Therefore, the benefits of prescribed burns are offset to some extent by the harm they inflict on soil structure and organic matter. This is yet another reason to use pre-grazing instead of pre-burning to deal with excess fuels.

Jian M, Berhe AA, Berli M, Ghezzehei TA. Vulnerability of Physically Protected Soil Organic Carbon to Loss Under Low Severity Fires. *Frontiers in Environmental Science*, 2018; 6 DOI: 10.3389/fenvs.2018.00066 This open-access study was retrieved from

<https://www.frontiersin.org/articles/10.3389/fenvs.2018.00066/full>

Jian M, Berli M, Ghezzehei TA. Soil Structural Degradation During Low-Severity Burns. *Geophysical Research Letters*, 2018; 45 (11): 5553 <https://doi.org/10.1029/2018GL078053> Limited access (paywall) from

<https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2018GL078053>

## Conclusions

I request thoughtful consideration of the information provided in these comments and adoption of the recommendations as best management practices.

Thank you.