December 1, 2020

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RE: Comment on the Integrated Non-Native Invasive Plant Management DEIS

Submitted at: https://cara.ecosystem-management.org/Public//CommentInput?Project=31150

Thank you for the opportunity to provide comment on the Integrated Non-Native Invasive Plant Management Draft Environmental Impact Statement (DEIS) on the Lincoln National Forest, New Mexico. Please accept these comments from the Center for Biological Diversity (The Center). The 60-day comment period ends on December 1, 2020, making these comments timely. The Center is a public-interest wildlife conservation organization that works to secure a future for all species. We do so through science, law and creative media, with a focus on protecting the lands, waters and climate that species need to survive. We provide these comments on behalf of our 1.7 million members and activist-supporters nationwide who value wilderness, biodiversity, old growth forests, and the threatened and endangered species which occur on America's spectacular public lands and waters.

I. THE DEIS FAILS TO DESIGN MANAGEMENT PRACTICES TO REDUCE OR MITIGATE THE RISK OF LIVESTOCK AS VECTORS OF INVASIVE SPECIES.

The EIS apparently "presents an integrated weed management strategy, as defined in Forest Service Manual 2900, for the prevention, eradication, suppression, and reduction of existing and future non-native invasive plant infestations."[1] The DEIS advances appropriate objectives to accomplish such a strategy, but falls short of meeting policy mandates. For example, Forest Service Manual 2900 directs the Forest Service to "Determine the vectors, environmental factors, and pathways that favor the establishment and spread of invasive species in aquatic and terrestrial areas the National Forest System, and design management practices to reduce or mitigate the risk for introduction or spread of invasive species in those areas." The DEIS admits that "dispersed recreation or livestock grazing can act as vectors to transport invasive seed"[2] but describes no management practices to reduce or mitigate the ability of cattle or recreation to act as vectors. In fact, the DEIS states in dozens of locations that the project will benefit livestock grazing, in spite of this industry being the source of many weeds. To make matters worse, the DEIS would increase the level of grazing currently occurring by allowing targeted grazing on weeds, a practice that has not been proven in the Southwest. In this regard the DEIS violates agency policy. Any subsequent NEPA document must correct this and meet the requirements of Forest Service Manual 2900.

[1] Oct 2020 NOA Letter at 2.
[2] DEIS at 94.

The best available science is clear that cattle grazing leads to increased prevalence and competitive advantage of invasive plants by a number of mechanisms, including livestock as direct vectors. NEPA requires agencies to utilize the best available scientific information. Please review these documents (submitted to CARA) to inform any subsequent NEPA documents.

● In one of the earliest, and perhaps the most seminal, publication on this subject, Fleischner (1994) summarized that "Grazing destabilizes plant communities by aiding the spread and establishment of exotic species, such as tamarisk *(Tamarix)* (Ohmart & Anderson 1982; Hobbs & Huenneke 1992). Livestock help spread exotic plant species by (1) dispersing seeds in fur and dung; (2) opening up habitat for weedy species, such as cheatgrass *(Bromus tectorum;* Gould 1951; Mack 1981), which thrive in disturbed areas; and (3) reducing competition from native species by eating them. As D'Antonio and Vitousek (1992) pointed out, alien grass invasions in North America have been most severe in the arid and semiarid West, where invasion by many species (including *Bromus tectorum, B. rubens, B. mollis, B. diandrus, Taeniatherum asperum,* and *Avena* spp.) was associated with grazing."[3]

● Ohmert (1996) summarized earlier studies on grazing and weed invasions, stating that: "Unmanaged grazing[4] extirpates palatable native species and creates opportunities for the establishment and expansion of exotic species that may be undesirable and unpalatable. Cottam and Evans (1945) reported the presence of 10 native grass species in a canyon protected from grazing since the late l800s (Red Butte), whereas these species were absent in a severely grazed canyon (Emigration) in Utah. Palatable grasses were 5 times greater in Red Butte than Emigration Canyon. Ruderals (unpalatable annuals and perennials, some being exotic such as cheat grass [Bromus tectorum]), were 7 times more abundant in Emigration Canyon. Young and Evans (1989) tie deteriorated range condition to the establishment and spread of exotic and noxious weeds in Nevada. Duff (1979) reported that in an exclosure on Big Creek in Utah, the more mesophyllic vegetation along the stream was moving outward from the stream as groundwater reserves increased, while in the grazed portion upland vegetation (i.e., sagebrush) continued invading the floodplain.[5]

● Belsky and Gelbard (2000) provide a comprehensive review of grazing and weed invasions, finding that "At the landscape and regional scales, livestock grazing is one of several factors causing and enhancing the invasion of alien weeds into grassland, shrubland, and woodland communities; but at the community scale, livestock may be the major factor causing these invasions."[6]

● In a massive 2006 report, the Food and Agriculture Organization of the United Nations reported that livestock grazing "directly affects biodiversity through invasive alien species (the livestock themselves and diseases for which they may be vectors) …. The contribution of the livestock sector to detrimental invasions in ecosystems goes well beyond the impact of escaped feral animals. Because of the many forms this contribution takes, the overall impact in this category of threat is perhaps even too complex for accurate assessment. One such other dimension is livestock's role as an important driver behind

[3] Fleischner, T.L. 1994. Ecological costs of livestock grazing in western North America. *Conservation Biology* 8(3): 629-644.

[4] If the current situation with the jumping mouse is an indicator, the Lincoln National Forest is essentially practicing unmanaged grazing by allowing permittees to continue violating permits and the ESA in critical habitat. We have reported on this in numerous letters and comments on file with the Lincoln National Forest.

[5] Ohmart, R.D. 1996. Historical and Present Impacts of Livestock Grazing on Fish and Wildlife. In: Krausman, P. R., ed. Rangeland Wildlife. Denver, CO: Society for Range Management: 245-279.

[6] Belsky, A.J. and J. L. Gelbard. 2000. Livestock Grazing and Weed Invasions in the Arid West. A Scientific Report published by The Oregon Natural Desert Association. 31 pp.

habitat change leading to invasions.…Movement of animals and animal products also makes them important vectors of invasive species."[7]

● In an article in Science, Parker and colleagues (2006) reported that a "meta-analysis of 63 manipulative field studies including more than 100 exotic plant species revealed that native herbivores suppressed exotic plants, whereas exotic herbivores facilitated both the abundance and species richness of exotic plants." They concluded that their findings have "considerable implications for ecosystem conservation, suggesting that eradication of exotic herbivores and restoration of native generalist herbivores could mitigate exotic plant invasions and avoid problems associated with introductions of nonnative herbivores for biocontrol."[8]

● In a study of seed composition in ungulate feces in Oregon, Bartuszevige and Endress (2008) documented that "A disproportionate number of exotic species germinated from cattle fecal pats and most of those species were exotic grasses…We projected that cattle disperse a disproportionate number of seeds, and exotic seeds in particular, in the Wallowa-Whitman National Forest compared to elk and deer."[9] Also, this paper references a number of papers that "investigated the potential for cattle to disperse seeds," which we request the Forest Service review.

● Sinkins and Otfinowski (2012) reported that summer grazing on rough fescue prairie led to its displacement and dominance by invasive exotic plants, and that even after more than forty years of rest form grazing, areas classified as heavily grazed in 1973 remained dominated by exotic species.[10]

● Reisner and colleagues (2013) investigated factors influencing cheatgrass invasions in the Great Basin and founds that "Grazing exacerbates Bromus tectorum dominance in one of North America's most endangered ecosystems by adversely impacting key mechanisms mediating resistance to invasion."[11]

● Eldridge and colleagues (2018) reported that in semi-arid rangelands of eastern Australia "livestock grazing increases exotic species richness but reduces native richness, while [native ungulate] grazing increases native richness in environments with low productivity."[12]

● Root et al (2019) found that "Grazing disturbance promotes exotic annual grasses by degrading soil biocrust communities."[13]

● Williamson and colleagues (2019) "data and results indicate that grazing corresponds with increased cheatgrass occurrence and prevalence regardless of variation in climate, topography, or community

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[7] Steinfeld, H., P. Gerber, T. Wassenaar, V. Castel, M. Rosales and C. de Haan, 2006. Livestock's Long Shadow. Environmental Issues and Options. Food and Agriculture Organization of the United Nations. 408 pp.

[8] Parker, J.D., D.E. Burkepile, and M.E. Hay. 2006. Opposing effects of native and exotic herbivores on plant invasions. *Science* 311: 1459-1461.

[9] Bartuszevige, A.M., and B.A. Endress. 2008. Do ungulates facilitate native and exotic plant spread? Seed dispersal by cattle, elk and deer in northeastern Oregon. *Journal of Arid Environments* 72: 904-913.

[10] Sinkins, P.A., and R. Otfinowski. 2012. Invasion or retreat? The fate of exotic invaders on the northern prairies, 40 years after cattle grazing. *Plant Ecology* 213: 1251-1262.

[11] Reisner, M.D., J.B. Grace, D.A. Pyke and P.S. Doescher. 2013. Conditions favouring Bromus tectorum dominance of endangered sagebrush steppe ecosystems. *Journal of Applied Ecology* 50: 1039-1049.

[12] Eldridge, D.J., M. Delgado-Baquerizo, S.K. Travers, J. Val, I. Oliver, J.W. Dorrough, and S. Soliveres. 2018. Livestock activity increases exotic plant richness, but wildlife increases native richness, with stronger effects under low productivity. *Journal of Applied Ecology* 55: 766–776.

[13] Root, H.T., J.E.D. Miller and R. Rosentreter, 2019. Grazing disturbance promotes exotic annual grasses by degrading soil biocrust communities. Ecological Applications 30(1): 10 pp

composition, and provide no support for the notion that contemporary grazing regimes or grazing in conjunction with fire can suppress cheatgrass."[14]

● The DEIS cites DiTomaso (200), which states that "Many ranges have had domestic stock grazing for more than 100 years and, as a result, the plant composition has changed greatly from the original ecosystems. Western rangelands previously dominated by perennial bunchgrasses have been converted, primarily through overgrazing, to annual grasslands that are susceptible to invasion by introduced dicots."[15] We appreciate that the Forest Service cited an article which describes well the problem that we have opined on in this letter. Now, any subsequent NEPA document must properly respond to this public comment and cite and evaluate the papers that we have presented here.

II. THE DEIS FAILS TO JUSTIFY TARGETED GRAZING AND DOES NOT DISCLOSE THE POTENTIAL IMPACTS

The DEIS states that "Most NNIP species are well adapted to invade heavily grazed areas, thereby allowing competitive advantage; and some NNIP species have chemical or physical defenses (spines) that prevent them from being utilized by livestock."[16] This is a first step towards admitting that livestock are a major factor in the perpetuation of invasive plants on the Lincoln National Forest. Instead, the Forest Service wishes to increase the level of grazing from current levels under the sham of targeted grazing.

A scientific review of this practice states that targeted grazing uses "a specific kind of livestock at defined timing, intensity, duration, and location of grazing to resolve specific vegetative issues as an alternative or in combination with other practices such as herbicide applications, mechanical treatments, or prescribed burning. Like other management, targeted grazing should be approached as an adaptive process, where applications are monitored and evaluated so that the techniques can be improved and refined."[17] Unfortunately, the Lincoln National Forest has proven itself to be utterly incapable of controlling grazing permittees, especially in areas where there are high concentration of exotic thistles which are to be targeted by this project.

Given the unwillingness to control the "timing, intensity, duration, and location of grazing" across the Sacramento and Agua Chiquita Allotments, for example, there is no way that targeted grazing could be controlled. So, in essence, targeted grazing would be an easy way to allow the most reckless permittees to increase their stock as they see fit under the lackluster oversight of Lincoln National Forest range staff.

The DEIS states that "A site-specific project operation plan would be developed for the treatment area that would consider factors such as target NNIP species, type of livestock to be used, forage preference, planned grazing intensity, herding characteristics, topography, water availability, and season of use, existing grazing operations, and a monitoring program."[18] Any such operation plan must have its own

[14] Williamson, M.A., E. Fleishman, R.C. Mac Nally, J.C. Chambers, B.A. Bradley, D.S. Dobkin, D.I. Board, F.A. Fogarty, N. Horning, M. Leu and M.W. Zillig. 2019. Fire, Livestock Grazing, Topography, and Precipitation Affect Occurrence and Prevalence of Cheatgrass (Bromus Tectorum) in the Central Great Basin, USA. Biological Invasions https://doi.org/10.1007/s10530-019-02120-8(0123456789().,-volV)(01234567

[15] DiTomaso, J. M. 2000. Invasive weeds in rangelands: Species, impacts and management. Weed Science. 48(2): 255-265.

[16] DEIS at 91.

[17] D.W. Bailey, J.C. Mosley, R.E. Estell, et al., Synthesis Paper: Targeted Livestock Grazing: Prescription for Healthy Rangelands, Rangeland Ecology & Management, https://doi.org/10.1016/j.rama.2019.06.003

[18] DEIS at 21.

standalone NEPA analysis. Without site-specific analysis and ESA consultation, there is no way to assure that the proposed targeted grazing is effective and would not cause harm. Any subsequent NEPA document must specify that any future site-specific project operation plan will have its own NEPA analysis and disclose the inherent contradiction of using livestock to control a problem that is caused by livestock. Because the DEIS has not analyzed the effects of livestock grazing that would result form targeted grazing programs, additional analysis is needed.

As one example of how inadequate and one-sided the DEIS is on the issue of targeted grazing, we will look at cheatgrass. Citing a report from 1994,[19] the DEIS is badly outdated with regards to cheatgrass and targeted grazing. The DEIS claims that "Livestock grazing can be purposely manipulated to control cheatgrass."[20] This may be true in a controlled laboratory setting, but the Lincoln National Forest is an abysmal failure at managing livestock permittees, so we have no faith that the Forest Service could ever implement a successful program using controlled grazing. This scheme will backfire, no doubt. Specifically, any subsequent NEPA document must consider and discuss each of the following scientific papers that describe the specific pathways through which livestock cause cheatgrass introduction, spread, and persistence, and disclose how the proposed targeted grazing would affect invasive plants over the longer term:

● Reisner et al. (2013)[21] stated that: "[o]ur results provide strong support for some *a priori* hypothesized mechanisms (i.e. cattle trampling reduces bunchgrass and [Biological Soil Crust] abundance) and no support for others (i.e. cattle reduce invasions by grazing *B. tectorum*)." They concluded that: "[o]ur findings raise serious concerns regarding proposals to use cattle grazing to control *B. tectorum* in these systems where remnant bunchgrass communities persist (Vallentine & Stevens 1994). In contrast, our findings support recent guidance for passively restoring resistance of these systems by reducing grazing levels (Pyke 2011).

● Williamson et al. (2019)[22] found that grazing corresponds with increased cheatgrass occurrence and prevalence regardless of variation in climate, topography, or community composition, and provide no support for the notion that contemporary grazing regimes or grazing in conjunction with fire can suppress cheatgrass.

● Root et al. (2019)[23] sampled random sites in Idaho's Snake River Plain and measured biocrust communities and vegetation across low, medium, and high grazing intensities. They found biocrust cover and species richness negatively related to grazing intensity, with plots with the lowest grazing intensity having the highest biocrust diversity and cover. Additionally, they found that exotic annual grasses were substantially more abundant in plots with higher grazing intensity. Their results indicated that reduction of biocrust cover and richness favored exotic annual grasses and disfavored perennial grasses, highlighting the importance of biocrust cover in maintaining site resistance to invasion by exotic annual grasses.

[19] Vallentine, J.F., and A.R. Stevens. 1994. Use of livestock to control cheatgrass--a review. In: S.B. Monsen and S.G. Kitchen, editors. Proceedings--ecology and management of annual rangelands. General Technical Report INT-GTR-313. USDA Forest Service, Intermountain Research Station, Ogden, UT. Pages 202-206.

[20] DEIS at 282.

[21] Cited earlier in this letter

[22] Cited earlier in this letter

[23] Cited earlier in this letter

● Condon and Pyke (2018)[24] summarized that "Evidence of grazing was more pronounced on burned sites and was positively correlated with the cover of B. tectorum, indicating an interaction between fire and grazing that decreases site resistance." However, even "[i]ndependent of fire, grazing impacts resulted in reduced site resistance to B. tectorum, suggesting that grazing management that enhances plant and biocrust communities will also enhance site resistance.

● Baker (2011)[25] stated "vulnerability to post-fire cheatgrass expansion has been positively correlated with high pre-fire cheatgrass, low cover of biological soil crust, and low native forb and grass cover, all of which are associated with degradation by domestic livestock grazing."

● McGlone and colleagues (2009) speculated that cattle grazing in combination with drought was responsible for the cheatgrass invasion of restored ponderosa pine forests at Mount Trumbull, adding that it was possible that cattle transported cheatgrass seeds from lower elevation pastures.[26]

The DEIS fails to analyze a range of reasonable alternatives by including controlled grazing in both action alternatives. Any subsequent NEPA document should present a third action alternative that eliminates controlled grazing. This is not unreasonable, as the only plant that the DEIS has provided evidence for successful targeted grazing is leafy spurge. The DES admits that (1) "Leafy spurge occurs in very limited populations on the Sacramento Ranger District,"[27] (2) "The milky latex found in leafy spurge causes lesions around the eyes and mouth when eaten by cattle," and (3) "The availability of herds managed for this type of control may be limiting,"[28] so it is not unreasonable to consider alternative methods for treatment of this species. Furthermore, as we have made clear in previous correspondence to the Lincoln National Forest, and reiterated here, your staff are completely unable to control grazing permittees, which essentially dooms targeted grazing to fail. The DEIS assumes that no grazing would occur in jumping mouse habitats, but this is a fantasy. If the current situation is any precedent, then we must assume that grazers would end up congregated only in the riparian areas. However, the DEIS fails to analyze the realistic outcomes of targeted grazing and relies on assumptions that are unattainable. Failure to analyze our proposed alternative or to justify why it is unwarranted would violate NEPA.

III. RIPARIAN CONSERVATION AREAS ARE UNDEFINED.

The term "Riparian Conservation Area" never appears in the Lincoln National Forest Preliminary Draft Land and Resource Management Plan, released in May 2019. The term "Riparian Conservation Area" never appears in any volume of the socio-economic or ecological assessment, released in July 2018. The term never appears in the 1986 Forest Plan. It never appears in the South Sacramento Restoration Project Draft Environmental Impact Statement, released in February 2019, nor in the Riparian and Aquatic Ecosystem Strategy Southwestern Region of the Forest Service, released in September 2019. In fact, it doesn't appear in anything other than three spots in the Integrated Non-Native Invasive Plant

[24] Condon, L.A. and D.A. Pyke. 2018. Fire and Grazing Influence Site Resistance to *Bromus tectorum* Through Their Effects on Shrub, Bunchgrass and Biocrust Communities in the Great Basin (USA). *Ecosystems* https://doi.org/10.1007/s10021-018-0230-8

[25] Baker, W.L. (2011). Pre-Euroamerican and Recent Fire in Sagebrush Ecosystems. Pages 185–201 in S. T. Knick and J. W. Connelly, editors. Ecology and conservation of Greater Sagegrouse: a landscape species and its habitats. Studies in Avian Biology, vol. 38. University of California Press, Berkeley, California, USA.

[26] Cited earlier in this letter

[27] DEIS at 274.

[28] DEIS at 21.

Management Project DEIS. Despite this vagary, we are intrigued, especially because it seems that protection of the Mexican spotted owl and New Mexico meadow jumping moue will be achieved through this designation. We welcome the designation of Riparian Conservation Areas as one step in restoring the devastated riparian areas on the Lincoln National Forest. The Forest Service has supported and embraced the cattle industry's abuse and neglect of riparian areas on the Lincoln National Forest for too long. Any subsequent NEPA document prepared for the Integrated Non-Native Invasive Plant Management Project must describe what these Riparian Conservation Areas are, where they occur, and how they will be managed to improve degraded current conditions.

IV. THE DEIS HERBICIDE PROPOSAL AND ANALYSIS VIOLATES THE ENDANGERED SPECIES ACT.

In considering permitting the use of 24 different herbicides in the Lincoln National Forest, the Forest Service fails to comply with its substantive mandates under the Endangered Species Act. This is acutely important as the Sacramento Mountains are a core population area for Mexican spotted owl, the Forest is home to a mouse on the brink of extinction (owing solely to horrendous range management), and the Forest generally is home to a higher than average amount of endemic species. To complicate this, many of the invasive species targeted in this DEIS exist in close proximity to protected species. As described above, the proposed Riparian Conservation Areas are meaningless and will do nothing to protect the owl and the mouse, because they exist only on paper.

The DEIS states that "All alternatives are consistent with Environmental Protection Agency, Occupational Health and Safety Administration, state and federal water and air quality regulations, and Forest Service regulations regarding pesticide use and worker safety."[29] However, in looking at the impacts of the various herbicide use alternatives, the Forest Service fails to recognize one key fact, that the EPA has never completed Section 7 consultation under the Endangered Species Act ("ESA" or "Act") for any of the pesticides proposed for use. In the wake of EPA's failure to complete ESA consultations on these pesticides, the Forest Service and U.S. Fish and Wildlife Service cannot simply rely on other risk assessments unrelated to ESA consultation to determine effects to species.

For decades, the EPA has refused to comply with its substantive and procedural ESA duties when it registers pesticides. Despite the clear and unambiguous command of the Endangered Species Act, the EPA has never implemented a nationwide pesticide consultation with the Services on the registration of any pesticide. Indeed, absent litigation forcing the EPA to comply with the law, the EPA has never voluntarily consulted on the impacts of any pesticide or pesticide product on any species.[30] Restricting herbicide use formulations to those containing either EPA or Forest Service risk assessments does nothing in terms of ESA compliance for this project. These risk assessments fail to comply with the basic mandates of the Act, as their purpose is pesticide registration, and they do nothing to actually look at effects on individual listed species, as required by the Act.

The Endangered Species Act was enacted to provide a "means whereby the ecosystems upon which endangered species and threatened species depend may be conserved…[and] a program for the

[29] DEIS at iv.

[30] EPA has voluntarily implemented conservation measures for four listed species over the past 50 years: (1) measures to protect Attwater's prairie chicken from thiram, (2) measures to protect the Delmarva fox squirrel from carboxin, (3) measures to protect the Karner blue butterfly from methoxyfenozide, and (4) measures to protect the Hine's emerald dragonfly from methoxyfenozide.

conservation of such endangered species and threatened species."[31] As the Supreme Court has unequivocally summarized, the ESA's "language, history and structure" make clear and "beyond doubt" that "Congress intended endangered species to be afforded the highest of priorities," and endangered species should be given "priority over the 'primary missions' of federal agencies."[32] Simply put, "[t]he plain intent of Congress in enacting this statute was to halt and reverse the trend toward species extinction, whatever the cost."[33] The ESA defines "conservation" to mean "the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary."[34]

The EPA and Forest Service risk assessments do not afford endangered species the highest of priorities, and cannot be used to analyze the effects of herbicides on listed species. To fulfill the substantive purposes of the ESA, each federal agency is required to engage in consultation with the Services to "insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the adverse modification of habitat of such species . . . determined . . . to be critical. . . ."[35] The obligation to "insure" against a likelihood of jeopardy or adverse modification requires the agency to give the "benefit of the doubt" to endangered species and to place the burden of risk and uncertainty on the agency taking the proposed action.[36]

Section 7 "consultation" is required for "any action [that] may affect listed species or critical habitat."[37] Agency "action" means "all activities or programs of any kind authorized, funded or carried out in whole or in part by Federal agencies . . ."[38] This definition is meant to be expansive and includes, but is not limited to, "(a) actions intended to conserve listed species or habitat; (b) the promulgation of regulations; (c) the granting of licenses, contracts, leases, easements, rights-of-way, permits, or grants-in-aid; or (d) actions directly or indirectly causing modifications to the land, water, or air."[39]

Under the Services' joint regulations implementing the ESA, an action agency such as the Forest Service must initiate consultation under Section 7 whenever its discretionary action "may affect" a listed species or critical habitat.[40] Only where the action agency determines that its action will have "no effect" on listed species or designated critical habitat is the consultation obligation lifted.[41]

Adoption of any herbicide use as contemplated in the DEIS's preferred alternative absolutely triggers the need for Section 7 consultation for the threatened and endangered plants and animals that cling to existence in the Lincoln National Forest.

Section 7(a)(2) requires that the action agency determine at the earliest possible time whether the action "may affect" listed species, or else issue a "no effect" determination.[42] The "may affect" threshold is

[31] 16 U.S.C. §§ 1531-1544; 16 U.S.C. § 1531(b).
[32] *Tenn. Valley Auth. V. Hill*, 437 U.S. 153, 174-75 (1978).
[33] *Id.* at 184.
[34] *Id.* at § 1532(3).
[35] *Id.* § 1536(a)(2).
[36] *See Sierra Club v. Marsh*, 816 F.2d 1376 1385 (9th Cir. 1987).
[37] 50 C.F.R. § 402.14
[38] *Id.* at § 402.02.
[39] *Id.*
[40] 50 C.F.R. § 402.14(a); *See also Ass'n of Home Builders v. Defenders of Wildlife*, 551 U.S. 644 (2007).
[41] 50 C.F.R. § 402.14(a).
[42] 50 C.F.R. § 402.14(a).

"relatively low" to ensure that "actions that have any chance of affecting listed species or critical habitat—even if it is later determined that the actions are not likely to do so—require at least some consultation under the ESA."[43] If the "may affect" threshold is met, the agency must determine if the action is "likely to adversely affect" (LAA) or "not likely to adversely affect" (NLAA) listed species and obtain concurrence from the Services. When a LAA determination is made, formal consultations with the Services are required.

When the Forest Service initiates consultation on this action, it must not only consider the direct effects when making this threshold call of whether the herbicides may affect listed species, but it also must consider indirect and cumulative effects. For example, for a listed bird, the Forest Service must not only consider the direct effect of lost habitat if herbicides are used to kill trees they nest in, but it also must consider indirect effects such as the loss of plants that provide habitat for the insects that the bird consumes. And it must consider the cumulative effects, like of bioaccumulation of the herbicide in soil and associated effects on insects and soil microbes.

Adopting any of the alternatives that would allow for herbicide use will in effects to listed species, and in addition to passing the "may affect" threshold, this action would also likely exceed the "likely to adversely affect" threshold as well, thereby triggering the requirement to conduct formal consultation with the U.S. Fish and Wildlife Service. The Forest Service may not move forward with any final decisions on this plan until it completes formal ESA consultation.

In addition to requiring consultation under Section 7, Under Section 9 of the ESA it is illegal for any person—whether a private or governmental entity—to "take" any endangered species of fish or wildlife listed under the ESA.[44] "Take" is defined to mean "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in such conduct."[45] FWS has defined "harm" to include "significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering."[46] Only an incidental take statement issued along with a final biological opinion can shield the action agency from the prohibition against take. If the Forest Service allows any herbicide use prior to completing formal consultation with the U.S. Fish and Wildlife Service, it will very likely be committing unauthorized take, and will be subject to the consequences provided under the Act. Because of this fundamental flaw, the Forest Service must address the ESA violations described here in any subsequent NEPA document.

V. THE DRAFT PLAN AND DEIS FAIL TO INCORPORATE THE BEST AVAILABLE SCIENCE ON THE RISKS POSED BY HERBICIDES TO WILDLIFE, WATER, AND ECOSYSTEMS.

In order to ensure the Forest Service has access to the best available science regarding the risks posed by herbicides to wildlife, water, and ecosystems (as required by NEPA), we have reviewed essential information and summarized it here. At the outset we must assert that we are strongly opposed to aerial application, especially in wilderness or roadless areas. This is completely reckless and unwarranted. The

[43] *Karuk Tribe of Cal. v. U.S. Forest Serv.*, 681 F.3d 1006, 1028 (9th Cir. 2012).
[44] 16 U.S.C. § 1538(a)(1)(B).
[45] *Id.* § 1532(19).
[46] 50 C.F.R. § 222.102.

DEIS fails to make a compelling case for why such vast spraying would be needed, violating NEPA. Any subsequent NEPA document should eliminate all proposed aerial herbicide application.

Aminocyclopyrachlor (ACP)

ACP is extremely harmful to plants, particularly dicots. EPA found that if used according to the label, nearby, non-target plants could be exposed to as much as 18,000 times the level of ACP known to cause harm.[47] The EPA's risk level of concern (a comparison of the estimated exposure concentration and the concentration known to cause harm) was exceeded by 3,600 and 18,200 for ESA-listed dicot plants for ground and aerial non-crop applications, respectively, and by 37 and 189 for non-listed dicot plants for ground and aerial non-crop applications, respectively.[48] And that is just when measuring how spray drift only will affect the vegetative vigor of plants. When modelling how the combination of spray drift and runoff could impact seedling emergence, EPA found that both listed and non-listed dicots could be exposed to nearly 300 times the concentration known to cause harm.[49]

Harm to listed and non-listed dicot plants from ACP spray drift was found to occur at distances greater than 1000 feet from ground applications – even when modelled at a reduced application rate – and greater than 2,600 feet from aerial applications.[50] As such, the EPA has stated that the use of ACP may affect any ESA-listed species of plant and animal if its use overlaps with a species' range.[51]

This estimated harm from the EPA-approved, labelled uses of ACP is significant and clearly explains why there have been many extremely adverse incidents associated with its use. When ACP first came on the market ten years ago, its maker was besieged by at least 30,000 claims from homeowners, golf courses, municipalities and landscapers that the herbicide damaged non-target trees.[52] It is estimated that hundreds of thousands of trees were killed or damaged by ACP in the first two years of its use.[53] More recently in Oregon, all formulations containing ACP are now highly restricted in the state following years of damage to 2,000 ponderosa pines in the state.[54] Many of the dead and dying trees were 150-300 years old.[55] Environmental sampling found the presence of ACP in dead and dying trees

[47] EPA. Memorandum. Transmittal Memo regarding the "Ecological Risk Assessment for the Section 3 New Chemical Registration of Aminocyclopyrachlor on Non-crop Areas and Turf." January 22, 2010. Pgs 50-51. Available here: https://www.regulations.gov/document?D=EPA-HQ-OPP-2009-0789-0004.

[48] *Id.*

[49] *Id.*

[50] *Ig.* at 53-54.

[51] *Id.* at 57.

[52] Robbins, J. DuPont Facing 30,000 Claims for Tree Deaths. New York Times. June 22, 2012. Available here: https://green.blogs.nytimes.com/2012/06/22/dupont-facing-30000-claims-for-tree-deaths/.

[53] *Id.*

[54] Cureton, E. Oregon Becomes 1st State To Sharply Restrict Herbicide Linked To Tree Deaths. Oregon Public Broadcasting. May 10, 2019. Available here: https://www.opb.org/news/article/oregon-herbicide-restriction-aminocyclopyrachlor-perspective-acp-sisters/.

[55] Oregon Department of Agriculture. PESTICIDE ADVISORY Permanent Rule Impacting the Use of Aminocyclopyrachlor on Specific Sites. Available here: https://www.oregon.gov/ODA/programs/Pesticides/RegulatoryIssues/Documents/Documents/2019/ACPPesticideAdvisory.pdf

6 years since the last nearby application was made.[56] An investigation by the Oregon Department of Agriculture found that all ACP applications were made according to the EPA-approved label.[57]

In addition to harm to trees and other plants, EPA also found significant weight reduction in birds exposed to ACP for short periods of time and the agency did not have enough data to sufficiently analyze chronic risk to birds from ACP exposure. Therefore, birds appear to be at risk of acute harm due to ACP exposure and there is not enough information to indicate that chronic, long-term exposures are safe.

2,4-D

2,4-D is a persistent, mobile herbicide used for control of broadleaf plants. It is a widespread water contaminant with monitoring data from the USGS, EPA, USDA, the California Department of Pesticide Regulation and the Washington Department of Agriculture finding traces of the pesticide in 37-59 percent of all surface water samples tested.[58] 2,4-D is highly prone to pesticide drift events due to its volatility and toxicity and has consistently been the most common pesticide involved in drift complaints.[59]

The labeled, aquatic use of 2,4-D can kill aquatic plants and invertebrates that endangered fish rely on for food and shelter, resulting in the U.S. National Marine Fisheries Service concluding that the use of 2,4-D was likely to jeopardize the continued existence of endangered Pacific salmon and steelhead species.[60] In addition the EPA determined that nearly all current labeled uses of 2,4-D were likely to adversely affect endangered amphibians and reptiles like the endangered California Red-legged Frog and Alameda Whipsnake.[61]

In a 2016 evaluation, EPA found that 2,4-D can cause direct harm to all plants and animals if used according to the EPA-approved label.[62] Harms found specifically for non-crop uses, like the ones proposed, are to ESA-listed vascular aquatic plants,[63] chronic harm to all species of birds that feed on short grasses,[64] acute harm to all species of mammals,[65] sublethal effects to pollinators such as bees,[66] and all terrestrial plants.[67] The potential for harm to non-target plants from spray drift extends up to 250

[56] Oregon Department of Agriculture. Natural Resources Pesticides Program. Notice Of Proposed Rulemaking Filing Including Statement Of Need & Fiscal Impact. Available here: https://www.oregon.gov/ODA/programs/Pesticides/RegulatoryIssues/Documents/Documents/2019/ACPRuleJustification.pdf.

[57] *Id.*

[58] EPA. Preliminary Ecological Risk Assessment for Registration Review of 2,4-D. June 29, 2016. Available here: https://www.regulations.gov/document?D=EPA-HQ-OPP-2012-0330-0047. Pg 24.

[59] AAPCO. Association of American Pesticide Control Officials. 2005 Pesticide Drift Enforcement Survey Report. 2005; Available from: https://www.centerforfoodsafety.org/files/aapco-2005_29712.pdf.

[60] NMFS. National Marine Fisheries Service Endangered Species Act Section 7 Consultation. Biological Opinion Environmental Protection Agency Registration of Pesticides 2,4-D, Triclopyr BEE, Diuron, Linuron, Captan, and Chlorothalonil. June 30, 2011. Available here: https://www3.epa.gov/pesticides/endanger/litstatus/final-4th-biop.pdf.

[61] EPA. Risks of 2,4-D Use to the Federally Threatened California Red-legged Frog (Rana aurora draytonii) and Alameda Whipsnake (Masticophis lateralis euryxanthus). Pesticide Effects Determination. Feb. 20, 2009. Available from: https://www3.epa.gov/pesticides/endanger/litstatus/effects/redleg-frog/2-4-d/analysis.pdf.

[62] *Id.*

[63] *Id.* Pgs 45-46.

[64] *Id.* Pgs 47-48.

[65] *Id.* Pgs 48-49.

[66] *Id.* Pgs 50-51.

[67] *Id.* Pgs 51-55.

ft away from the site of application at an application rate of 2 lb/acre (the maximum application rate for non-crop uses is twice as high at 4 lb/acre).[68]

There have been a high number of incidents involving human harm from 2,4-D. From 2007 to 2012, there were over 2,000 incidents reported to the EPA involving neurological, respiratory, liver, and kidney dysfunctions.[69] EPA also identified occupational exposure risks of concern via inhalation.[70] The EPA also found that "Based on currently available toxicity data, which demonstrate effects on the thyroid and gonads following exposure to 2,4-D, there is concern regarding its endocrine disruption potential."[71] Altered hormone levels have also been associated with urinary 2,4-D levels in human epidemiological studies.[72,73]

The Ninth Circuit ruled in July of this year that the EPA violated the FIRFA by failing to assess adverse effects of a mixture of glyphosate with 2,4-D on monarch butterfly habitat.[74]

Clethodim

Clethodim poses a risk to many non-target organisms, including freshwater fish and amphibians, for every single approved use of the pesticide.[75] Mammals are also estimated to experience chronic harms from many uses of clethodim.[76] Terrestrial plants, particularly monocots, are expected to experience reduced seedling emergence more than 1000 ft away from the treated area and experience growth impairment nearly 500 ft from the treated area.[77]

Clopyralid

EPA has found that some clopyralid uses can expose small and medium-sized mammals to levels of clopyralid that can decrease body weight and food consumption.[78] Risks of concern were also identified for endangered herbivorous birds, reptiles and terrestrial amphibians, and terrestrial invertebrates, based on short-term exposures from the labelled uses of clopyralid.[79] The EPA found that clopyralid spray drift can result in harm to ESA-listed and non-ESA listed plants at a distance of more than 1,000 ft from where it is sprayed.[80] When modelling the lowest approved application rate, EPA found that plants can

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[68] *Id.* Pg 63.
[69] EPA. 2,4-D: Tier II Incident Report. June 28, 2016. Available here: https://www.regulations.gov/document?D=EPA-HQ-OPP-2012-0330-0046. Pgs 2-3.
[70] EPA. 2,4-D. Revised Occupational and Residential Exposure Assessment for Registration Review. Nov. 15, 2016. Available here: https://www.regulations.gov/document?D=EPA-HQ-OPP-2012-0330-0085.
[71] EPA. *Reregistration Eligibility Decision for 2,4-D*. 2005; Available from: http://www.epa.gov/pesticides/reregistration/REDs/24d_red.pdf.
[72] Garry, V.F., et al., Biomarker correlations of urinary 2,4-D levels in foresters: genomic instability and endocrine disruption. Environ Health Perspect, 2001. 109(5): p. 495-500.
[73] Schreinemachers, D.M., Perturbation of lipids and glucose metabolism associated with previous 2,4-D exposure: a cross-sectional study of NHANES III data, 1988-1994. Environ Health, 2010. 9: p. 11.
[74] https://www.jdsupra.com/legalnews/epa-failed-to-evaluate-potential-13674/
[75] EPA. Clethodim: Preliminary Ecological Risk Assessment for Registration Review. January 13, 2014. Pgs 51-52. Available here: https://www.regulations.gov/document?D=EPA-HQ-OPP-2008-0658-0020.
[76] *Id.* at 59.
[77] *Id.* at 61.
[78] EPA. Clopyralid: Draft Ecological Risk Assessment for Registration Review. Dec. 14, 2018. Pg. 7. Available here: https://www.regulations.gov/document?D=EPA-HQ-OPP-2014-0167-0032.
[79] *Id.* at 33 and 39.
[80] *Id.* at 41.

be harmed more than 1000 ft away from aerial applications and nearly 500 ft away from ground applications.[81]

Dicamba

In June of this year, the U.S. Court of Appeals for the 9th Circuit ruled that the Trump administration wrongly approved Monsanto's pesticide dicamba for use on genetically engineered soy and cotton – a decision that makes the sale and use of the pesticide illegal. The 56-page opinion[82] held the Environmental Protection Agency's 2018 registration of the dicamba formulas unlawful because it "substantially understated risks that it acknowledged and failed entirely to acknowledge other risks."

The case involved three formulations of the pesticide dicamba – Monsanto's XtendiMax, Corteva's FeXapan, and BASF's Engenia – that EPA first registered for the 2017 season for "new uses" on Monsanto's genetically engineered, dicamba-resistant soybeans and cotton.

Though introduced in the 1960s, dicamba had been little-used due to its propensity to volatilize and drift, damaging neighbors' crops. In approving the new uses, the EPA defied numerous warnings that the pesticide would cause far more widespread drift damage than ever before, relying entirely on dubious industry studies and complex usage restrictions to supposedly "eliminate" any damage to crops from drift.

What ensued was historical — from 2017 to 2019 farmers reported thousands of dicamba drift episodes causing damage to millions of acres of soybeans as well as vegetables, fruit trees, gardens and residential trees. In ruling the pesticide approval unlawful, the opinion cited "enormous and unprecedented damage" caused by dicamba in the last few years, damage that has "torn apart the social fabric of many farming communities."

This is a massive victory that will protect people and wildlife from uses of a highly toxic pesticide that never should've been approved by the EPA. The fact that the Trump EPA approved these uses of dicamba despite its well-documented record of damaging millions of acres of farmland, tree groves and gardens highlights how tightly the pesticide industry controls EPA's pesticide-approval process. But this ruling is a powerful rejection of their lawlessness.

The court found that the EPA "refused to estimate the amount of dicamba damage" by characterizing it as "potential" and "alleged," when in fact the record showed that "dicamba had caused substantial and undisputed damage." Similarly, the EPA ignored the consensus views of scientists, farmers and even EPA officials that formal complaints of dicamba damage understated actual damage, solely because Monsanto had claimed the contrary.

The court's ruling was far-reaching, touching on risks that the EPA entirely ignored and that are seldom raised in cases on pesticide law. For instance, the judges ruled that the EPA had ignored the substantial costs imposed on soybean farmers who purchased Monsanto's dicamba-resistant

[81] *Id.* at 42.
[82] https://.centerforfoodsafety.org%2Ffiles%2F125--dicamba-opinion_35970.pdf

seed solely to preserve their crops from dicamba drift damage – an "anti-competitive economic effect" of the registrations.

Also stunning was the court's acknowledgement that these uses of dicamba "tear the social fabric of farming communities" by engendering strife among those spraying dicamba and those suffering drift damage. The judges noted that the EPA had ignored this outcome, despite the fact that federal pesticide law requires an accounting of the "social costs" of a pesticide's use as well as health and environmental harms. The court singled out a gunshot death involving such a dicamba dispute.

Finally, the court chastised the EPA for piling so many restrictions on the dicamba labels, in a vain attempt to reduce drift that even highly trained pesticide applicators found virtually impossible to follow.

Dicamba does not adsorb to soil and is highly mobile with the potential to contaminate and persist in groundwater.[83] A nationwide sampling of surface waters by the EPA indicated 40% were contaminated with dicamba[84] and dicamba is known to run off into water bodies following rainfall.[85] It was one of the most frequently detected herbicides in water and sediment samples in California,[86] and 90 percent of air samples throughout Canada's agricultural region contained dicamba with distributions being suggestive of both local and long-distance transport.[87] Dicamba is characterized as a volatile compound and prone to extensive spray drift, which can severely impact non-target crops and wild plants.[88,89] Bottom line is: Dicamba doesn't stay put, it migrates away from the area of application and contaminates the surrounding environment.

This is no better exemplified by the unprecedented amount of damage to crop fields, backyard gardens, century-old trees, and natural landscapes that has occurred in the last four years. It is estimated that nearly 5 million acres of crop fields were damaged by dicamba drift in 2017 and 2018 alone.[90,91] 200-

[83] EPA. Reregistration Eligibility Decision (RED) Document for Dicamba and Associated Salts. 2006. Available from: http://www.epa.gov/pesticides/reregistration/REDs/dicamba_red.pdf.

[84] EPA. Office of Drinking water. Dicamba: health advisory. 1987.

[85] Carroll, M. J., Hill, R. L., Pfeil, E., & Herner, A. E. Washoff of Dicamba and 3,6-Dichlorosalicylic Acid from Turfgrass Foliage. Weed Technology, 1993. 7(2): p. 437-442.

[86] Ensminger, M.P., et al. Pesticide occurrence and aquatic benchmark exceedances in urban surface waters and sediments in three urban areas of California, USA, 2008-2011. Environ Monit Assess, 2013. 185(5): p. 3697-710.

[87] Yao, Y., et al. Spatial and temporal distribution of pesticide air concentrations in Canadian agricultural regions. Atmosperic Environment, 2006. 40(23): p. 4339-4351.

[88] Behrens, R. and W. Lueschen. Dicamba Volatility. Weed Science, 1979. 27(5): p. 486-493.

[89] Egan, J.F. and D.A. Mortensen. Quantifying vapor drift of dicamba herbicides applied to soybean. Environ Toxicol Chem, 2012. 31(5): p. 1023-31.

[90] Bradley, K. A Final Report on Dicamba-injured Soybean Acres. University of Missouri. October 30, 2017. Available here: https://ipm.missouri.edu/ipcm/2017/10/final_report_dicamba_injured_soybean/.

[91] Bradley, K. July 15 Dicamba injury update. Different Year, same questions. July 19, 2018. Available here: https://ipm.missouri.edu/IPCM/2018/7/July-15-Dicamba-injury-update-different-year-same-questions/.

year old cypress trees,[92] oak trees,[93] and fruiting trees[94] have not escaped the onslaught of damage from this pesticide. A federal USDA advisory committee has recommended that a buffer of no less than one mile be implemented between dicamba and any sensitive, non-target plant.[95]

Doses of dicamba meant to approximate herbicide drift reduced and delayed the flowering of multiple plant species, reducing the floral resources that pollinators rely on in farmed regions.[96] Dicamba levels far below those estimated to be contained in particle and vapor drift are known to reduce plant diversity.[97] Similarly, drift-level rates of dicamba were found to reduce flowering of multiple plants, a reduction scientists have found coincides with reduced visitation by pollinators.[98] Studies have also shown dicamba to be particularly harmful to milkweed, a plant the monarch caterpillar uses as its only food source, putting the monarch butterfly at risk of harm.[99]

The EPA has determined that small birds and mammals would exceed the agency's level of concern for dicamba if they foraged on plants or insects in treated fields following treatment and that dicamba had the potential for causing risk to endangered birds, mammals, and non-target plants.[100] Furthermore, the EPA stated that "mammals could potentially be at risk for developmental/reproductive effects or for direct effects on foraging behavior when chronically exposed to dicamba as a result of the labeled uses of the herbicide."[101] Dicamba has also been shown to disrupt behavioral patterns in fish[102] and low doses were shown to induce mortality in coho salmon that were given a biologically-appropriate seawater challenge.[103]

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[92] Charles, D. A Drifting Weedkiller Puts Prized Trees At Risk. National Public Radio. September 27, 2018. Available here: https://www.npr.org/sections/thesalt/2018/09/27/651262491/a-drifting-weedkiller-puts-prized-trees-at-risk.

[93] Hettinger, J. Complaints surge about weed killer dicamba's damage to oak trees. Midwest Center for Investigative Reporting. October 9, 2017. Available here: https://investigatemidwest.org/2017/10/09/complaints-surge-about-weed-killer-dicambas-damage-to-oak-trees/.

[94] Ruff, C. Jury Awards Missouri Peach Farmer $15 Million In Damages In Dicamba Suit. St. Louis Public Radio. February 14, 2020. Available here: https://news.stlpublicradio.org/post/jury-awards-missouri-peach-farmer-15-million-damages-dicamba-suit#stream/0.

[95] Fruit and Vegetable Industry Advisory Committee (FVIAC). 2018 – 2020 Recommendations. Available here: https://www.ams.usda.gov/sites/default/files/media/2018_2020FVIACRecommendations.pdf.

[96] Bohnenblust, E.W., et al. Effects of the herbicide dicamba on non-target plants and pollinator visitation. Environ Toxicol Chem, 2015.

[97] Egan, J.F, Bohnenblust, E, Goslee, S, Mortensen, D.A, and Tooker, J. Herbicide drift can affect plant and arthropod communities. Agriculture, Ecosystems, and Environment, 2014. 185: p. 77-87.

[98] Bohnenblust, E.W, Vaudo, A.D, Egan, J.F, Mortensen, D.A, Tooker, J.F. Effects of the herbicide dicamba on nontarget plants and pollinator visitation. Environ Toxicol Chem, 2016. 35(1): p. 144–151

[99] Donley, N. A Menace to Monarchs Drift-prone Dicamba Poses a Dangerous New Threat to Monarch Butterflies. Center for Biological Diversity. March 2018. Available here: https://www.biologicaldiversity.org/species/invertebrates/monarch_butterfly/pdfs/Menace-to-Monarchs.pdf.

[100] EPA. Reregistration Eligibility Decision (RED) Document for Dicamba and Associated Salts. 2006. Available from: http://www.epa.gov/pesticides/reregistration/REDs/dicamba_red.pdf.

[101] *Id.*

[102] Ruiz de Arcaute, C., S. Soloneski, and M.L. Larramendy, Evaluation of the genotoxicity of a herbicide formulation containing 3,6-dichloro-2-metoxybenzoic acid (dicamba) in circulating blood cells of the tropical fish *Cnesterodon decemmaculatus*. Mutat Res Genet Toxicol Environ Mutagen, 2014. 773: p. 1-8.

[103] Lorz, H., et al., EPA. Corvallis Environmental Research Laboratory. Office of Research and Development. Effects of selected herbicides on smolting of coho salmon. 1979.

There are early indications that dicamba may affect hormone signaling[104,105] and induce developmental toxicities[106] at biologically-relevant doses. Multiple studies have also indicated that it is a mutagen.[107,108,109]

Endothall

The EPA has identified many harms to non-target organisms from the labelled uses of endothall. Acute harm to mammals was identified from all terrestrial uses of endothall and reproductive harm, resulting in decreased birth weight of pups and pup death, was also identified for a subset of uses.[110] Some uses of endothall were found to expose birds that feed on grasses, broad leaf plants, and small insects to nine times the amount known to cause early embryonic mortality.[111] As with many herbicides, endothall was also found to result in harm to non-target plants.

Endothall is considered "highly toxic" to "very highly toxic" to freshwater fish and invertebrates by the EPA.[112] EPA has concluded that all uses including direct water application and terrestrial application resulted in risks of concern to fish and aquatic invertebrates.[113]

Fluazifop-P-Butyl

Using fluazifop according to the pesticide label can expose mammals to concentrations that are known to cause reduced pup viability and pup weight.[114] Fluazifop can also cause chronic harm to bee larva following every use of the pesticide that was modelled by EPA.[115] Terrestrial plants can be exposed to levels of fluazifop via spray drift that can cause harm, anywhere from 100 to 1,000 ft from the treated area.[116]

Fluridone

[104] Zhu, L., et al. Dicamba affects sex steroid hormone level and mRNA expression of related genes in adult rare minnow (Gobiocypris rarus) at environmentally relevant concentrations. Environ Toxicol, 2015. 30(6): p. 693-703.
[105] Goldner, W.S., et al. Hypothyroidism and pesticide use among male private pesticide applicators in the agricultural health study. J Occup Environ Med, 2013. 55(10): p. 1171-8.
[106] Greenlee, A.R., T.M. Ellis, and R.L. Berg. Low-dose agrochemicals and lawn-care pesticides induce developmental toxicity in murine preimplantation embryos. Environ Health Perspect, 2004. 112(6): p. 703-9.
[107] Ruiz de Arcaute, C., S. Soloneski, and M.L. Larramendy, Evaluation of the genotoxicity of a herbicide formulation containing 3,6-dichloro-2-metoxybenzoic acid (dicamba) in circulating blood cells of the tropical fish *Cnesterodon decemmaculatus*. Mutat Res Genet Toxicol Environ Mutagen, 2014. 773: p. 1-8.
[108] Cenkci, S., et al. Evaluation of 2,4-D and Dicamba genotoxicity in bean seedlings using comet and RAPD assays. Ecotoxicol Environ Saf, 2010. 73(7): p. 1558-64.
[109] Gonzalez, N.V., et al. A combination of the cytokinesis-block micronucleus cytome assay and centromeric identification for evaluation of the genotoxicity of dicamba. Toxicol Lett, 2011. 207(3): p. 204-12.
[110] EPA. Reregistration Eligibility Decision for Endothall. September 2005. Pg. 18. Available here: https://archive.epa.gov/pesticides/reregistration/web/pdf/endothall_red.pdf.
[111] *Id.*
[112] *Id.* at 19.
[113] *Id.* at 19-20.
[114] EPA. Fluazifop-p-butyl: Draft Ecological Risk Assessment for Registration Review. June 27, 2019. Pg. 61. Available here: https://www.regulations.gov/document?D=EPA-HQ-OPP-2014-0779-0017.
[115] *Id.* at 64-65.
[116] *Id.* at 67.

Fluridone is an aquatic use herbicide primarily applied directly to water to control unwanted aquatic vegetation. The EPA found that aquatic use of fluridone can result in acute harm to aquatic invertebrates, and aquatic plants were found to be harmed at distances of more than 1,000 feet from the use site.[117]

Glyphosate

The DEIS explanation of the current status of glyphosate is accurate (at page 56-57), though the description under the heading Direct Effects of Selected Herbicides on Terrestrial and Aquatic Species is now outdated and in need of substantial reconsideration. This section claims that Glyphosate has "minimal" effects on terrestrial species, and "slightly toxic" to fish. However, on November 24, The Environmental Protection Agency released a draft biological evaluation[118] finding that glyphosate is likely to injure or kill 93% of the plants and animals protected under the Endangered Species Act. The draft biological opinion also found that glyphosate adversely modifies critical habitat for 759 endangered species, or 96% of all species for which critical habitat has been designated. The EPA has, for decades, steadfastly refused to comply with its obligation under the Endangered Species Act to assess the harms of pesticides to protected plants and animals. But it was finally forced to do this evaluation under the terms of a 2016 legal agreement[119] with the Center. Emails obtained in litigation brought against Monsanto/Bayer by cancer victims and their families have uncovered a disturbingly cozy relationship between the agency and the company on matters involving the glyphosate risk assessment. In one example, when the U.S. Department of Health and Human Services announced it would be reviewing glyphosate's safety, an EPA official assured Monsanto he would work to thwart the review, saying, "If I can kill this, I should get a medal."[120] The Health and Human Services review was delayed for three years. Unfortunately, the cozy and sinister relationships between the pesticides industry and the government now threatens the protected species that this DEIS is intended to help.

A recent EPA analysis found multiple environmental harms from glyphosate use. Use of glyphosate in accordance with the label was found to:

1) Result in concentrations that can potentially impact the survival and biomass of aquatic plants, upland plants, and riparian/wetland plants.[121]
2) Result in residues on foliage that can potentially impact the growth of herbivorous birds, reptiles and terrestrial amphibians.[122]
3) Potentially impact the growth and reproduction of terrestrial mammals following ground applications of glyphosate.[123]

This analysis also indicated that considerable no-spray buffers would be needed to keep off-target plants from being harmed by glyphosate use, more than 1000 feet for certain aerial applications and nearly

[117] EPA. Fluridone: Preliminary Ecological Risk Assessment for Registration Review. September 8, 2017. Pgs 3-4. Available here: https://www.regulations.gov/document?D=EPA-HQ-OPP-2009-0160-0065.
[118] https://www.epa.gov/endangered-species/draft-national-level-listed-species-biological-evaluation-glyphosate#executive-summary
[119] https://www.biologicaldiversity.org/news/press_releases/2016/pesticides-02-19-2016.html
[120] https://www.bloomberg.com/news/articles/2017-03-14/monsanto-accused-of-ghost-writing-papers-on-roundup-cancer-risk
[121] EPA. Preliminary Ecological Risk Assessment for Glyphosate and Its Salts. Sept. 8, 2015 page 2. Available here: https://www.regulations.gov/document?D=EPA-HQ-OPP-2009-0361-0077.
[122] *Id.*
[123] *Id.*

400 feet for certain ground applications.[124] The states of California and Arkansas both have mandatory no-spray buffers of 500 feet for aerial applications.[125]

Ecological incident data also reinforce the finding that the current labelled uses of glyphosate are having devastating effects to plant and animal life outside of the sprayed field.[126] Approximately 600 incidents have been reported and logged on the Ecological Incident Information System (EIIS) and Avian Monitoring Information System (AIMS) databases. A separate Incident Data System (IDS) database has identified 269 separate aggregate incident reports. Ecological incidents are also significantly underreported for pesticides so this should be viewed as the absolute bare minimum of ecological incidents that involve glyphosate.

The EPA has found that glyphosate poses a risk to a federally listed amphibian, the California Red-legged frog, making a Likely to Adversely Affect determination for the species.[127] Some glyphosate formulations and co-formulants have been found to be "highly toxic" to certain species of fish.[128]

Researchers have found negative associations between glyphosate use and monarch population size.[129] Use of glyphosate has been tied to widespread declines of milkweed, which is essential to monarch butterfly survival.[130]

The World Health Organization's International Agency for Research on Cancer ("IARC") conducted an exhaustive review of the publicly available scientific literature in 2015 and concluded that glyphosate is "probably carcinogenic to humans" (Group 2A).[131] IARC carefully weighed evidence in three areas, and found that: 1) There was sufficient evidence to conclude that glyphosate causes cancer in animal studies; 2) There was limited evidence that exposure to glyphosate causes cancer (non-Hodgkin

[124] *Id.* page 92.
[125] EPA. Drinking Water Assessment for the Registration Review of Glyphosate. June 15, 2017. Pg. 16.
[126] EPA. Preliminary Ecological Risk Assessment for Glyphosate and Its Salts. Sept. 8, 2015. Pgs 59-62. Available here: https://www.regulations.gov/document?D=EPA-HQ-OPP-2009-0361-0077.
[127] EPA. Risks of Glyphosate Use to Federally Threatened California Red-legged Frog (Rana aurora draytonii). Pesticide Effects Determination. October 17, 2008. Available here: https://www3.epa.gov/pesticides/endanger/litstatus/effects/redleg-frog/glyphosate/determination.pdf.
[128] *Id.* at 82, 84.
[129] Semmens, B. X., D. J. Semmens, W. E. Thogmartin, R. Wiederholt, L. Lopez-Hoffman, J. E. Diffendorfer, J. M. Pleasants, K. S. Oberhauser and O. R. Taylor (2016). "Quasi-extinction risk and population targets for the Eastern, migratory population of monarch butterflies (Danaus plexippus)." Sci Rep 6: 23265.
[130] Center for Biological Diversity, Petition to Protect the Monarch Butterfly (*Danaus Plexippus Plexippus*) Under the Endangered Species Act, 7 (2014), available at http://www.biologicaldiversity.org/species/invertebrates/pdfs/Monarch_ESA_Petition.pdf ("*A primary threat to the monarch is the drastic loss of milkweed caused by increased and later season use of the herbicide glyphosate in conjunction with widespread planting of genetically engineered, herbicide-resistant corn and soybeans in the Corn Belt region of the United States and to planting of genetically-engineered cotton in California. In the Midwest, nearly ubiquitous adoption of, glyphosate-resistant 'Roundup Ready' corn and soybeans has caused a precipitous decline of common milkweed, and thus of monarchs, which lay their eggs only on milkweeds. The majority of the world's monarchs originate in the Corn Belt region of the United States where milkweed loss has been severe, and the threat that this habitat loss poses to the resiliency, redundancy, and representation of the monarch cannot be overstated*.").
[131] WHO. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 112: Some Organophosphate Insecticides and Herbicides. Glyphosate. 2017. Available at: http://monographs.iarc.fr/ENG/Monographs/vol112/mono112.pdf

lymphoma) in humans; and 3) There was strong evidence that glyphosate can damage DNA and induce oxidative stress,[132] two well characterized pathways that can lead to cancer.[133]

IARC's finding that glyphosate causes cancer in animals prompted California's Office of Environmental Health Hazard Assessment to list glyphosate as a known carcinogen under California's Proposition 65 law.[134] The agency has also finalized a No Significant Risk Level for glyphosate, which estimated the daily exposure level that will result in a 1/100,000 chance of developing cancer, of 1.1 mg/day.[135]

Hexazinone

EPA has found that approved hexazinone uses can expose non-target terrestrial plants to as much as 500 times the concentration needed to cause harm and that harmful exposures can exist greater than 1,000 feet from the treated area.[136] EPA found that non-agricultural uses of hexazinone can result in risks of concern to small herbivorous and insectivorous birds, reptiles and terrestrial amphibians[137] and that mammals can be exposed to as much as 80-times the amount known to cause reduced female pup body weights at birth and during lactation.[138]

For the granular uses of the herbicide, EPA found that large birds, reptiles and terrestrial amphibans would only need to ingest one granule to exceed EPA's risk of concern for ESA-listed species and three granules for non-ESA-listed species.[139] The outlook is even worse for mammals, needing to ingest less than one granule to trigger the EPA's risk of concern for ESA-listed and non-ESA-listed mammals.[140]

The EPA has found that the labelled uses of hexazinone can potentially harm a federally listed amphibian, the California Red-legged frog, making a Likely to Adversely Affect determination for the species.[141]

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[132] *Id.*

[133] Klaunig, J.E., et al., The role of oxidative stress in chemical carcinogenesis. Environ Health Perspect, 1998. 106 Suppl 1: p. 289-95; and Lee, S.J., et al., Distinguishing between genotoxic and non-genotoxic hepatocarcinogens by gene expression profiling and bioinformatic pathway analysis. Sci Rep, 2013. 3: p. 2783.

[134] OEHHA. The California Environmental Protection Agency's Office of Environmental Health Hazard Assessment. Glyphosate Listed Effective July 7, 2017, as Known to the State of California to Cause Cancer. Available at: https://oehha.ca.gov/proposition-65/crnr/glyphosate-listed-effective-july-7-2017-known-state-california-cause-cancer.

[135] OEHHA. The California Environmental Protection Agency's Office of Environmental Health Hazard Assessment. Amendment to Section 25705 No Significant Risk Level - Glyphosate April 10, 2018. Available at: https://oehha.ca.gov/proposition-65/crnr/amendment-section-25705-no-significant-risk-level-glyphosate-april-10-2018.

[136] EPA. Registration Review – Preliminary Ecological Risk Assessment for Hexazinone. September 17, 2015. Pgs. 69, 79. Available here: https://www.regulations.gov/document?D=EPA-HQ-OPP-2009-0755-0021.

[137] *Id.* at 62-63.

[138] *Id.* at 49, 67.

[139] *Id.* at 76-77.

[140] *Id.* at 77.

[141] EPA. Risks of Hexazinone Use to Federally Threatened California Red-legged Frog (Rana aurora draytonii). Pesticide Effects Determination. February 20, 2008. Available here: https://www3.epa.gov/pesticides/endanger/litstatus/effects/redleg-frog/hexazinone/analysis.pdf.

Hexazinone is designated as Toxicity Category 1 for acute eye irritation – the most severe category – causing corneal opacity and irritation to humans that are exposed.[142] Consistent with its known harm to human health, occupational exposures from the labelled uses of hexazinone were estimated by EPA to expose workers to levels known to cause harm.[143] This was the case for multiple uses modelled with more protective PPEs than required by the label.[144]

Picloram

Picloram is highly persistent, with a half-life that can range from one month to 116 years.[145] It is one of the most mobile pesticides still used in the U.S. and a known water contaminant that has been detected in water systems in 43 different states.[146][147] EPA found that 136 water systems servicing more than 8 million people across the country had detections of picloram above the health safety threshold.[148]

EPA also found that picloram has a "very high potential" to leach into groundwater, and that once it reaches groundwater will be unlikely to degrade for multiple years.[149] EPA goes so far as to state:

> "Eventual contamination of ground water is virtually certain in areas where picloram residues persist in the overlying soil. Once in ground water, picloram is unlikely to degrade, even over a period of several years."[150]

USGS found that 10% of groundwater testing sites had detections of picloram in Wyoming and that picloram was detected at the highest concentration of any other pesticide tested.[151]

Picloram's main effect to humans is liver toxicity. Picloram acid is also designated highly toxic through inhalation exposure, meaning it has a high potential to cause harm to humans through the airway.[152]

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[142] EPA. Hexazinone: Draft Human Health Risk Assessment for Registration Review. June 3, 2015. Pg. 5. Available here: https://www.regulations.gov/document?D=EPA-HQ-OPP-2009-0755-0019.

[143] *Id.* at 37-44.

[144] *Id.*

[145] California Office of Environmental Health Hazard Assessment. Public Health Goals: Carbofuran, Diquat, Endrin, Picloram, Thiobencarb in Drinking Water. September 2016. Available here: https://oehha.ca.gov/media/downloads/water/chemicals/phg/pesticidebatch092316.pdf.

[146] EPA. R.E.D. FACTS Picloram. August 1995. Available here: https://www3.epa.gov/pesticides/chem_search/reg_actions/reregistration/fs_PC-005101_1-Aug-95.pdf.

[147] EPA. The Analysis of Regulated Contaminant Occurrence Data from Public Water Systems in Support of the Second Six-Year Review of National Primary Drinking Water Regulations. September 2010. Available here: https://www.epa.gov/sites/production/files/2014-12/documents/815b09006.pdf.

[148] *Id.*

[149] EPA. R.E.D. FACTS Picloram. August 1995. Available here: https://www3.epa.gov/pesticides/chem_search/reg_actions/reregistration/fs_PC-005101_1-Aug-95.pdf.

[150] *Id.* at 5.

[151] United States Geological Survey, Wyoming Department of Agriculture and Wyoming Department of Environmental Quality. Pesticides in Ground Water - Fremont County, Wyoming, 1998-99. March 2000. Available here: https://pubs.usgs.gov/fs/fs03500/fs03500.pdf.

[152] EPA. R.E.D. FACTS Picloram. August 1995. Available here: https://www3.epa.gov/pesticides/chem_search/reg_actions/reregistration/fs_PC-005101_1-Aug-95.pdf.

Picloram is a restricted use pesticide based on its extreme toxicity to non-target plants. EPA found that estimated concentrations from the labelled use of picloram are hundreds to thousands of times the amount known to cause harm to non-target plants.[153]

Tebuthiuron

EPA found that the current, labelled uses of tebuthiuron resulted in acute and chronic risks of concern to:

- Mammals
- Terrestrial-phase amphibians
- Reptiles
- Small-sized birds
- Terrestrial and aquatic plants

Nearby birds, amphibians, and reptiles were estimated to be exposed to levels of tebuthiuron that cause chronic harm for 140 days out of the year and at a distance of up to 139 ft from the site of application.[154] Mammals were estimated to be exposed to a level of tebuthiuron that was 45 times higher than the level known to cause harm.[155] Harm to mammals from tebuthiuron could extend up to 100 days out of the year at a distance of up to 479 ft.[156] The labelled uses of tebuthiuron can expose terrestrial plants to over 1000 times the level known to cause harm. Harm to plants can also extend 1000 ft from the site of use.[157]

EPA found that bystanders could be exposed to concerning levels of tebuthiuron at distances of up to 150 ft away.[158] And that occupational users can be harmed by some uses of the pesticide, even when wearing the label-required PPEs.[159]

Triclopyr

EPA has found that the range, pastureland, and rights-of-way uses of triclopyr can expose birds, reptiles and terrestrial amphibians to levels of the herbicide that cause reduced survival of offspring.[160] The same uses can expose mammals to 37 times the amount of triclopyr known to reduce litter size.[161] All labelled uses of triclopyr were found to expose adult and larval bees to levels estimated to reduce survival and larval emergence.[162] Harm to bee larva was estimated more than 1000 feet from the application site.[163] Terrestrial plants were also estimated to be exposed to levels of triclopyr that were

[153] *Id.* at 6.
[154] EPA. Transmittal of the Draft Environmental Fate and Ecological Risk Assessment in Support of the Registration Review of Tebuthiuron. May 20, 2014. Pg. 3. Available here: https://www.regulations.gov/document?D=EPA-HQ-OPP-2009-0327-0042.
[155] *Id.*
[156] *Id.*
[157] *Id.*
[158] EPA. Tebuthiuron: Draft Human Risk Assessment. June 12, 2014. Pg 25. Available here: https://www.regulations.gov/document?D=EPA-HQ-OPP-2009-0327-0041.
[159] *Id.* at 26-27.
[160] EPA. Triclopyr (Acid, Choline salt, TEA salt, BEE): Draft Ecological Risk Assessment for Registration Review. Sept. 30, 2029. Pg. 6. Available here: https://www.regulations.gov/document?D=EPA-HQ-OPP-2014-0576-0026.
[161] *Id.* at 8.
[162] *Id.* at 9.
[163] *Id.* at 90.

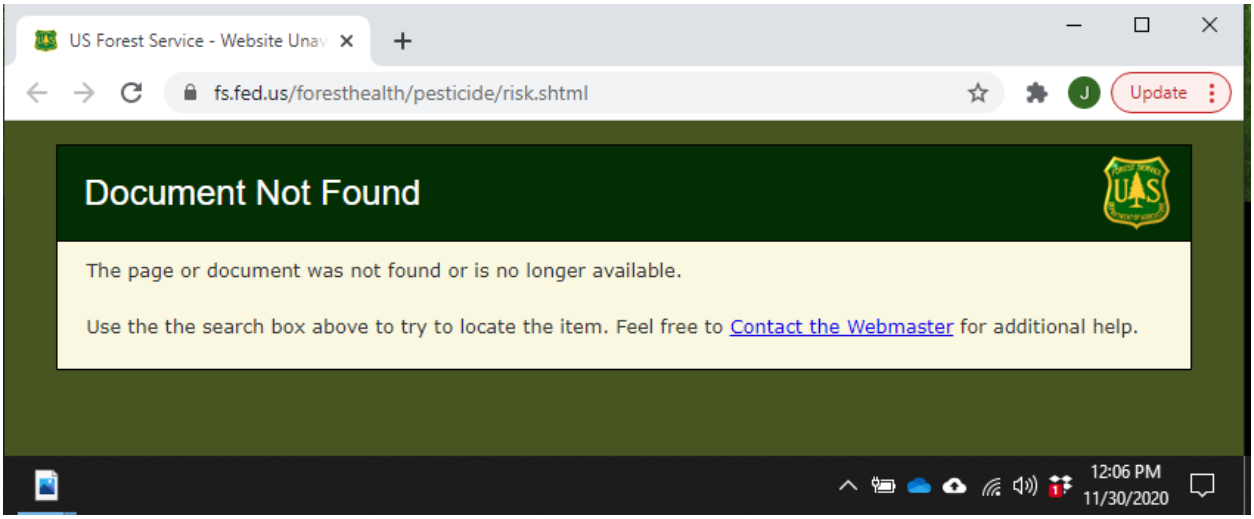
known to cause harm more than 1000 feet away from the site of application, even for ground applications.[164]

Triclopyr butoxyethyl ester (BEE) is classified as "highly toxic" to aquatic organisms. Range, pastureland and meadow uses of BEE can expose fish and aquatic invertebrates to levels of the pesticide known to cause acute harm.[165] The EPA has found that triclopyr poses a risk to a federally listed amphibian, the California Red-legged frog, making a Likely to Adversely Affect determination for the species.[166]

The best available science reviewed here must be incorporated into any analyses of herbicide use on the Lincoln National Forest, including any future version of the DEIS. These herbicide risk reviews are not inclusive of all herbicides proposed for use. Many others proposed have equally as disastrous risks to ecosystems, water, people, and wildlife. We do not endorse the use of any of those herbicides under the current proposal framework subject to these comments.

Lastly, the DEIS cites a pesticide risk assessment link 27 times, but the provided link is not functional. Please address this issue. See the screenshot below.

https://www.fs.fed.us/foresthealth/pesticide/risk.shtml



VI. RARE PLANTS SECTION REQUIRES UPDATING.

The DEIS is out of date on the subject of rare plants. The references section cites a 1999 report by the New Mexico Rare Plant Technical Council,[167] as well as 2012 reports on the Cloudcroft scorpion-

[164] *Id.* at 94-95.
[165] *Id.* at 9.
[166] EPA. Risks of Triclopyr Use to Federally Threatened California Red-legged Frog (Rana aurora draytonii) Pesticide Effects Determination. October 19, 2009. Available here: https://www3.epa.gov/pesticides/endanger/litstatus/effects/redleg-frog/triclopyr/analysis.pdf.
[167] New Mexico Rare Plant Technical Council. 1999. New Mexico Rare Plants. New Mexico Rare Plant Technical Council, Albuquerque, New Mexico. Update, July 21, 2016. nmrareplants.unm.edu, accessed October 21, 2016

weed[168] and the Wright's marsh thistle,[169] and a 2013 report on the Sacramento Mountains Thistle[170] prepared by the expert botanists at the New Mexico Forestry Department. While these three reports are important, we are concerned with the lack of information for the dozens of other rare plants known to occur, or likely to occur, on the Lincoln National Forest. Any subsequent NEPA document should be updated to include the latest information presented in the New Mexico Rare Plant Conservation Strategy, released in 2017.[171]

We are concerned that no specific information was cited for the following plants which are likely to occur on the Lincoln National Forest: Echinocereus fendleri, Astragalus kerrii, Heuchera wootonii, Penstemon cardinalis ssp. cardinalis, Geranium dodecatheoides, Heuchera woodsiaphila, Rhodiola integrifolia ssp. neomexicana, Ionactis elegans, Allium gooddingii, Astragalus altus, Escobaria villardii, Aquilegia chrysantha var. chaplinei, Penstemon alamosensis, Microthelys rubrocallosa, Lilium philadelphicum, Ericameria nauseosa var. texensis, Streptanthus sparsiflorus, and Solidago wrightii var. guadalupensis. Any subsequent NEPA document should provide scientific documentation that the proposed action will not harm these species.

We are also concerned that the following list of species is not addressed at all in the DEIS: Penstemon neomexicanus, Hedeoma pulcherrima, Lupinus sierrae-blancae, Erigeron rybius, Delphinium novomexicanum, Philadelphus argyrocalyx, Eriogonum wootonii, Asclepias uncialis, Ribes mescalerium, Physaria lata, Cirsium inornatum, Senecio sacramentanus, Draba standleyi, Philadelphus argyrocalyx, Synthyris oblongifolia, Physaria aurea, Malaxis abieticola, Hexalectris arizonica, Perityle staurophylla var. staurophylla, Sclerocactus papyracanthus, Agastache pringlei var. verticillate, Epipactis gigantea, Cladium californicum, Perityle quinqueflora, Nerisyrenia hypercorax, Salvia summa, Mentzelia humilis var. guadalupensis, Dermatophyllum guadalupense, Anulocaulis leiosolenus var. howardii, Boechera zephyra, Escobaria guadalupensis, Paronychia wilkinsonii, Lepidospartum burgessii, Astragalus waterfallii, Escobaria sneedii var. sneedii, Salvia summa, Grindelia havardii, Hexalectris nitida, Polygala rimulicola var. rimulicola, Valeriana texana, Chaetopappa hersheyi, Hedeoma apiculate, and Viola calcicole. Any subsequent NEPA document should provide scientific documentation that the proposed action will not harm these species.

Lastly, it appears that Crataegus wootoniana is not addressed in the Region 3 sensitive species analysis, despite being a sensitive species. Any subsequent NEPA document should provide scientific documentation that the proposed action will not harm this species.

CONCLUSION

Thank you for the opportunity to provide our comments on the Integrated Non-Native Invasive Plant Management Project Draft Environmental Impact Statement. Because of the many endemic species confined to tiny locales,[172] the use of herbicides as proposed is incredibly risky on the Lincoln National

[168] Roth, D. 2012. Cloudcroft scorpion-weed status report 2012. NM EMNRD – Forestry Division, prepared for USFWS, Albuquerque, NM. Section 6, Segment 26.
[169] Sivinski, R.C. 2012. Cirsium wrightii, Wright's marsh thistle: a 2101 population assessment. Prepared for NM Energy, Minerals and Natural resources Department – Forestry Division. Santa Fe, NM December 2012.
[170] Roth, D. 2013. Status report, Cirsium vinaceum (Sacramento Mountains Thistle) 2013 (Section 6, Segment 27). Energy, Minerals and Natural Resources Department, New Mexico Forestry Division, Santa Fe, NM.
[171] http://www.emnrd.state.nm.us/SFD/documents/NMRarePlantConsStrategy_Final_reduced.pdf
[172] The DEIS admits: "Many of the special emphasis plants on the Lincoln National Forest are endemic to very specialized locations and are present in low numbers."

Forest. We are gravely concerned that worst-case outcomes will result from this approval process, and cannot fathom how a finding of "May impact individuals or habitat but is not likely to result in a trend toward listing" could possibly be given to species where misapplication could wipe out a significant portion of a species range. We are also deeply disappointed that in the ten years that have passed since this project was proposed that a reasonable accurate baseline for infestations has not been provided. This fails to meet NEPAs requirements for providing an environmental baseline for comparison of proposed effects. Please keep us informed of any future opportunities for comment or involvement.

Respectfully,

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