February 10, 2006

Brian Amme
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Dear Mr. Amme:

Please accept the following comments on the Bureau of Land Management's (BLM) *Draft Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic EIS* (DEIS) and *Draft Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Report* (PER).

We are very concerned that, after years of public input and analysis, the BLM has considered neither invasive species management that addresses the root causes of the spread of destructive invasive species, nor integrated systems of passive and active restoration of sites occupied by invasive species. Citizens' organizations (including many of the organizations signed below) previously submitted the Restore Native Ecosystems Alternative ("Restoration Alternative"; DEIS App. G) to the BLM during the scoping process in 2002 as an alternative for the proposed vegetation management EIS. The Restoration Alternative prescribed measures to <u>prevent conditions</u> that favor invasive species and hazardous forest fuel loads; and <u>restore</u> invaded sites to native ecosystems with both passive and active treatments. We are disappointed that the Restoration Alternative was not considered as an integrated comprehensive alternative in the DEIS/PER. We incorporate the Restoration Alternative, and all previous communications with the BLM regarding the Restoration Alternative, and associated annotated bibliographies here by reference.

We are further concerned that the DEIS and PER that BLM has produced are contrary to the National Environmental Policy Act (NEPA). There is a direct link – cause and effect – between some land uses (such as livestock grazing), the spread of invasive species and the need for "vegetation treatments" (e.g., manipulation, burning, herbicide spraying). It is folly not to address these links in the DEIS/PER. Furthermore, splitting out non-chemical vegetation treatments from herbicides (while avoiding the issue of passive restoration altogether) into two separate documents (one of which is an EIS and the other a "report") is "segmentation," which is disallowed under NEPA.

The occurrence or non-occurrence of other vegetative treatments (including passive treatments and prevention measures) and activities (e.g., livestock grazing, ORV use) are so inextricably linked to increased or decreased herbicide use that they must be thoroughly aired in a cumulative beneficial and adverse effects analysis. The DEIS fails to do this.

We also contend that the PER (if it is to remain a separate document from the DEIS, which it should not) must be analyzed under NEPA. Environmental impact statements and records of decisions in the late 1980s and early 1990s (PER: ES-1; 1-1; 1-7) analyzed the consequences of non-chemical vegetation treatments on 500,000 acres in 14 western states (PER: ES-1, ES-2). The PER describes annual treatments on approximately 6 million acres annually (PER: 1-5) in 17 western states (PER: ES-1). Such an enormous expansion of the BLM vegetation management program, particularly when considered with the more than three-fold increase in proposed herbicide applications (from 300,000 to 932,000 acres annually; PER: ES-1), requires that the agency produce a new environmental impact statement (EIS) to assess all reasonable alternatives and the impacts of preventing and treating unwanted vegetation on 6 million acres of public lands per year. The fact that the BLM believes it was mandated by the President's *National Fire Plan* and *Healthy Forests Restoration Act of 2003* and other policies to "take more aggressive actions to reduce catastrophic wildfire risk on public lands" (PER: 1-1) does not excuse the agency from analyzing the PER pursuant to NEPA.

Finally, in addition to the number of states and acres treated, the BLM has proposed a broader vegetation management program with different and greater goals that would employ more active (and no passive) treatment methods on more habitat types and in different combinations than was authorized in previous environmental impact statements and agency records of decision. As the PER (1-1) states, "previous EISs primarily focused on vegetation control of competing and unwanted vegetation for resource enhancement (forestry and rangelands), noxious and invasive weed control related to surface use activities (oil and gas, rights-of-way), and reduction of hazardous fuels to protect resources at risk from wildfire damage." The new BLM vegetation management program as described in the NEPA-less PER is intended to "reduce hazardous fuels, improve rangeland health, and manage and control vegetation <u>affecting other resources</u>," (PER: 1-5, emphasis added) including wildlife habitat and watersheds. Thus, the BLM seeks to expand its current program from basic weed and hazardous fuel control to a landscape-scale vegetation management program with significant environmental impacts. This enlarged program requires further analysis under NEPA, particularly as it is linked to major increases in herbicide use.

The DEIS Violates NEPA

> "The choice, after all, is ours to make. If, having endured much, we have at last asserted our 'right to now,' and if, knowing, we have concluded that we are being asked to take senseless and frightening risks, then we should no longer accept the counsel of those who tell us that we must fill our world with poisonous chemicals; we should look about and see what other course is open to us."
>
> --- Rachel Carson, *Silent Spring*[1]

I. The DEIS Fails to Anlyze the "Restore Native Ecosystems Alternative"

The following is the stated Purpose of the DEIS (1-3, emphasis added):

[1] Carson, Rachel. 1962. *Silent Spring.* Boston, MA: Houghton-Mifflin.

> *The purposes of the proposed action are to provide BLM personnel with the herbicides available for vegetation treatment on public lands and to describe the conditions and limitations that apply to their use.*

The following is the stated "Need" to be addressed by the DEIS (1-3, emphasis added):

> *The need for the proposed action is to reduce the risk of catastrophic wildfires by reducing hazardous fuels, restoring fire-damaged lands, and improving ecosystem health by 1) controlling weeds and invasive species, and 2) manipulating vegetation to benefit fish and wildlife habitation, improve riparian and wetlands areas, and improve water quality in priority watersheds.*

This DEIS fails to abide by Section 1502.14 of NEPA ("Alternatives including the proposed action"), because it has not considered a reasonable alternative provided to the BLM in 2002. The Restore Native Ecosystem Alternative ("Restoration Alternative"; Appendix G) is a reasonable alternative. The Alternative meets the Purpose and Need by describing

1. Herbicides that should be available for vegetation treatment on public lands; and
2. conditions and limitations that apply to herbicide use

The Restoration Alternative is a comprehensive, reasonable alternative that was originally submitted April 29, 2002 and submitted as a revised alternative on August 26, 2002 in response to comments by Brian Amme (BLM) regarding content and format. This DEIS fails to analyze the Restoration Alternative as a comprehensive alternative.

The BLM claims (2-13) that Alternative E (i.e., "No Use of Sulfonylurea and other Acetolactate Synthase-inhibiting Active Ingredients") is "based on" an alternative submitted by American Lands Alliance, "an alliance of several environmental and conservation groups." In fact, the Restoration Alternative was submitted by the Restore Native Ecosystems Coalition of which American Lands Alliance was only one entity that prepared the Alternative. The original alternative was collaboratively developed by numerous organizations and submitted by 43 organizations; the revised version was submitted by 13 organizations.[2])

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[2] Northwest Coalition for Alternatives to Pesticides
Science And Environmental Health Network
Wildlands Center for Preventing Roads
Committee for Idaho's High Desert
American Lands Alliance
Biodiversity Conservation Alliance
Oregon Natural Resources Council
Pacific Rivers Council
Wyoming Outdoor Council
Colorado Environmental Coalition
Western Watersheds
Wilderness Watch
California Indian Basketweavers Association

In contrast to Alternative E (i.e., "No Use of Sulfonylurea and other Acetolactate Synthase-inhibiting Active Ingredients"), the central element of the Restoration Alternative is the linkage of prevention, treatment (both passive and active), and restoration to judicious use of herbicides. By contrast, Alternative B, the Preferred Alternative in the DEIS, merely describes the disembodied use or lack of use of herbicides.

As illustrated by the title BLM has given its Alternative E substitute for the Restoration Alternative (i.e., "No Use of Sulfonylurea and other Acetolactate Synthase-inhibiting Active Ingredients"), the BLM describes Alternative E only in terms of what it does not do (e.g., doesn't use ALS-inhibiting/sulfonyl urea herbicides, doesn't rely exclusively on active vegetation treatments[3] to (1) control invasive species establishment and/or spread and/or (2) to restore native ecosystems so they will subsequently resist invasive species). The BLM fails to analyze the active, positive control of invasive species that has been and can be accomplished with (1) prevention of the conditions that favor the introduction, establishment, and/or spread of invasive species, and (2) passive treatments[4] in conjunction with, or sometimes obviating the need for, use of (3) herbicides.

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[3] **Active Restoration Treatments** (DEIS: G-2)
Actions other than suspension of activities to restore ecological integrity or native species populations. Includes, but is not limited to
1. Road and off-road vehicle route removal
2. Culvert removal
3. Prescribed burning
4. Use of biological control introductions, cultural methods, mechanical methods, chemical methods, and prescribed fire to directly act on invasive exotic species
5. Fish and wildlife habitat rehabilitation
6. Reintroduction of extirpated species
7. Planting and care of native seeds and plants
8. Reintroduction of soil biota required by native species, when necessary
9. Other necessary activities based on priorities established in the ecological restoration assessment.

[4] **Passive Restoration Treatments** (DEIS: G-2)
Suspension of activities that cause the loss of ecological integrity or native species populations in a specific area Passive restoration treatments may include:
1. Area , road, and off-road vehicle route closures
2. Voluntary livestock permit retirement
3. Retirement of vacant livestock allotments
4. Livestock grazing exclosures (e.g., in aggressive weed infestations, uplands "at risk" of weed infestation, riparian areas, habitat of threatened or endangered species, springs, wetlands)
5. Restrictions of logging activities
6. Restrictions of oil and gas and mineral development, including allowing expired leases to remain expired
7. Restrictions on other human activities, as relevant
8. Prescribed natural fire (i.e., allowing fires to burn under predefined circumstances)

Additionally, the DEIS "cumulative analysis" fails to analyze the cumulative results of linking herbicide use with prevention, other passive and active treatments and/or native seedings on BLM and other sites. When prevention is linked with herbicide treatments, for instance, the beneficial cumulative results could be both less weed invasion and less subsequent herbicide use. Although at times the BLM has administratively ordered passive restoration (e.g., route closures, temporary or permanent cattle exclusion) in conjunction with herbicide use, the combination of these is not analyzed in the cumulative effects analysis.

In contrast, the Restoration Alternative prioritizes vegetation treatments based on scientific evidence of efficacy as follows:

1. cessation of activities that impede natural recovery (i.e., passive restoration)
2. active treatments that incorporate passive restoration
3. active treatments (at G-5).

Thus, the Restoration Alternative, by giving highest priority to passive treatments and second highest priority to passive treatments linked to active treatments (which sometimes and sometimes do not employ herbicides) (1) provides "conditions and limitations" that apply to the use of herbicides for "controlling weeds and invasive species", and (2) "manipulate[es] vegetation to benefit fish and wildlife habitation, improve riparian and wetlands areas, and improve water quality in priority watersheds." The Restoration Alternative thus fully meets the Purpose and Need of the EIS and should have been fully analyzed. It was not analyzed in the DEIS.

The scientific literature consistently warns (and observations on ground throughout the West confirm) that herbicide treatments in the absence of eliminating or reducing the causes of conditions favoring invasive species almost always are doomed to failure. Likewise, integrated (1) prevention; (2) passive and active non-chemical and/or chemical treatments; and (3) restorative actions following treatments are explicitly linked cumulatively to reductions in herbicide use. This integration is the essence of "integrated pest management" (invasive species being "pests") and "integrated weed management", widely used throughout agricultural, roadside, parks, aquatic, and wildlands management in the U.S. and worldwide.

For instance as BLM employee R. Anthony Chavez notes in his paper, "Integrated Weed Management: Concept and Practice" (1996):

> The concept of [Integrated Weed Management] IWM… refers to the "classic" understanding of IWM: the integrated use of cultural, physical, biological and chemical control strategies to contain or eradicate a population of noxious weeds. There are "other" aspects of IWM which may have been overlooked in the previous discussion, especially those related to weed infestation on open rangelands. Planning is the process by which problems and solutions are identified and prioritized, and an economic plan of action is developed to provide direction for implementing the control program. Implementing an IWM plan includes: 1) preventing weed encroachment into uninfested rangeland; 2) detecting and eradicating new weed introduction; 3) containing large-scale weed infestations; 4) controlling large-scale infestations using an integrated approach; 5)

revegetation of control sites when and where appropriate; 6) Adoption of the proper range management practices (cultural control) in conjunction with the development of a weed management program; and 7) Monitoring and evaluation of the IWM plan itself. Monitoring and evaluation are the keys to determining if weed and/or grazing management plans are meeting plan objectives and are the prime determining factors used in altering IWM plans. [Emphases added.]

An explicit commitment to integrated weed management (e.g., as in the Restoration Alternative) constitutes a "condition and limitation" applying to herbicide use. Alternative B (the BLM's preferred alternative) makes no such commitment and is thus a different alternative than the Restoration Alternative. The two must be analyzed side-by-side in light of on-ground BLM evidence as well as evidence in the scientific literature. The cumulative impacts of the Restoration Alternative versus Alternative B must likewise be analyzed across the 17 states.

In order to analyze these two different alternatives, the BLM needs to examine what has happened to invasive species and lands threatened with invasive species throughout the 17 western states and elsewhere in the world when the following two approaches have been used:

(a) linking prevention-focused management, invasive species treatment and restoration of ecosystems; versus

(b) employing herbicide treatments without altering conditions that have favored invasive species.

Importantly, the DEIS fails to analyze the results, on its own lands, of where a combination of chemical and non-chemical methods, including passive restoration have been used (see Appendix H for such an example on Jenny Creek in the Cascade-Siskiyou National Monument), compared to results of where herbicide use alone has been used. If the DEIS had analyzed the Restoration Alternative, it would have been forced to use its own experiences in comparing herbicide use alone versus herbicide use combined with passive restoration, seeding with native species, and/or other treatments.

When preventive actions and restorative treatments (potentially including passive treatments) are linked to the judicious use of herbicides., the herbicide use will have far more lasting, positive results (i.e., efficacy) than spraying invasive species while leaving intact the activities that fostered the introduction, establishment and spread of invasive species. This is, in popular parlance, a "no-brainer." Yet this DEIS insists on disconnecting herbicide use from any other management on BLM lands and then purports to estimate the benefits of herbicide spraying apart from other preceding or subsequent non-chemical treatments.. The benefits/costs of herbicide use alone versus herbicide use limited and conditioned by priorities for prevention and non-chemical passive and/or active restoration must be analyzed in the EIS.

Proposing an increase of herbicide use from 300,000 to 930,000 acres is akin to planning to increase punishment of one's child for misbehavior without altering any circumstances that are contributing to the "misbehavior,´ (e.,g., lack of parental presence or support). Similarly, it is akin to requesting public money for numerous new flood control dams while refusing to question how much acreage upstream has been channelized, disturbed, paved, denuded, or otherwise rendered unstable.

In its summary of its Alternative E (i.e., Table 2-8, at 2-26 through 2-39), the BLM focuses on Alternative E's (a) lack of use of ALS-inhibiting/sulfonyl urea herbicides, even though such herbicides account for less than 17% of BLM's projected herbicide use in their preferred Alternative B (Table 2-4 at 2-11). and (b) reduced use of active treatments (i.e., emphasis on passive restoration). The BLM has failed to analyze the Restoration Alternative's active reliance on integrating herbicide use with positive management for prevention and non-chemical active treatmemts and/or passive restoration actions.

Thus the BLM is entirely failing to consider a valid approach to the stated purpose of controlling invasive species and enhancing wetlands, native species habitat, and water quality in multiple-use lands.

Example 1: Prevention Treatments for Invasive Species-Resistant Vegetation: The DEIS fails to analyze the consequences for herbicide use of preventing conditions favoring introduction, establishment, and spread of invasive species..

[*Note: "Prevention" does not mean merely preventing the introduction of invasive species into an area. It means preventing the conditions that favor not only the introduction of invasive species into an area, but also the establishment of invasive species; and also the spread of already-established invasive species. Such invasive species-encouraging conditions include soil disturbed by machines, hooves, or boots; denudation, e.g., by livestock, elk, or other species that "harvest" the vegetation; ready sources of invasive species propagules, such as ORV tires and pans*].

Following are examples of how the DEIS fails to analyze the Restoration Alternative's conditions and limitations on herbicide use which, by preventing the conditions that favor invasive species, reduce the amount of herbicides that will be "needed":

a. Linkage of Passive and Active Treatments

The Restoration Alternative conditions herbicide or other treatments on a prior consideration of whether passive treatments can replace, avoid, or augment herbicide use to attain vegetation goals (DEIS: G-4):

> Action-PLAN 6
> Prior to implementing site-specific vegetation treatments, prepare goals based on:
> 1. vegetation conditions, including invasive species concentrations
> 2. vulnerable wildlife and plant species and habitats
> 3. habitat important for threatened, endangered, and sensitive species and carnivores; connectivity for habitat-specialist wildlife
> 4. past and present activities within the watershed leading to vegetation problems
> 5. passive and active restoration needs
> 6. feasible restoration goals

Thus, the Restoration Alternative looks at the whole invasive species problem, not merely what herbicide to spray where. Neither the BLM's Alternative E (a fatally truncated version of the Restoration Alternative) nor Alternative B (their Preferred Alternative) include the above planning steps.

The approach adopted in Alternative B of merely considering which herbicide to apply on how many acres fails to include the consideration of passive treatments (where they would be likely to help) when planning herbicide treatments. As noted in Attachment H (Comments on this DEIS and PER by Soda Mountain Wilderness Council), the BLM is successfully using passive restoration to reduce non-native vegetation on the former Box-O ranch property that is now within the Cascade-Siskiyou National Monument. The following is an excerpt from the Soda Mountain Wilderness Council comment regarding (1) the role of passive treatment; and (2) the role of linking active and passive treatments:

> In fact, the Monument Manager stated that "[r]eintroducing livestock could impede the recovery of plant communities which have been dominated by non-native annual species, slowing the recovery of native perennial species . . . . Reduction in abundance of these species through grazing would further allow for the advancement of weed species already known to be present."
>
> The passive treatment utilized on the former Box-O crucially included, but was not limited solely to, the elimination of livestock grazing. The BLM utilized other active restoration efforts such as burning and reseeding, removal of man-made berms along Jenny Creek, and tree planting in riparian areas which, in conjunction with the elimination of grazing, contributed to the restoration benefits that have been achieved so far….

b. <u>Prevention of Invasive Species – Two Examples: Livestock and ORVs</u>

The Restoration Alternative conditions herbicide use on avoidance of unnecessary invasive species spread by livestock (DEIS: G-8):

> Action- PREVENTION 3
>
> Reduce spread of invasive weeds caused by domestic livestock grazing:

1. retire domestic livestock grazing permits at earliest opportunity where grazing has been found to promote invasion or persistence of invasive species
2. prioritize invasives prevention and restoration activities for areas where domestic livestock grazing has been permanently ended
3. manage livestock movement patterns to insure animals are not moving seeds of invasive species from infested to uninfested areas
4. suspend livestock grazing on non-cohesive soils in perennially saturated meadows
5. manage livestock grazing to favor native species

6. avoid grazing in systems still containing a strong component of native perennials, biological soil crusts, or other features known to act as natural barriers to invasion or increase of invasive exotic species.

Perhaps the BLM politically does not want to rein in livestock grazing in this manner, but it is under a NEPA obligation to consider how reductions in the need for herbicide use might directly, indirectly, or cumulatively result from such constraints on livestock grazing.

As another example, the DEIS does not estimate how control of invasive species (a Purpose of the EIS) might be increased by following the Restoration Alternative's conditioning of herbicide use on prevention of off-road vehicle use that results in invasive species (DEIS: G-9), e.g.:

> Action- PREVENTION 5
>
> Precede all road or off-road vehicle route reconstruction, and any consideration of adding existing or illegal user-created roads and off-road vehicle routes to the transportation system, by NEPA analyses of their impacts, including potential to facilitate the spread of invasive species into native ecosystems.
>
> Action- PREVENTION 6
>
> Close or restrict non-essential, designated routes for motorized vehicle travel in areas of high risk for spread of invasive species.

The DEIS admits (2-13) that Alternative E (the BLM's version of the Restoration Alternative) would "place greater emphasis on passive restoration…where…activities [e.g., livestock grazing and ORV driving] have promoted a less desirable vegetation community [e.g., invasive species] or increased erosion [i.e., a condition associated with invasive species]," but avoids analyzing the meaning of this for herbicide use, stating:

> Since these activities [e.g., livestock grazing and ORV driving] are allowed under FLPMA, however, restrictions on their use would only be considered to the extent they are consistent with BLM vegetation and land use management practices (e.g., excluding grazing animals from recently seeded areas) [emphasis added].

But annual herbicide use prescribed for 900,000 acres by the DEIS is itself a "vegetation and land use management practice." So, given the EIS Purpose (i.e., to describe the conditions and limitations that apply to herbicide use), this EIS is the appropriate place in which to analyze the Restoration Alternative's approach to conditioning and limiting the use of herbicides, including linking prevention to herbicide use, for its direct, indirect, and cumulative beneficial impacts.

Consider the following failure to include prevention in livestock management:

Continue to graze livestock where grazing has been found to promote invasion or persistence of invasive species

→ more invasive species (i.e., a greater number of invasive species and/or increased introduction, establishment and/or spread of invasive species)
→ more herbicide treatments
→ more forage for cattle
→ continued or increased cattle grazing
→ more invasive species
→ more herbicide treatments , and so on.

The DEIS does estimate that more herbicide use will mean more livestock grazing potential (4-123): "In cases where herbicide treatments are able to reduce the cover of noxious and unpalatable weeds on grazed lands, this would create short- and long-term benefits to livestock by increasing the quality of forage" [emphasis added].

However, the DEIS then claims that analyzing whether more livestock grazing will mean more herbicide use is beyond the scope of the DEIS (2-12: "… restrictions on [livestock grazing] would only be considered to the extent they are consistent with BLM vegetation and land use management practices").

Thus, the DEIS discusses the linkage of herbicide use to increased livestock forage, but refuses to consider the link of livestock grazing to increased herbicide use.

The BLM must analyze the consequences for herbicide use of herbicide treatments being linked to prevention. The DEIS has not done this, and then the BLM expects the public to fund and acquiesce each year to toxic applications on 930,000 acres of the land the BLM is charged with managing each year, even though much of the toxic applications will be doomed to failure because of the BLM's failure to explicitly link their applications of toxic chemicals to prevention of the need for at least some of those toxic applications..

Example 2: Revegetation. The DEIS fails to analyze the consequences for reduced future herbicide use of proactive management to consolidate successes of passive and active prevention and direct treatments of invasive species

The Restoration Alternative proposes that revegetation may be needed, and that the revegetation use native seeds/plants (DEIS: G-16):

> Action-REVEGETATION 1
> In revegetation efforts, whenever it is possible to do so, use native seed and seedlings that have been grown from seeds of locally adapted populations.
>
> Action- REVEGETATION 2
> If native seeds/plants are not available, revegetation projects will rarely be undertaken until native plant seed or plants become available. Non-native plant species will be used only in extremely degraded/severely altered systems as an intermediate step toward/placeholder for native restoration, accompanied by a full commitment to complete restoration of native species. This commitment must include funds set aside as part of the project, with specific deadlines for accomplishment.

> Action- REVEGETATION 3
> When reseeding with non-native species, certification must be provided that only species that have been documented as non-persistent are present in the seeding mixture.
>
> Action- REVEGETATION 4
> Assure availability of native seed and plants:
> 1. establish BLM contracting systems that will provide growers the necessary assurance their native, locally-adapted seed/plants will be purchased if grown
> 2. establish sufficient storage facilities for native seeds for major revegetation efforts.

The DEIS does not include these revegetation considerations in its Alternative E (2-13), which is supposedly "based" on the Restoration Alternative. Alternative B (BLM's Preferred Alternative; 2-11) does not mention use of native vegetation for reseeding/revegetation linked to herbicide use.

The DEIS needs to examine the results of where revegetation with and without native seeds has been linked to herbicide use on BLM lands or in the scientific literature in order to compare Alternative B with the Restoration Alternative for its cumulative consequences for subsequent herbicide use.

In the DEIS section titled "Standard Operating Procedures" for mitigating herbicide treatments, the BLM describes ten Standard Operating Procedures that "<u>can</u> be implemented at local level according to specific conditions" [emphasis added]. One of the "Standard Operating Procedures" is:

- *Use native or sterile species for revegetation and restoration projects*

The DEIS states, "These [standard operating] procedures [i.e., including using native or sterile species for revegetation] <u>would</u> help minimize impacts to plants and ecosystems on public lands…associated with herbicide use" (4-42; emphasis added).

However, at 4-61, under "Impacts by Alternative", the DEIS proposes no plan to revegetate with native vegetation:

> Herbicides would be used on rangelands dominated by annual grasses, such as downy brome and medusahead, followed by revegetation with perennial grasses and forbs.

The DEIS doesn't state whether the perennial grasses and forbs will be exotic or native.

Elsewhere, the DEIS (4-45) does note that merely poisoning invasive species may not result in native vegetation returning:

> Some treatments are very successful at removing weeds over the short term, but are not successful at promoting the establishment of native species in their place. In such cases, seeding of native plant species would be beneficial. Weeds may resprout or reseed quickly, outcompeting native species, and in some cases

> increasing in vigor as a result of treatments. The success of treatments would depend on numerous factors, and could require the use of a combination of methods to combat undesirable species.

Although the above passage refers to the need to "use a combination of methods to combat undesirable species", the DEIS in fact gives only the example of seeding species as an example of combining methods. For example, the DEIS never mentions combining herbicide use with removal of livestock grazing or ORV use.

The above passage (and DEIS) fails to note a major reason herbicide activity may not result in native vegetation: Often there are virtually no native seed sources remaining in a large, highly-invaded site (e.g., where cheatgrass or star thistle form a near-monoculture over hundreds or thousands of acres) DEIS fails to analyze on what proportion of the estimated 900,000 acres of annually sprayed acres revegetation might be needed <u>based on its own experience of the failure of herbicide use to promote the establishment of native species.</u>

Regardless, the DEIS never analyzes the consequences of using "a combination of methods to combat undesirable species," let alone the consequences of herbicide use with and without native seedings in a range of settings.

The DEIS fails to analyze the Restoration Alternative's explicit commitment to seeding with native species and its commitment to developing an institutional availability/storage of native seeds for revegetation. The Restoration Alternative's use of native species for revegetation as a condition/limitation on use of herbicides must be examined.

II. The DEIS Fails to Identify the Primary Issue of Controversy

The BLM falsely identifies the "primary issue of controversy" to be BLM's "continuing and proposed increase in the use of herbicides in vegetation treatment problems needed to implement the *National Fire* Plan and related initiatives" (1-2). In fact, the primary issue of controversy that the Restore Native Ecosystems Coalition raised in person with Brian Amme of BLM as early as 2002, and which we have raised throughout our development and transmittal to the BLM of the Restoration Alternative is that the BLM:

a. refuses to acknowledge BLM management that is <u>causing</u> vegetation problems via their other, "stand-alone" land management practices (e.g., ORV use managed by recreation managers; livestock use managed by livestock managers; tree-cutting managed by "fuels reduction" managers);
b. refuses to consider and utilize <u>passive restoration</u> as a non-toxic approach proven to be effective in many sites experiencing invasive species problems; and
c. <u>refuses to link</u> (1) <u>prevention</u> of invasive species, (2) <u>"control"</u> of invasive species, and (3) <u>maintenance and restoration of native vegetation habitat</u> as a valid, integrated approach to controlling invasive species that is <u>different than the BLM's current practice and preferred alternative.</u>

III. The DEIS Fails to Address Cumulative Impacts

The DEIS notes (4-1) that cumulative impacts are:

> Those effects that result from the incremental impact of the action when it is added to other past, present, and reasonably foreseeable future actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time. For this PEIS, potential cumulative effects include those that could occur on other federal and non-federal lands. [Emphasis added]

First and foremost, the DEIS fails to analyze the beneficial and adverse cumulative impacts of when herbicide use has and has not been

a. linked to management that prevents the conditions that favor invasives species
b. linked with non-chemical treatments; or
c. linked with native species revegetation.

Such examples are rife throughout the Integrated Weed Management literature (both experimental and practical); and exist on BLM lands where management has or has not removed livestock (see, e.g., the Jenny Creek example cited in Attachment H to these comments, i.e., the comments of Soda Mountain Wilderness Council), or closed ORV roads as well as spraying with herbicides; where BLM has or has not followed herbicide use with native revegtetation; or where BLM has or has not followed one or the other of the Restoration Alternative's proposed prevention practices.

The cumulative impacts section (4-194 through 2-246) is riddled with unreferenced conclusions, false assumptions, and failure to consider impacts of present and reasonably foreseeable future actions, as well as the different cumulative impacts that would result from implementing the Restoration Alternative..

- Since the DEIS fails to analyze the Restoration Alternative, it fails to analyze the cumulative effects of the class of actions of combining prevention treatments, active and passive direct treatments, and revegetation with native species.

  At 4-194, the DEIS states that the class of actions that will be analyzed are "all vegetation treatment methods used by the BLM." This is inappropriate, as the BLM should be analyzing all treatment methods they could reasonably be using (e.g., as in the Restoration Alternative), not just those that they are currently using.

  For instance, the DEIS notes (4-199) that grazing and ORV use cause cumulative impacts to soils and notes the lack of inventory and monitoring data available to determine the status of soil condition. However, the DEIS fails to analyze the comparative cumulative effects on soil of the Restoration Alternative's linkage of prevention treatments, active and passive direct restoration treatments, and native revegetation.

- The cumulative impacts analysis falsely represents the relationship of the Preferred Alternative to passive restoration.

At 4-203, the DEIS states with regard to cumulative effects on hydrologic function and water quality:

> Alternative E places greater emphasis on passive restoration than the other alternatives. Passive restoration is often an important first step in improving watershed health because the anthropogenic activities that are causing degradation or preventing recovery are reduced or eliminated. Livestock grazing and OHV use are often cited as factors that cause loss of wetland and riparian habitat function and watershed degradation; by prohibiting livestock from entering wetland and riparian areas, and placing limits on OHV activity, improvement in watershed function can be expected (Kauffman et al. 1997). However, the BLM would have to balance watershed protection with the multiple use requirements under FLPMA. As discussed in Chapter 2, Vegetation Treatment Programs, Policies, and Methods, passive restoration[5] would be considered first when developing restoration management plans, and would be used to the extent possible within the constraints of FLPMA.

The DEIS repeats a similar statement with regard to cumulative effects on resource function and scenic quality (4-228; emphases added):

> Alternative E places greater emphasis on passive restoration than the other alternatives. Passive restoration is often a critical first step in successful restoration of degraded areas since anthropogenic activities that are causing degradation or preventing recovery are halted. OHVs are often cited as a factor contributing to loss of resource function and degradation of scenic quality. By controlling OHV use, improvement in recreational values can be expected (Kauffman et al. 1997). However, the BLM would have to balance resource protection with the multiple use requirements under FLPMA. As discussed in Chapter 2 of the PER, Vegetation Treatment Programs, Policies, and Methods,

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[5] The unanalyzed Restoration Alternative, defines "passive restoration treatments" as (DEIS: G-2):

> Suspension of activities that cause the loss of ecological integrity or native species populations in a specific area. Passive restoration treatments may include:
>
> 1. Area , road, and off-road vehicle route closures
> 2. Voluntary livestock permit retirement
> 3. Retirement of vacant livestock allotments
> 4. Livestock grazing exclosures (e.g., in aggressive weed infestations, uplands "at risk"of weed infestation, riparian areas, habitat of threatened or endangered species, springs, wetlands)
> 5. Restrictions of logging activities
> 6. Restrictions of oil and gas and mineral development, including allowing expired leases to remain expired
> 7. Restrictions on other human activities, as relevant
> 8. Prescribed natural fire (i.e., allowing fires to burn under predefined circumstances)

> passive restoration would be considered when developing restoration management plans, and would be used to the extent possible within the constraints of FLPMA.

The above is false. Chapter 2 of the Programmatic Environmental Report does not indicate that passive restoration treatments would be considered "first" when developing restoration management plans, nor does it indicate that it would be used "to the extent possible within the constraints of FLPMA." It doesn't even use the words passive restoration.

Chapter 1 of the PER indicates (1-6) that passive restoration treatments are not a focus of the proposed vegetation treatments:

> Although this PER refers to activities consistent with the authorities under FLPMA and other statutes that may contribute, in some cases, to land and resource degradation (e.g., livestock grazing, OHV use, recreation), its focus is on proactive vegetation treatments to maintain and restore ecological conditions. The focus of the PER is not to restrict, limit, or eliminate FLPMA-authorized activities as a means to restore land health.

That FLPMA allows livestock grazing or ORV use is not debated. However FLPMA does not prevent restrictions on livestock grazing, ORV use or other activities where such restrictions would contribute to ecosystem health or restoration.

The unanalyzed Restoration Alternative, defines "passive restoration treatments" as (G-2):

> Suspension of activities that cause the loss of ecological integrity or native species populations in a specific area. Passive restoration treatments may include:
> 1. Area , road, and off-road vehicle route closures
> 2. Voluntary livestock permit retirement
> 3. Retirement of vacant livestock allotments
> 4. Livestock grazing exclosures (e.g., in aggressive weed infestations, uplands "at risk" of weed infestation, riparian areas, habitat of threatened or endangered species, springs, wetlands)
> 5. Restrictions of logging activities
> 6. Restrictions of oil and gas and mineral development, including allowing expired leases to remain expired
> 7. Restrictions on other human activities, as relevant
> 8. Prescribed natural fire (i.e., allowing fires to burn under predefined circumstances)

- The BLM wrongly considers the use of "SOPs identified in PEIS' (4-197) as an assumption for cumulative impacts assessment, as the DEIS indicates that the ten Standard Operating Procedures it identifies as mitigation for herbicide use "can be implemented at local level according to specific conditions" [emphasis added]. One of the "Standard Operating Procedures," "use native or sterile species for revegetation and

restoration projects" cannot be assumed to be operating for the purposes of cumulative impacts, as it is not part of any alternatives being considered by the BLM (2-10 through 2-13). It is a part of the unanalyzed Restoration Alternative.

The DEIS later states (4-207):

> Alternative E places greater emphasis on passive restoration than the other alternatives. Passive restoration is often considered a critical first step in successful restoration of degraded areas since anthropogenic activities that are causing degradation or preventing recovery are halted. Under Alternative E, recovery of vegetation through passive management is expected to take longer than under alternatives A, B or D, where active management through treatments such as seeding with native species, establishing intermediate vegetation to control erosion, and use of pre-emergent herbicides to prevent weed establishment would be expected to promote faster recovery. [Emphasis added.]

This shows that Alternative E is not based on the Restoration Alternative, which does explicitly engage active management through treatments such as seeding with native species, establishing intermediate vegetation to control erosion, and using pre-emergent herbicides to prevent weed establishment The above statement also misrepresents Alternative B (2-11), which does not provide for seeding with native species or use of intermediate vegetation.

- The cumulative impacts section formulaically equates long-term success with number of acres treated. This is unwarranted and unsupportable, given the combination of approaches allowed in Alternative E, and the failure to analyze the Restoration Alternative which requires linkage of prevention treatments, active and passive direct treatments, and native revegetation (if revegetation is needed) For instance, the DEIS claims (emphases added):
    - "Based on the number of acres treated….long-term improvements to wetland and riparian area function and productivity would be greatest under the Preferred Alternative, and least under the No Action Alternative" (4-204)
    - "Based on the number of acres treated long-term improvements to hydrologic function and water quality would be greatest under the Preferred Alternative, and least under the No Action Alternative" (4-203)
    - "Based on the number of acres treated …long-term improvements to vegetation would be greatest under the Preferred Alternative, and least under the No Action Alternative" (4-207)
    - "Based on the number of acres treated, long-term improvements to the health and productivity of aquatic organisms would be greatest under the Preferred Alternative, and least under the No Action Alternative" (4-209)
    - "Based on the number of acres treated…long-term improvements to wildlife and habitat would be greatest under the Preferred Alternative, and least under the No Action Alternative" (4-214).

- "Based on the number of acres treated…long-term improvements to domestic livestock would be greatest under the Preferred Alternative, and least under the No Action Alternative" (4-216).
- "Based on the number of acres treated…long-term improvements to the wild horses and burros would be greatest under the Preferred Alternative, and least under the No Action Alternative" (4-218).
- "Based on the number of acres treated…long-term improvements to the visual qualities of public lands would be greatest under the Preferred Alternative, and least under the No Action Alternative" (4-224).
- "Based on the number of acres treated…long-term improvements to the wilderness and special areas should be greatest under the Preferred Alternative, and least under the No Action Alternative" (4-226).

  The DEIS discussion of wilderness and special areas notes that livestock grazing is a threat to wilderness and special areas and that the vegetation treatments do not address this threat (4-224), but in fact the unanalyzed Restoration Alternative does address this threat (G-13):

  > Action- RESTORATION 5
  > Except for treatment of small infestations without motorized equipment, prescribe direct treatments within designated wilderness or wilderness study areas only in conjunction with efforts to halt avoidable spread of invasive species into the wilderness from outside these areas.
  >
  > Guideline- RESTORATION 1
  > Adopt the Carhart Model (Arthur Carhart National Wilderness Training Center) for completing minimum requirement analyses and minimum-impact tool analysis. The model assists managers in making administrative decisions concerning wilderness.

- "Based on the number of acres treated…long-term improvements to recreation resources on public lands would be greatest under the Preferred Alternative, and least under the No Action Alternative (4-228).
- "Based on the number of acres treated…long-term improvements to socioeconomic resources would be greatest under the Preferred Alternative, and least under the No Action Alternative (4-231)
- "…as the long-term objective of treatments is to restore native plant communities and habitats, including those of traditional importance to Native peoples, the greatest benefits [to cultural resources and traditional lifeway values) should accrue under the Preferred Alternative." (4-221)

- The cumulative impacts section assumes (4-200) that monitoring and evaluation will occur. However, the DEIS promises no monitoring (2-21), and notes (2-21)

> The BLM recognizes that many sites treated in the past lack monitoring data. In many cases, project monitoring was not done, was done sporadically without consistent documentation, or was done but the records were lost or destroyed.

The DEIS provides zero assurance that any particular monitoring will occur in the future and only says that the results of any monitoring that happens to be done "should" (not "shall") be made available to "interested parties" (2-11).

In contrast, the unanalyzed Restoration Alternative mandates monitoring and involves the public in all aspects of monitoring:

> Action-OVR 5
> Include realistic and dedicated funding for, and an institutional commitment to, assessment, monitoring and appropriate response to monitoring results. Design and implement assessment (including the gathering of baseline data) and monitoring systems before activities commence.
>
> Action-OVR 6
> Encourage and facilitate public participation by local, regional and national stakeholders in such activities as assessment, monitoring, early detection of invading species, provision of new and scientific information, review of assessment and monitoring protocols, and analysis of alternatives for actions.
>
> Action- PRIORITIES 3
> Vegetation prevention and restoration treatments must utilize:
> 1. a precautionary approach, which, in the face of uncertain outcomes, proceeds experimentally and cautiously
> 2. best available science and experiential and indigenous knowledge where applicable
> 3. an adaptive process that regularly incorporates revisions from monitoring and evaluation
> 4. a public process
> 5. the least intrusive techniques available to restore ecological integrity
> 6. the least risky interventions that are likely to provide the greatest ecological benefit
> 7. recovery plans for threatened and endangered species, or improvements on such plans
> 8. prevention strategies to reduce the need for chemical and mechanical treatments, and prescribed fire, so that the number of acres treated annually with these methods will decline over the life of the EIS.
>
> Action-MONITOR 2
> Monitoring must be used to:
> 1. inventory baseline conditions at the landscape, watershed, subwatershed, and project site levels

2. measure whether positive goals for native ecosystem recovery, conservation, and integrity are being attained
3. track biodiversity and health using an increaser/decreaser species procedure (including biological soil crusts, wildlife, and endemic/sensitive species).
4. practice precaution, retain flexibility, and respond to change, unforeseen harm, failure to reach objectives, and/or new information
5. quantify invasive species population changes
6. establish success/problems with specific prevention and restoration treatments in a variety of sites.

Action-MONITOR 3
Monitoring and evaluation of vegetation treatments shall:
1. relate to the clearly stated objectives of all restoration projects
2. be an integral component of each restoration project
3. be incorporated into the essential costs of each project
4. use scientific principles of experimental design including replication and measurements from untreated control areas for comparison with treated locations
5. use a process responsive to all-party and scientific input
6. encourage involvement of local, regional and national stakeholders
7. be documented in a sixteen-state central database with assessments, objectives, monitoring procedures, and analyses in comparable formats
8. outline clear procedures for responding to monitoring and evaluation results

Action-MONITOR 4
Monitoring methods shall be:
1. Relevant: evaluates progress toward stated objectives
2. Sensitive: quickly detects change, shows trends, identifies critical features
3. Available: inexpensive, easily applied
4. Measurable: accurately quantifiable with acceptable methods
5. Defensible: minimally subject to individual bias
6. Verifiable: allows others applying the same methods to achieve similar results
7. Inclusive: avoids reductionism, where feasible
8. Scheduled: monitoring interval firmly scheduled.

Action-MONITOR 7
Each District must prepare an annual monitoring report of all vegetation restoration projects (passive and active). These reports should be available at a central BLM location

Action-MONITOR 9
All proposals to undertake a vegetation restoration activity must include a description of the monitoring that will be necessary to determine the compatibility of the activity with specific goals, objectives, and standards; and the treatment efficacy.

Action-MONITOR 11
Annually monitor for five years all firelines, fire camps, helicopter spots, and fire retardant-treated areas for invasive species; eliminate introduced invasive species.

Action- MONITOR 12
Monitor progress toward attainment of long term health and integrity of the watershed, aquatic, riparian, native vegetation and soil resources.

- Many statements in the cumulative impacts section have no reference to underlying data. A few examples include:

  - "Approximately 4% of rangeland on public lands is achieving desired condition." (4-200)

  - "In a study of the Interior Columbia Basin, approximately 92% of federally-administered lands had none to low soil disturbance" (4-200)

  - "… 25% of wetlands on public lands in the lower 48 states are not functioning properly (USDI BLM 2005d), while 52% of riparian areas are considered non-functional, or functioning at risk. The poorest functioning riparian areas are found in the southwest and Montana, while most riparian areas in Alaska, Colorado, and Utah function properly." (4-202)

    In the above quote, presumably the claim that most riparian areas function properly in Utah is drawn from "USDI BLM 2005d" which refers to "Public Land Statistics Fiscal Year 2004," which is hardly a scientific reference for the claim that most Utah riparian areas function properly.

- The DEIS refers (4-196) to a "PER scoping process" as related to cumulative effects for protection of Threatened and Endangered species. As the Programmatic Environmental Report (PER) is not being developed under NEPA, there is no "scoping process"

  Likewise, the DEIS claims (4-198):

  > Thus, the proposed action, which includes over 4.3 million acres of fire use and mechanical treatments, in addition to 1.7 million acres of treatments using other methods, would be expected to provide greater improvement in ecosystem function and air quality than is projected under current treatment methods.

  This is an unreferenced and unsupportable conclusion, given that the treatments on the 4.3 million acres are being proposed in a report which is not being developed under NEPA, and thus the public has no legal access to challenge the scientific accuracy of its conclusions.

- The DEIS inaccurately assumes that cumulative impacts at the site-specific level will be addressed. The DEIS states (4-197):

> Ground-disturbing activities on public lands are conducted only after any necessary site-specific NEPA analysis has been completed. Such analyses are required to describe the cumulative impacts of the site-specific alternatives on adjacent lands and resources, and on the watershed. This provides opportunities to detect and minimize cumulative environmental effects that cannot be specifically determined at the broad level of this PEIS.

This implies that livestock grazing and ORV use (the two most widespread ground-disturbing activities on BLM lands) are analyzed for cumulative impacts on the watershed or other resources at the site-specific level. In fact, the BLM does not undertake cumulative impacts analyses for these two ongoing ground-disturbing activities and on January 25, 2006 is proposing to allow term grazing permits to be issued without any NEPA analysis (USDI 2006), which means no cumulative analysis will be required, no consideration of alternatives to the grazing terms, and no scientific accountability.

IV. Increases in Vegetation Treatments and New Goals must be Proposed under NEPA

The Programmatic Environmental Report (PER) proposes a three-fold increase in vegetation treated directly, from 2 million to 6 million acres per year (PER ES-2). These treatments will have significant impacts in and of themselves. Likewise, they will include ground disturbances and removal of vegetation, favoring invasive species, the primary response to which will be herbicides, which will have additional impacts (PER ES-2).

This should not be examined in a report, but through NEPA, which will:

a. Fully analyze reasonable alternatives for vegetation treatments, including the Restoration Alternative (EIS, Appendix G) and
b. Insure public review of the scientific accuracy of conclusions regarding benefits and impacts.

1. As a non-NEPA document PER doesn't consider the Restore Native Ecosystem Alternative ("Restoration Alternative"), which proposes different actions (and combinations of actions) than the PER:

The overall goal of vegetation management within the Restoration Alternative (EIS G-1) is to:

> Enhance the ecological integrity of BLM land by restoring natural processes, native species, ecosystem function, and resilience of plant and animal communities.

This contrasts with the goal of the PER vegetation management (PER 2-1):

> The goals of vegetation management are to manage vegetation to sustain the condition of healthy lands, and, where land conditions have degraded, to restore desirable vegetation to more healthy conditions.

The BLM goal does not mention native vegetation but instead "desirable" vegetation (which could be exotic, as in introduced pasture grasses). Desirable for whom? Livestock permittees? Sage grouse? Ground cover in the midst of ground disturbance? Erosion control?

The Restoration alternative would have far different consequences for native species and ecosystems than that proposed by the PER, thus revealing the significance of environmental impacts under the different proposals.

Example: Differing Direction for Biological Soil Crusts

The Restoration Alternative provides the following detailed directions for biological soil crusts:

> (DEIS: G-8):
> Action- PREVENTION 3
> Reduce spread of invasive weeds caused by domestic livestock grazing:
> …avoid grazing in systems still containing a strong component of native perennials, biological soil crusts, or other features known to act as natural barriers to invasion or increase of invasive exotic species
>
> (DEIS: G-12):
> GOAL- PREVENTION 6
> Biological soil crusts shall be maintained as a partial shield preventing establishment or spread of invasive exotic species
>
> Action- PREVENTION 35
> Using existing data, map and describe the presence and integrity of biological soil crusts at the Ecoregion and watershed levels within the 16 western states; locally develop maps at the subwatershed level.
>
> Action- PREVENTION 36
> Prepare and implement a general plan for damaged biological soil crusts.
>
> Action- PREVENTION 37
> Prohibit livestock grazing for at least five years following a fire in areas capable of maintaining biological soil crusts. Return of livestock will be delayed past five years if significant recovery of the biological soil crust has not occurred.
>
> (DEIS: G-14):
> Action- RESTORATION 20

> Consideration of the following must be documented prior to prescribed burns, if relevant:
>
> 1. long-term damage to biological soil crusts…

In contrast, the following vague statements constitute the sole PER direction for biological soil crusts:

> (PER: 2-22):
>
> [During manual treatments]: Minimize damage to soil crusts.
>
> [During use of domestic livestock for vegetation management:] Minimize use of domestic animals if removal of vegetation may cause significant soil erosion or impact biological soil crusts.
>
> (PER: 2-23)
>
> [During mechanical treatments]: Minimize damage to soil crusts.

These differing directions for biological soil crusts are one example that reveals that significant impacts and significant linkages with promotion of invasive species will be associated with the vegetation treatments proposed in the PER. This necessitates the preparation of an EIS.

2. As a non-NEPA document, the PER "gets away" with making claims minus scientific evidence. This reveals the lack of "equivalence" of the PER to a NEPA document.

   Example: Herbicides in sagebrush

   As noted later in these comments [page 28] in the case study regarding sagebrush and invasive species treatments in sage grouse habitats, there is a far more complicated relationship between herbicide and other sagebrush community treatments and sage grouse habitat than the simplistic conclusion that herbicide use leads to native vegetation (PER 4-53; notes in italics added):

   > The use of herbicides would benefit plant communities [*i.e., apparently without regard to whether the plant communities are exotic European livesetock forage pastures*] with weed infestations by decreasing the growth, seed production, and competitiveness of target plants, thereby releasing native species from competitive pressures (e.g., water, nutrient, and space availability) and aiding in their reestablishment. [*This assumes, without evidence, that it is competitive pressures and not trampling, selective consumption, compaction, or other pressures that is reducing or eliminating the native species and favoring invasive species.*] The degree of benefit to native communities would depend on the toxicity of the herbicide to the target species, and its effects on non-target species

> as well as the success of the treatments over both the short and long term. [*The preceding is tautological: "The degree of benefit to native communities would depend on…the success of the treatments."*] Some treatments are very successful at removing weeds over the short term, but are not successful at promoting the establishment of native species in their place. In such cases, seeding of native plant species would be beneficial. [*Neither the PER nor the DEIS estimate what acreage would require seeding of native plant species; the amount of native seed this would require, nor the demonstrated success of such seedings under various habitat conditions*] The success of treatments would depend on numerous factors, and could require the use of a combination of methods to combat undesirable species [*Neither the PER nor DEIS estimate what acreage will require "a combination of methods" or what methods will be involved in those combinations.*]

There are no references offered for the above conclusions, and yet there is no effective way for scientists or others to challenge the conclusions, because the report is free of NEPA requirements for accuracy.

The PER provides no solid direction, no solid evidence for claims, and no comparison with alternative approaches to vegetation treatments. And yet, these vegetation treatments, particularly the mechanical, manual, and fire treatments, will disturb the ground, favoring invasive species, for which there is a NEPA document.

BLM Failed to Analyze the *Causes* of Invasive Species Spread in DEIS/PER

NEPA regulations state that "accurate scientific analysis" (40 CFR §1500.1) is an essential mandate of the Act. Yet, in the DEIS the BLM ignores recent scientific analysis of the management of invasive species that state, unequivocally, that management of invasive plants will be successful only when management plans address the causes, rather than merely the symptoms, of invasive plant problems. Herbicides are potent tools for addressing the symptoms of invasive species spread, but do not address the causes; by focusing exclusively on herbicide use, therefore, the DEIS ignores NEPA's mandate to include accurate scientific analysis.

Roger Sheley is a weed ecologist now with the U.S. Department of Agriculture's Agricultural Research Service. In a recent (2003) article published in the journal *Weed Science*, he wrote, "It is becoming increasingly clear that prescriptions for rangeland weed control are not sustainable because they treat the symptoms of weeds rather than their cause." He continued by stating, "A generalized objective for ecologically based weed management is to develop and maintain a healthy plant community that is largely invasion resistant."

Another recent (2005) publication from the Pacific Northwest Research Station (USDA FS) has a similar conclusion. "Herbicides, prescribed fire, and other methods kill weeds, but without a source of native seeds or a long-term strategy for restoration, the treated areas are recolonized by the same species or by other, potentially more damaging, invasive plants." The publication does point out, however, that this problem can be solved by addressing the causes of invasive plant problems: "Research can contribute information on best practices to minimize invasive risks in

road maintenance, recreation, range management, prescribed fire, thinning, wildlife habitat improvement, and timber management." Such an analysis is necessary for the DEIS/PER to succeed, but it has been ignored in both the EIS and NEPA-less PER.

Another consequence of BLM's failure in the DEIS/PER to adequately analyze current science about the causes of invasive plant problems is that BLM fails to recognize or address the way that activities authorized or conducted by the agency encourage the establishment and spread of invasive plants.

Dana Blumenthal is a rangeland ecologist, also with USDA's Agricultural Research Service. In a recent (2005) article published in the journal *Science*, he wrote that "anthropogenic increases in resource availability, ranging from small-scale disturbances to global climate change, may not just facilitate invasion, but facilitate invasion by exotic species in particular." He concludes, "Humans may therefore play an even larger role in invasions by exotic species than previously thought."

Blumenthal's analysis is supported by an article published in the journal *Rhodora* by Elizabeth Farnsworth of the New England Wild Flower Society. She found "a significant association of invasives with roads and with other anthropogenic threats." Similar conclusions were reached by Jonathan Gelbard (Duke University) and Jayne Belknap (U.S. Geological Survey) in an article published in the journal *Conservation Biology* in 2003. They state that: "roads can act as conduits for the invasion of adjacent ecosystems by converting natural habitats to those highly vulnerable to invasion." In another paper, Gelbard and Harrison (2003) state that: "Roadless areas are significant refuges for native species. However, to protect these habitats from the continued threat of invasion, land managers should consider means of preventing construction of new roads, limiting off-highway vehicle access into grasslands with low road densities…."

Plant communities can also shift to non-native invasive species following off-road vehicle use. With knobby tires and large undercarriages, non-native "weedy" species seeds can be unintentionally taken deep into wildlands. The spread of invasive weeds has been cited by the Chief of the U.S. Forest Service as one of the four "great issues" facing U.S. Forest Service lands today (Bosworth 2003). Several recent studies have documented how off-road vehicles are a major vector for spreading invasive exotic species (Montana State Extension Service 1992, Gelbard and Harrison 2003, T. Rooney, *in prep*.). For example, on a ten-mile off-road vehicle course in Montana, 2,000 spotted knapweed (*Centaurea biebersteinii*) seeds were dispersed in just one circuit around the course. In Wisconsin, exotic species were found on 88 percent of the segments sampled along off-road vehicle trails (T. Rooney, *in prep*.). None of this science is addressed in the DEIS or PER.

The DEIS/PER also does not address the potential of <u>removing roads</u> to restore weed free habitats. Ripping roadbeds, restoring stream crossings, and recontouring roads were all found to reduce weed invasion. Bradley (1997) found that ripping the roadbed discouraged weed invasion in western Montana. In northern California, Madej et al. (2001) reported that following full recontour and stream crossing restoration some weeds emerged on hot dry terrain; however, very

few weeds appeared in more common moister terrain. Following hundreds of miles of full road recontour, few weeds were reported in north central Idaho (USDA FS 2003).

The DEIS Lacks Required Analysis of Herbicide Risks

The evaluations of herbicide risks in the DEIS fall short of NEPA's mandate to include accurate scientific analyses of the following topics: nonlethal effects on fish; nonlethal effects on amphibians; nonlethal effects on plants; effects on birds of herbicide damage to habitat; hazards of inert ingredients; occupational hazards; and synergistic hazards. Examples of each of these issues follow.

1. Nonlethal effects on fish (effects on fish other than mortality): The DEIS (4-82) states, in reference to 2,4-D, "Routine acute and chronic exposure scenarios do not result in risk to fish." However, the DEIS omits recent research published in the journal *Marine Environmental Research* by scientists from the University of Maryland showing that concentrations as low as ten parts per billion cause proliferation of peroxisomes in fish. (Ackers, Johnston, and Haasch, 2000) In addition, the DEIS (4-86) states with respect to picloram, "An acute LC50 value for trout ranges from 0.8 mg/L to 19.3 mg/L." However, the DEIS omits research showing that concentrations as low as 0.04 mg/L reduce the size and survival of trout fry. This research was published by D. F. Woodward at the U.S. Fish and Wildlife Service in the *Journal of the Fisheries Research Board of Canada*. (Woodward, 1976)

2. Nonlethal effects on amphibians (effects on amphibians other than mortality): The DEIS (C-10) states that "mammals and birds were used as the surrogate species for reptiles and adult amphibians because of the lack of data for these taxa (fish were used as surrogates for juvenile amphibians)." However, scientific accuracy requires that at a minimum, available data should be used. For example, a study showing that 2,4-D interferes with normal hormone function and maturation of eggs in frogs should not be omitted. Such a study was conducted by researchers at Willamette University and published in the journal *Molecular Reproduction and Development*. (Stebbins-Boaz et al. 2004) In addition, a study conducted by biologists at Trent University, Carleton University, and the University of Victoria and published in the journal *Environmental Toxicology and Chemistry* showed that environmentally relevant concentrations of Roundup (glyphosate) herbicides caused the development of intersex in frogs. (Howe et al. 2004)

3. Nonlethal effects on plants (effects on plants other than mortality): Although the DEIS (4-43) claims that in the evaluation of herbicide effects on nontarget plants the assessment endpoints include "adverse direct effects on growth, reproduction, or other ecologically important sublethal processes," the DEIS omits important recent research in this area. For example, the DEIS omits evaluation of recent research showing nonlethal effects of 2,4-D occur at exposure levels far below normal application rates. A recent study published in the journal *Mutation Research* showed that concentrations of 2,4-D "that did not have any visible physiological effects" caused genetic damage in plants. The study was conducted by biologists at the University of Lethbridge. (Filkowski et al 2003)

In addition, the DEIS omits evaluation of a series of studies that showed glyphosate increases the frequency of disease in a variety of non-target plants. These diseases include fusarium head blight in cereal crops, sudden death syndrome in soybeans, root rot in sugarcane, and white mold in soybeans. The studies were conducted by scientists at Agriculture and Agri-Food Canada, Iowa State University, Louisiana State University, and Michigan State University, and were published in the *Canadian Journal of Plant Pathology, Phytopathology*, and the *Agronomy Journal*. (Hanson and Fernandez 2003, Sanogo, Yang, and Scherm 2000, Dissanayake, Hoy, and Griffin 1998, and Nelson, Renner, and Hammerschmidt 2002)

4. Effects on birds of herbicide damage to habitat: In reference to chlorsulfuron, the DEIS (4-100) states, "Its use in forested rangeland and other wildlife habitat areas could benefit wildlife over the long term by controlling invasive plant species and promoting the establishment and growth of native plant species that may provide more suitable wildlife habitat and forage." However, the DEIS omits discussion of a series of studies showing that minute of amounts of chlorsulfuron can disrupt the production of seeds and fruits by many species of plants, destroying an important food source for birds. The studies were conducted by researchers from the U.S. Environmental Protection Agency and the University of Oklahoma, and published in the journals *Environmental Science and Technology*, *Physiologiia Plantarum*, and *Environmental Toxicology and Chemistry*. (Fletcher, Pfleeger, and Ratsch 1993, Fletcher, Pfleeger, and Ratsch 1995,Fletcher, J.S. et al 1996)

   In addition, the DEIS (4-102) states that "tebuthiuron is used to thin shrubs, creating a more favorable habitat for shrub-dependent species." However, the DEIS ignores research showing, for example, that lesser prairie-chickens prefer untreated nesting areas to those treated with tebuthiuron. This research was done by scientists at Texas Tech University and published in the journal *Great Basin Naturalist*. (Haukos and Smith 1989)

5. Hazards of inert (unidentified) ingredients in herbicides: The DEIS (C-84) states that "minimal impacts to the environment would result from these inert ingredients." However, the DEIS ignores recent research showing that the combination of inert ingredients with the herbicidal ingredients in a commercial herbicide product can pose hazards not identified when ingredients are tested singly. For example, scientists from the University of Caen showed that the combination of inerts and herbicidal ingredients in Roundup is toxic to human placental cells and disrupts the synthesis of sex hormones. This research was published in the journal *Environmental Health Perspectives*. (Richard et al 2005) In another example, researchers from the University of Minnesota showed that the combination of inert ingredients and herbicidal ingredients in two commercial 2,4-D products acts like estrogens in breast cancer cells. This research was published in the *Journal of Toxicology and Environmental Health*. (Lin and Garry 2000)

6. Occupational hazards: The DEIS (4-173) states that human health risks are based on "both acute (short-term) and chronic (long-term) toxicity information." However, the DEIS omits health risks identified through epidemiological studies of people exposed to herbicides occupationally. For example, occupational exposure to 2,4-D has been

associated with genetic damage, changes in levels of sex hormones, and increased incidence of cancer. These studies were conducted by researchers from the University of Minnesota and the University of Saskatchewan and published in the journals *Environmental Health Perspectives* and *Cancer Epidemiology, Biomarkers and Prevention*. (Garry et al 2001 and McDuffie et al. 2001)

In another example, occupational exposure to glyphosate is associated with increased incidence of cancer in a series of studies. The studies were conducted by scientists at the University of Saskatchewan, Örebro University, and the National Cancer Institute, and published in the journals *Cancer Epidemiology, Biomarkers and Prevention, Leukemia and Lymphoma*, and *Occupational and Environmental Medicine*. (McDuffie et al 2001, Hardell, Eriksson, and Nordström 2002, De Roos et al 2003)

7. Synergistic effects: The cumulative effects analysis in the DEIS does not consider effects of exposure to multiple herbicides. For example, it was shown over 20 years ago that picloram and 2,4-D are synergistically toxic to trout. This research was conducted by Daniel Woodward at the U.S. Fish and Wildlife Service and published in the *Journal of Range Management*. (Woodward 1982) In addition, imazapic herbicides and commonly used organophosphate insecticides are synergistically toxic to non-target plants, according to imazapic's manufacturer. (BASF Corporation 2004)

<u>Case Example</u>: Management of Sagebrush Steppe and Sage Grouse under the DEIS/DER

Sagebrush Steppe and Sage Grouse in the DEIS/PER

The BLM manages large areas of sagebrush steppe, identified as the "temperate desert ecoregion" in the DEIS/PER (PER: 3-49), which is habitat for sage grouse species (PER: 3-49). The greater sage-grouse is a BLM "sensitive species" in eight states (DEIS II: H-33) and the Gunnison sage-grouse is a Candidate Species under the Endangered Species Act (DEIS II: H-33).

Approximately seventy percent of herbicide applications and most non-chemical treatments described in the DEIS (preferred alternative) and PER are intended for sagebrush steppe habitats (DEIS: 4-64), particularly to benefit sage grouse and other wildlife (PER: 4-54; DEIS: 4-106).

Sage grouse are identified as a species that would benefit from the preferred alternative (Alternative B) in the DEIS (DEIS: 2-32). Herbicide treatments would target non-native broadleaf plants (to increase native grasses) (PER: 4-54) and sagebrush and other desert shrubs (to create openings in the canopy for wildlife and increase native grasses). The DEIS contemplates continued use of 2,4-D, glyphosate, picloram and tebuthiuron, and other herbicides in sagebrush steppe (sage grouse) habitats (DEIS: 4-63).

Approximately sixty-three percent of fire treatments described in the PER would occur in sagebrush steppe, purportedly to benefit sage grouse and other wildlife (PER: 4-73; 4-84). Some prescribed fire treatments would focus on reducing pinyon-juniper encroachment into sagebrush steppe and grasslands habitats (PER: 4-75).

Mechanical treatments would also be used in sagebrush steppe to “create openings in sagebrush habitats for use as foraging habitat and sage grouse leks” (PER: 4-78).

Past and Present Management of Sagebrush Steppe

Native sagebrush habitats have undergone drastic declines in the last century (Hann et al. 1997, West 1999, Miller and Eddleman 2000), with concomitant declines in populations of greater and Gunnison Sage-Grouse (Connelly and Braun 1997, Braun 1998, Leonard et al. 2000, Oyler-McCance et al. 2001, Beck et al. 2003). Publicly owned sagebrush steppe continues to be fragmented and degraded by livestock grazing, off-road vehicle use, energy development, mining, agriculture, (sub)urban sprawl, fire suppression, invasive species, and the placement and construction of roads, fences and utility corridors.

Sagebrush habitats used by sage-grouse have been significantly altered by land management practices (Patterson 1950; Kufeld 1968; Braun 1987; Drut 1994; Connelly and Braun 1997; Schroeder et al. 1999, 2004; Miller and Eddleman 2000; Wisdom et al. 2000, 2002). By 1974, about 10 to 12 percent of the 40 million hectares of sagebrush rangelands in North America had been treated to provide forage for livestock (Vale 1974). Overall, more than 80 percent of sagebrush rangelands have been altered in some way by human activities (West 1999).

Historically, brush control was used widely to eliminate sagebrush, especially from 1960 to 1970 (USDI Bureau of Land Management et al. 2000). Sagebrush control efforts diminished in the 1970's, primarily due to reduced federal funding and increasing environmental concern (Donoho and Roberson 1985). However, “treatments” (efforts to control sagebrush) to increase grasses for domestic livestock forage are still common. Treatments include the use of herbicides, blading (bulldozing of sagebrush), fire, mechanical and other methods (often followed by seeding non-native pasture grasses). Sagebrush has been removed to allow for cultivation of crested wheatgrass (*Agropyron cristatum*) for livestock forage (Drut 1994: 21).

Livestock grazing is a principal use of publicly-owned sagebrush lands. Grazing has affected the entire range of the sage grouse, and grazing and associated infrastructure and support systems may be the most important threat to the continued existence of sage grouse species. No sage grouse habitat is known to have escaped degradation by livestock grazing (Braun 1998). Indeed, livestock grazing is the most widespread influence on native ecosystems in western North America (Fleischner 1994, Wagner 1978, Crumpacker 1984). Approximately 165 million acres of BLM land are open to livestock grazing (PER: 3-55).

Grazing changes habitat structural characteristics and species composition on both upland and riparian sites, spreads exotic invasive species, and causes soil erosion (Rasmussen and Griner 1938; Patterson 1952; Autenrieth, et al. 1982; Klebenow 1982, 1985; Call and Maser 1985, Belsky, et al. 1999). Grazing has rendered many areas unusable for sage grouse and other wildlife. Some areas may be irreparably damaged, and may not be able to return to a desirable condition due to continued grazing (Autenrieth 1981, Laycock 1991). Even light grazing is known to stress herbaceous plants, grasses and shrubs required by sage grouse for hiding cover,

nesting habitat and food (West 1996). Thus, even light grazing has the potential to reduce habitat quality for sage grouse.

The scientific literature is replete with studies showing the serious ecological costs of livestock grazing domestic livestock in arid ecosystems (Fleischner 1994, Robbins and Wolf 1994, Brown and McDonald 1995, Paine, et al. 1996, Brown and McDonald 1997, Clements and Young 1997, Dudley 1997, Bork, et al. 1998, Dobkin, et al. 1998, Belsky, et al. 1999). Grazed sites may have only one-third the species richness of ungrazed sites (Reynolds and Trost 1980, Rummell 1951). Removal of livestock can double grass densities, but an area may take 110 years to recover (Gardner 1950). Webb and Stielstra (1979) found that grazing caused the aboveground biomass of annuals to decrease by 60 percent and decreased the above ground biomass of perennial shrubs by 16 to 29 percent. Domestic livestock grazing reduces water infiltration rates, reduces cover of herbaceous plants and litter, disturbs and compacts soils (creating microsites for invasion of invasive species such as cheatgrass), and increases soil erosion, which reduces the productivity of vegetation.

1. Effects of Herbicides on Sage Grouse

The following information on the effects of herbicides on sage grouse is excerpted from Rowland (2004), which was not referenced in the DEIS.

> Until the 1980's, herbicides such as 2,4-D were the most common method of eliminating large blocks of sagebrush (Connelly et al. 2000*b*). Lands after treatment often were planted with crested wheatgrass or other non-native perennial grasses for livestock forage. Application of herbicides affects all seasonal ranges of sage-grouse (Connelly et al. 2000*b*), and its effects have been widely reported compared to other land management practices (e.g., Gill 1965, Martin 1970, Carr 1967, Klebenow 1970, Pyrah 1970, Braun and Beck 1976, Rowland and Wisdom 2002).
>
> Spraying of herbicides primarily degrades habitat for sage-grouse by increasing fragmentation and removing shrubs used as nesting cover. Long-term studies in North Park, Colorado, revealed that applying 2,4-D resulted in reduced cover of sagebrush, fewer sagebrush plants and forbs, and lek abandonment (Braun and Beck 1976, 1996). Production of sage-grouse, as measured by percentage young in the harvest and chicks per hen, declined in the 5 yr following treatment but rebounded by 15 year post-treatment (Braun and Beck 1996). Hens with broods avoided sprayed blocks while moving toward traditional brood-rearing habitats (Carr 1967, Carr and Glover 1971). In another study in North Park, in which >120 flocks (>3,000 birds total) were observed during two winters, only 4 flocks were found in altered (by spraying with 2,4-D, plowing, burning, or seeding) sagebrush habitats, although >30% of the study area had been treated (Beck 1977).
>
> In Montana, 693 ha of big sagebrush in a 777-ha study area were strip-sprayed with 2,4-D in one year; 3 yr of subsequent study revealed nearly complete mortality (97%) of sagebrush in sprayed areas (Martin 1970). Only 4% of 415 observations of sage-grouse were in sprayed strips. Shifts in sage-grouse distribution were attributed to differences in

> vegetation composition; unsprayed strips had a greater proportion of forbs to grasses (40:60, vs. 20:80 in sprayed strips) and more live sagebrush, as well as more abundant forbs (Martin 1970). In southeastern Idaho, spraying of >1,300 ha of threetip and big sagebrush appeared to effectively eliminate nesting in sprayed areas, at least for 5 yr post-treatment (Klebenow 1970). Sprayed plots also had less basal area of forbs and lower crown cover of big and threetip sagebrush than control plots, in both brood sites and sites with no broods recorded (Klebenow 1970).

Herbicides may also be toxic to sage grouse, although sage grouse are not mentioned once in the DEIS Ecological Risk Assessment (DEIS II, Appendix C) or draft Biological Assessment. Wallestad (1975) and Blus et al. (1989) have noted the detrimental effects on sage grouse populations from application of herbicides and pesticides. Besides their acute effects, many herbicides have chronic effects, and may act as endocrine disrupters. Further, sage grouse in areas that have been treated with tebuthiuron (Spike) have been observed engaging in atypical behaviors. For example, during a period when most males were flocking, "one male [was] consistently alone in an area where sagebrush has been treated with Spike" (Brigham 1995). Another male was observed sitting out "in the open" in "the heat of the day" even though a sagebrush provided shade only 50 meters away (Brigham 1995). Although anecdotal, such observations may reflect contaminant mediated behavioral alterations.

2. Effects of Fire on Sage Grouse

The following information on the effects of fire on sage grouse is excerpted from Rowland (2004), which was not referenced in the PER.

> Prescribed fire has been used not only to remove sagebrush, primarily to enhance livestock forage, but also with the expressed goal of improving habitat conditions for sage-grouse and other wildlife (Klebenow 1973). Although some studies have demonstrated neutral or even positive effects on sage-grouse habitats from fire (e.g., Martin 1990, Fischer 1994, Pyle and Crawford 1996, Crawford and Davis 2002), others have documented population declines and long-term habitat degradation (Connelly et al. 2000*a*, Nelle et al. 2000). While some short-term benefits, such as increases in annual forbs, may accrue from prescribed burning, nesting cover in particular may be reduced and thus become less suitable (Wrobleski 1999, Nelle et al. 2000). A 9-yr study in southeastern Idaho examined lek attendance in relation to prescribed burning and suggested that declines in breeding populations of sage-grouse were more severe following fire (Connelly et al. 2000*a*). The study area was a Wyoming big sagebrush/bluebunch wheatgrass (*Pseuodoroegneria spicata*) site, with 23 cm average annual precipitation. Four years of pre-treatment data were obtained before a 5,000-ha portion was burned; nearly 60% of the sagebrush was eliminated, leaving a mosaic of sagebrush and grassland types. Although declines in lek attendance occurred throughout the study in both treatment and control sites, declines were greater in the burned area. Following the burn, the number of active leks declined 58%, from 12 to 5, in the treatment versus 35%, from 17 to 11, in the control. Furthermore, mean number of males/lek postburn was 6 in the treatment versus 17 in the control, whereas these variable

values had been similar at both sites prior to treatment. Attendance at the major leks following the fire declined 90% at the treatment site versus 63% at the control.

In southeastern Idaho, Nelle et al. (2000) examined characteristics of 20 burns of differing ages and sizes in mountain big sagebrush-dominated communities in relation to sage-grouse habitat. Mean size of four wildfires in the study area was 390 ha, whereas the mean size of 12 prescribed burns was 975 ha. Canopy cover of forbs, grasses, and shrubs was measured, along with invertebrate abundance. The authors concluded that burning conferred no benefits to sage-grouse nesting or brood-rearing habitat, and that long-term negative impacts resulted from fires in nesting habitat, due to the lengthy time (>20 yr) for the sagebrush canopy to recover to suitable levels for nesting.

* * *

Fischer (1994) investigated effects of a 5,800-ha prescribed fire on sage-grouse habitat in southeastern Idaho. The study area was primarily Wyoming big sagebrush/bluebunch wheatgrass, but three-tip sagebrush also was common. During the 3 years after the fire, 655 grouse were captured and 127 followed with radiotelemetry. Data had been collected on sage-grouse for 3 years prior to the burn. Nest success and habitat characteristics did not differ between burned and unburned areas, and no positive response by sage-grouse to the burned habitat was noted. Abundance of Hymenoptera, an important grouse food item, declined significantly following the fire (Fischer 1994).

The relationship between fires and leks is inconsistent. At the U.S. Sheep Experiment Station near Dubois, Idaho, fires (both wild and prescribed) apparently caused the abandonment of two active leks, enhanced the creation of one, and had no apparent effect on the fourth (Hulet et al. 1986). Also in Idaho, Fischer (1994) found that, although the number of active leks declined during the 3 years after a prescribed burn, this decline was similar in burned and control areas.

Coupled with the outright loss of sage-grouse habitat from fire, altered fire regimes have resulted in severe habitat degradation in sagebrush steppe from invasion of cheatgrass (*Bromus tectorum*) and other exotic vegetation following wildfires (Pellant 1990, Billings 1994, Knick 1999, West 1999). This problem is most severe in Wyoming big sagebrush communities at lower elevations (Miller and Eddleman 2000, Hemstrom et al. 2002) and is uncommon in cooler, more mesic areas such as Montana and Wyoming. It is estimated that >50% of the sagebrush ecosystem in western North America has been invaded to some extent by cheatgrass (West 1999), with losses projected to accelerate in the future (Hemstrom et al. 2002).

3. Effects of Livestock Grazing on Sage Grouse

Livestock grazing is associated with the widespread decline of sage grouse across their range through habitat degradation, loss, and fragmentation. (Connelly and Braun 1997; Webb and Salvo 2002). Connelly et al. described the impacts of livestock grazing on greater sage-grouse (Connelly et al. (2004): 7-26 – 7-35). Beck and Mitchell (2000) reviewed literature for positive

and negative direct and indirect impacts of livestock grazing on sage grouse. Their review found more negative than positive impacts from grazing. (Beck and Mitchell 2000: 994, Table 1). However, of more importance is the scope of the reported positive and negative impacts on sage grouse and sagebrush-steppe habitats. While positive impacts are generally limited to specific areas and circumstances (e.g., light grazing regenerates upland meadow), negative impacts often affect much larger areas, rendering them unusable for sage grouse.

> Impacts should be considered in the context of their scale. For example, a sage grouse population in southeastern Idaho may have benefited indirectly from presence of livestock when they established strutting grounds on sheep salting areas [very small areas relative to overall habitat], whereas weed infestations induced by livestock grazing in the Great Basin may reduce quality of habitat for sage grouse populations across this vast region.

(Beck and Mitchell 2000: 997, *citations omitted*).

Beck and Mitchell (2000) concluded, and significant other research indicates that livestock grazing appears to most affect productivity of sage grouse populations. Hockett (2002) reviewed the many ways that grazing affects nesting and brood-rearing habitats. Livestock eat and trample sagebrush, and grasses and forbs around sagebrush, which can degrade or eliminate nesting habitat (Webb 1993; Gregg and Crawford 1991; *see also* Holloran et al. 2005), which affects both nesting success and chick survival. (Gregg et al. 1994; DeLong et al. 1995; Sveum et al. 1998). Significant research indicates:

- Adequate availability of forbs (that are also grazed by livestock) during the pre-laying period may affect the nutritional status of hens and their reproductive success. (Barnett and Crawford 1994).
- Herbaceous cover is an important factor in nest site selection (Connelly et al. 1991; Wakkinen 1990), and nest success is positively correlated with the presence of big sagebrush (*Artemisia tridentata*) and thick grass and forb cover. (Beck and Mitchell 2000; Connelly et al. 1991; Greg et al. 1994; Schroeder and Baydack 2001; Bergerud 1988).
- Herbaceous cover is important for nesting sage grouse for concealment, security and shelter from weather and predators. (Schroeder and Baydack 2001; Sveum et al. 1998); unsuitable nesting habitat (exposing nests to the sun, wind, and predators) may contribute to lower nesting success. (Connelly and Braun 1997).
- The presence of livestock can cause sage grouse to abandon their nests. (Rasmussen and Griner 1938; Patterson 1952; Call 1979).
- Consumption of forbs by livestock in late spring and early summer may limit their availability for sage grouse chicks. (Call 1979).
- Insects (arthropods), which are an important food source for sage grouse chicks (Pyle and Crawford 1991; Johnson and Boyce 1990), are less abundant in degraded habitats. Dense stands of sagebrush with little herbaceous understory support fewer ant colonies. (Sneva 1979). Beetles are most abundant in a mosaic of shrub-dominated sites and open areas with some bare ground. (Rickard and Haverfield 1965).
- The availability of primary foods directly affects diets of sage grouse chicks. Where forbs and insects comprised >75 percent of chick diets where forbs and arthropods were more

available, whereas chicks consumed 65 percent sagebrush in less productive habitat. (Drut et al. 1994b).

Livestock grazing also affects other seasonal habitats for sage grouse. Livestock damage riparian areas and associated meadows (Belsky et al. 1999) that are important for sage grouse. Livestock also eat and trample sagebrush (Owens and Norton 1992), the sole food source for sage grouse during the winter. Wandering livestock can stress sage grouse, and their grazing opens the vegetative cover, exposing sage grouse to predators. Livestock grazing also introduces and spreads unpalatable weeds in sagebrush habitat (Bedunah 1992; Lacey 1987), reducing food sources for sage grouse.

Range developments to support livestock grazing also harm sage grouse. Raptors perch on fence posts and telephone poles to spy sage grouse. Livestock water developments may artificially increase predators or competitors for sage grouse. The conversion of sagebrush steppe to crested wheatgrass or other forage species for livestock eliminates sage grouse habitat (Autenrieth 1981). Low fliers, sage grouse frequently collide with fences used to manage livestock, often while attempting to escape from predators. (Wilkinson 2001: 1). Fence strikes are frequently lethal for sage grouse.

In an assessment of the ecological conditions of Great Basin habitat, the U.S. Department of Agriculture noted that vast areas of sagebrush habitat in Nevada are at risk of cheatgrass invasion and may be especially sensitive to inappropriate livestock grazing. (Wisdom et al. 2003: xiv; Rowland et al. 2003). These sagebrush stands "may be sensitive to inappropriate grazing by domestic and wild ungulates, which results in the reduction or elimination of native grasses and forbs, and thereby conveys competitive advantage to cheatgrass establishment and dominance." (Wisdom et al. 2003: xiv).

The DEIS/PER will Not Benefit Sage Grouse

As described in these comments and other sources, habitat manipulation (by fire and mechanical methods), herbicides, and land uses, such as livestock grazing, harm sage grouse.

The DEIS/PER fail to address the individual and cumulative negative impacts of herbicide use, fire, and livestock grazing on sage grouse, or their contributions to the spread of invasive species; and the agency's refusal to address livestock grazing and other land uses as the <u>cause</u> of invasive species spread will worsen habitat conditions for sage grouse.

The BLM scarcely acknowledges the effects of livestock grazing on sage grouse (PER: 4-80 - 81) and its role in the spread of invasive species, and ultimately shirks responsibility for managing grazing in the DEIS/PER by stating that such land use decisions are outside the scope of either document. "Although this PER addresses vegetation treatments, it will not directly address any other aspects of the livestock grazing program" (PER: 1-6). Similarly, the PER only addresses soil stabilization as it specifically relates to vegetation treatment activities (and not soil disturbance related to land use, such as livestock grazing, which creates seed beds for invasive weeds) (PER: 1-6). The BLM claims that it is not permitted to "to restrict, limit, or eliminate FLPMA-authorized activities as a means to restore land health" in the DEIS/PER (PER: 1-6).

However, BLM is also required by FLPMA to manage public lands "in a manner that will protect the quality of …environmental …resources" (PER: 1-7). There are many cases across the West where the agency has adjusted grazing intensity, duration, and season of use to achieve resource goals on public lands without compromising multiple-use management. FLPMA allows the BLM to make such adjustments, and the Restore Native Ecosystems Alternative includes a full set of grazing prescriptions to control invasive species and restore native vegetation. Unfortunately, the BLM failed to develop its own grazing rules for public lands beset by invasive species.

Ironically, while claiming that grazing management cannot be addressed in the PER, the BLM includes "livestock" as a "public land resource" (akin to water, wildlife, wilderness and other public values) (PER: 3-55) that will benefit from vegetation treatments described in the invasive species management. Livestock grazing is also identified as a tool for managing invasive species, even though grazing is a vector for invasive weeds (PER: 4-88).

BLM's failure to address the link between livestock grazing and invasive species; the lack of grazing prescriptions in the DEIS/PER; and the agency's oft-stated goal to reduce sagebrush and increase grasses and forbs (purportedly to improve sage grouse habitat) would have us believe that the DEIS/PER are in fact an elaborate (veiled) grazing plan. And under this program, federal grazing permittees will be the only beneficiaries. As stated above, and as demonstrated daily across the sagebrush steppe, grazing harms sage grouse. Livestock will continue to consume the bulk of grasses and forbs that result from vegetation treatments described in the DEIS/PER, and will continue to cause weed problems wherever they are allowed to graze among weeds, on burned sites or in areas sprayed with herbicides.

In addition to myriad nonnative species that have spread across public lands, the BLM is also rightly concerned about the spread of native pinyon pine and juniper trees into sagebrush habitats. Fire is identified as a tool to control encroaching pinyon-juniper (PER: 4-75). However, the BLM does not direct that areas be rested from livestock grazing following a burn to allow for proper recovery. Miller et al. (2005) (another reference missing from the DEIS/PER) notes that (1) livestock grazing is primarily to blame for pinyon-juniper encroachment onto western landscapes and (2) livestock should be (at least temporarily) excluded from areas where juniper has been burned to allow grasses, forbs and sagebrush to recover following a prescribed burn. If livestock are not excluded from burned areas, then they will continue to remove emerging grasses and forbs, damage sagebrush and disturb the soil, creating conditions that encouraged pinyon-juniper encroachment in the first place.

As described above, the use of fire to restore sagebrush habitats has had mixed success. This is probably due to the fact that most sites are subjected to livestock grazing soon after they are burned. It is not surprising that Hart Mountain National Antelope Refuge and Sheldon National Wildlife Refuge, both of which have been free of domestic livestock for more than fifteen years, are the setting for successful restoration burns. Recent burns have also improved habitat on Steens Mountain in southeast Oregon, which has been livestock-free since 2000. Rowland (2004):

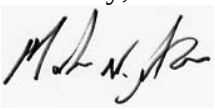
> Retrospective studies of burns (5- to 43-yr old) at Hart Mountain and Steens Mountain in southeastern Oregon revealed that key components of sage-grouse habitat used during the breeding period were available in burned areas ranging from 25- to 35-years old (Crawford and McDowell 1999, McDowell 2000). Sagebrush cover was the only habitat component "substantially affected" in the long term by burning (McDowell 2000). During the first 2 years after prescribed burning in mountain big sagebrush at Steens Mountain, forage quality (e.g., percentages of calcium and crude protein) was generally superior in burned sites compared to control sites (McDowell 2000). The fires in this study covered 619 and 1,352 ha.
>
> Wrobleski (1999) evaluated the response of vegetation to prescribed fire in a Wyoming big sagebrush site at Hart Mountain National Antelope Refuge in eastern Oregon. Vegetation was sampled in eight 400-ha plots, of which four were subsequently burned, creating 27 km of burned/unburned edge. Measurements were obtained for 1 year postfire; annual forb cover increased in burned versus control plots, but perennial grass cover decreased. Most pronounced differences were large increases in sagebrush vigor (number of reproductive and vegetative shoots) along the edge of the burned areas.
>
> At Sheldon NWR in Nevada … arthropod abundance did not decline following wildfire (Crawford and Davis 2002). [Arthropods are a key food source for sage grouse chicks.]

Hart Mountain National Antelope Refuge is a model of how an integrated vegetation management program can benefit sage grouse—similar to what commenters have recommended in the Restore Native Ecosystems Alternative. Sage grouse populations have increased significantly since livestock grazing ended on Hart Mountain in 1990. Monitored trend leks on Hart Mountain showed a 223 percent increase in grouse counted since 1990. The average lek count since 2000 is 156 percent (2.5 times) higher than the average count in the 1980s, when grazing was permitted on the refuge. The refuge pronghorn population has also increased to its highest level ever since the refuge was established in 1938.

Anecdotal evidence is that native vegetation has flourished since livestock were removed from Hart Mountain, providing better nesting habitat, brooding habitat, and summer habitat for sage grouse. Refuge managers have reintroduced fire into the ecosystem and without the concern that livestock will graze and trample the burned areas. Finally, refuge staff have observed invasive species retreating from the refuge as a result of passive restoration treatments.

Thank you for this opportunity to comment on the DEIS/PER.

Sincerely,



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Appendix A

Comments on DEIS/PER by Alaska Inter-Tribal Council

RE: 'Draft Programmatic Environmental Impact Statement and Environmental Report for Vegetation Treatments on Public Lands Administered by the Bureau of Land Management in the Western United States, Including Alaska'.

The Alaska Inter-Tribal Council is a consortia of federally recognized Tribes that advocates on behalf of issues of concern to the Traditional and IRA tribal governments across Alaska.

AITC recently learned that the Bureau of Land Management is requesting comments by January 9, 2006, on herbicide use on the vegetation relied upon for subsistence by the indigenous people of Alaska. We further understand that no public hearings have been held nor are scheduled to be held in Alaska on this matter. This matter is far too important not to include Alaska's tribal governments in the public process.

AITC strongly urges the rescission of this deadline until after the BLM and its cooperating agencies, including the US Fish and Wildlife Service and the US Department of Defense conform to the requirements of Executive Orders 12898 on Environmental Justice and E.O. 13175 on government to government relations with federally recognized Tribal governments.

Tribal members all across Alaska depend directly on subsistence gathering and hunting on federal lands. This right is protected by international law and the provisions of ANILCA as well as the above executive orders. Contamination of food sources of the indigenous people is a serious matter for the tribal governments that should be recognized directly by the federal government through one on one meetings in the communities adjacent to the impacted federal lands. Publication in the federal register of actions directly related to protected indigenous subsistence activities is wholly inadequate for Tribes with little access to the internet or awareness of meetings and decisions held thousands of miles from the impacted traditional lands.

The Alaska Inter-Tribal Council respectfully requests that all tribes in the region, as sovereigns concerned about herbicide activities on traditional lands, must be directly notified and provided government to government consultation on such action before the public notice process. The Alaska Inter-Tribal Council requests that the Executive Orders on Environmental Justice and government to government relations be acknowledged and implemented and that the public comment and review process cease until such time as the Tribal governments have been afforded meaningful participation.

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Appendix B

Comments on DEIS/PER by Mr. Doug Troutman

I must preface my comments with some personal history. My degree is in Biology, with emphasis in Entomology and a minor in Law Enforcement. I retired from government service after 7 years as a Ranger in Yosemite National Park, and 23 years with BLM as a Rec Planner, Wilderness Specialist, Environmental Coordinator. I participated in the first prescribed fire programs in Yosemite, and was involved with many programs in BLM. I am also on the VAs Agent Orange Register having been exposed in Viet Nam.

After 30 years experience in land management, having seen mistakes, blunders, outrages, and some sound practices, I find the proposal in Appendix G, identified minimally as alternative E (with some minor changes) to be the only viable alternative.

The EIS is totally remiss in not identifying livestock grazing as the number one source of degradation of native resources and introduction of noxious weeds on the public lands. Anecdotal references go back to the autobiography “The Cattle Drives of David Shirk”, wherein he describes the devastation wrought on Oregon grazing lands in the 1890's by livestock, many of which he owned. The loss of native forage and wildlife; elk, pronghorn and others is also documented in this text. His anecdotes are well documented scientifically in later research and study observations by agencies and university studies.

While some herbicide use to restore native range is necessary, it must not be a primary methodology (even at 16%). At the same time, the objectives in the Restore Native Ecosystems Alternative should be looked at with potential to include newer, safer, chemical alternatives if they become available.

BUT, the number one positive proposal (Alternative E) in this alternative is the reduction and restraint of livestock grazing in infected or sensitive ecosystems followed closely by the restraint of roads and/or off highway vehicle use for recreation, or management activities. My personal observations and study over three decades would indicate this is the only way to restore or preserve not only native range, but the ecologic health of all public lands and waters.

Which brings me to my largest complaint and observation of the report. Livestock grazing is perpetuated as the holy grail of BLM management objectives. Despite the fact that Recreation use now brings in more revenue, and does not send 75% back to locals, grazing is still touted as an economic positive.

The VRM statement that “domestic animals are common and expected” does NOT improve the public view of the land. Deer, elk, pronghorn, wild horses, these excite the recreation or casual visitor, not more cows and cow poop! VRM quality is highly degraded by livestock and “range improvement” projects. Degraded, trampled streams and lakeshores are NOT positive VRM management. Water features are the most critical VRM issue, and rare on BLM lands, which makes their preservation from livestock abuse very critical.

Wilderness management should include prescribed fire, but whether in wilderness or WSAs, mechanical and chemical treatments should only be used in emergencies where infestations are starting. Removal of livestock from these areas should be immediate if weeds threaten!

The PER states that a primary purpose is fuel reductions. Fire is better than chemical treatments to reduce fire fuels, dead plants will still burn. Keeping livestock off burned areas for a minimum of five years, not two growing seasons, will do more than coming in with chemicals to eradicate weeds livestock bring into the burn area.

When the Cook Well area burned here a number of years ago, upwind were native seed sources, and cheatgrass/pepperweed. Post fire, the regrowth was almost totally favored native bunchgrasses, NO WEEDS! Cattle were brought in after the “second growing season”, and left to nuke the area. The site was then left with nothing but cheat, pepperweed, and other noxious species. Fire didn't damage the area, cows did.

Mechanical clearing, followed by fire, may be necessary in the urban interface to reduce off-site fire hazard. This is still preferable to chemicals.

My experience with entomology, and with Agent Orange, leads me to distrust assurances of “safety” relative to volatile and lethal chemical compounds. Eliminating most aerial spraying is desired in any alternative selected. I see no evidence of studies of sufficient length to declare any of these compounds can't have mutagenic effects in the environment. Short half-life compounds are of course preferable.

I have had but a brief time to give cursory review to the document, but find it basically disappointing and distorted. I worry after 30 years of experience that while fuel reduction is a proclaimed goal, “range improvement” for livestock grazing is the real proposed alternative. The impacts section is particularly weak in Recreation, Wilderness, and again repeatedly reflects what's good for cows is good for the USA.

We spend $7 for every dollar collected in range. Seventy-five percent of those fees goes back to ranchers and counties for 8100 or range improvement projects. Recreation brings in more dollars, serves more people, and the dollars remain with the federal government for its purposes. I will not get into a discussion of the fraudulence behind the “Fee Demonstration Project” passed off to the public.

FLPMA calls for multiple use, and places Recreation BEFORE grazing! It is time that we realized though grazing is a legitimate use, it should not have dominance, and should no longer be a “loss leader” and subsidy to industry, yes grazing is run by big industry, not mom and pop operations.

Therefore, projects implemented under this PER should only be approved if they are clearly for improvement of native range and removal of hazard fuels and noxious weeds. NO project should be approved that leads to either increasing AUMs on an allotment, or restoring suspended non-use due to improved forage opportunities resulting from treatment.

One final comment. The BLM should address a program of acquiring a continuous source of native seeds and plants for restocking wherever fire, chemical or other means is used to “treat” the land. Only by the total exclusion of such seedings as “Crested Cheatgrass” - crested wheatgrass, will range trends truly improve on the public lands.

Doug Troutman
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Lakeview, Oregon 97630

Appendix C

Comments on DEIS/PER by Oregon Natural Desert Association

The Oregon Natural Desert Association (ONDA) is concerned about the potential impacts of the proposed alternative in the DEIS and treatments described in the PER to wilderness resources in citizen-inventoried areas with wilderness characteristics. The DEIS should address the effects of herbicide application and the PER should consider the effects of other, non-chemical treatments on citizen-inventoried wilderness-quality areas.

Beginning in 2002, ONDA undertook a massive effort to systematically inventory and document wilderness characteristics on Bureau of Land Management (BLM) lands in eastern Oregon. The premise of ONDA's "Wilderness Research and Rescue" program is twofold: (1) that the BLM's original wilderness inventory (mandated by the Federal Land Policy and Management Act (FLPMA)) in the 1970s ad 1980s failed to identify and document significant areas of public land possessing wilderness characteristics; and (2) that on-the-ground conditions have changed substantially in the last 25 years since the agency conducted a wilderness inventory of its own holdings — such that many of these areas now possess wilderness characteristics worthy of consideration and potential conservation.

During the course of four years of field inventory work and GIS mapping and analysis, ONDA has inventoried more than 5.5 million acres of public land and recommended to the BLM that more than 3.5 million of those acres do indeed contain wilderness characteristics as defined by the Wilderness Act, FLPMA, and the BLM itself. ONDA followed the wilderness inventory protocol established in the BLM's own Wilderness Inventory Study and Procedures handbook and ONDA's final reports include maps identifying the boundaries of each area in question, annotated road and photo logs with GPS locations cued to the maps, and narratives analyzing each inventory unit under the BLM's definition of wilderness characteristics and documenting how that information is new and/or differs from the information in prior inventories conducted by the BLM regarding wilderness values for the area. The full reports are available at http://www.onda.org/projects/ohdpa/index.html.

These citizen-inventoried wilderness-quality BLM lands must be protected until first the agency, and then Congress, has an opportunity to consider them for formal protection under the Wilderness Act.

Appendix D

Comments on DEIS/PER by Mr. Peter Richardson

I am troubled by BLM's recently published draft environmental impact statement, “Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement” (DEIS), which proposes to authorize use of a large number of different herbicides to control weeds and other undesirable vegetation on BLM lands in 17 western states. I believe it is unwise to undertake to spray annually 932,000 acres acres per year.

Each year increasing evidence appears in the scientific literature that the public health is at risk as we add more new chemicals to the environment.

I would argue that a more conservative approach than is offered in the DEIS be considered. You are putting our children and grandchildren at risk.

Please don't do it.

Peter Richardson
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Exeter, New Hampshire 03833

Appendix E

Comments on DEIS/PER by Concerned Friends of Ferry County

Mr. Brian Amme
PEIS Program Manager
Nevada State Office
PO Box 12000
Reno, Nevada 80520-0006

RE: BLM Herbicides/Vegetation Management Plan

Please accept these comments on behalf of Concerned Friends of Ferry County. We have several concerns about the DEIS. We feel that:

(a) Invasive species cannot be eliminated without eliminating the *causes* of weed invasion.

(b) Herbicides are not only poisonous and expensive, but they fail because they are "treating" symptoms, not the causes, of weed invasion and undesirable vegetation.

(c) The BLM should analyze the Restore Native Ecosystems Alternative in the DEIS/PER, a citizens' alternative submitted to the BLM that addresses both the causes and the effects of weed invasion and undesirable vegetation on public lands (PEIS: App. G "Restoration Alternative").

We have seen a great decline of various weeds prevalent in Ferry County due to the use of biological agents, namely insects that attack these non-native weeds. The use of weevils has dramatically reduced the acres infested with knapweed and various thistles. A beetle has proven effective against St. Johns Wart. The BLM needs to investigate the use of these biological agents where and whenever possible to avoid the use of poisonous chemicals.

There was an agreement, as you should be aware, on May, 24, 1989, a Mediated Agreement on vegetation management in the Pacific Northwest Region of the U.S. Forest Service was signed by Northwest Coalition for Alternatives to Pesticides, Paul Merrell, the U.S. Forest Service, and Oregonians for Food and Shelter.

One major purpose of this Mediated Agreement was to clarify the distinction between prevention (i.e., detection and amelioration of the conditions that cause or favor the presence of competing or unwanted vegetation) and treatment (activities for controlling or eradicating infestations of competing or unwanted vegetation) or early treatment (i.e., activities for controlling or eradicating initial, small infestations of competing or unwanted vegetation).

A second major purpose was to operationalize the Record of Decision for the Final EIS for Vegetation Management, which stated that **prevention is the preferred alternative for managing vegetation** (emphasis added). The Mediated Agreement spells out specific steps required for, among other things, (a) site-specific analyses, (b) public participation; and (c) monitoring and evaluation for all vegetation management projects.

The Mediated Agreement is the Forest Service's Pacific Northwest Region's interpretation of its obligations under the Record of Decision and is part of its administrative practice. The provisions of the Mediated Agreement are not optional. The Forest Service MUST document the prevention they've done. If they haven't done it, they're not abiding by the MA.

We expect that the BLM should have to go though the same procedure to reach a record of decision that states that **prevention is the preferred alternative for managing vegetation and not resort to a DM that stresses the use of Herbicides.**

Thank you for the opportunity to comment.

Dave Robinson
Concerned Friends of Ferry County
PO Box 151
Curlew, Washington 99118-0151

Appendix F

Comments on DEIS/PER by Siskiyou Project

Mr. Brian Amme
PEIS Program Manager
Nevada State Office
PO Box 12000
Reno, Nevada 80520-0006

Subject: Draft EIS Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States

Dear Mr. Brian Amme

The Siskiyou Project is a conservation advocacy organization based in the Illinois Valley of Southwest Oregon. For future generations of all species, the Siskiyou Project is the grassroots network dedicated to permanently protecting the globally outstanding Klamath-Siskiyou forests and a place we call the Siskiyou Wild Rivers. The Siskiyou Project combines science, education and advocacy to build an inspired and effective local and national constituency for this special place. Thank you for the opportunity to participate Draft EIS comments for the Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States. In particular we have many concerns about the use of herbicides. Please consider the following comments.

Watershed Health and Aquatic Organisms:

We are concerned that the use of herbicides would be detrimental to the area that we call the Siskiyou Wild Rivers (SWR). SWR is located in SW Oregon within and around the Siskiyou National Forest including adjacent Bureau of Land Management lands. We call this place the SWR because it has the highest concentration of nationally designated Wild and Scenic Rivers between Canada and Mexico on the Pacific Coast. Currently our ground water is among the highest "good" (DEIS, V1, p. 3-83) quality and our watershed surface water quality is rated moderate (DEIS, V1, p. 3-81). Our rivers and streams host some of the last strong holds of wild salmon and steelhead trout.

Specifically, 2,4-D, Dicamba, Glyphosate, and Picloram herbicides are all currently approved for use in Oregon (DEIS p. 2-19). Of these only two are currently approved for use in riparian areas.

> "2,4-D is registered for use in aquatic systems. 2,4-D is a known groundwater contaminant … a maximum concentration level of 0.07 mg/L as a permissible level … concentrations of up to 61 mg/L 2,4-D have been reported immediately following direct application to water … There are conflicting conclusions regarding biodegradation of 2,4-D in aquatic systems" (DEIS, V1, p. 4-27).

A known groundwater contaminant and conflicting conclusions does not seem to constitute the safety of this chemical being used in or near aquatic systems. "Under the No Action Alternative,

it is unlikely that 2,4-D … would be used … Based on historic use, 2,4-D … would constitute approximately 70% of herbicide use" (DEIS, V1, p. 4-32). It is unclear whether or not you intend to use 2,4-D under the preferred alternative. In addition to 2,4-D, Glyphosate is currently approved for riparian use.

> "Glyphosate, which is registered for aquatic use, would be applied to wetland and emergent aquatic vegetation … it is a known groundwater contaminant … may stimulate algal growth at low concentration; Austin et al. (1991) have suggested that this could contribute to eutrophication of waterways" (DEIS, V1, p. 4-28).

Because this chemical is also a known groundwater contaminant, it does not seem wise that it should be used in riparian reserves (as defined in the 1994 Northwest Forest Plan). Riparian reserves should not permit the use of herbicides, other means including preventative measures, hand pulling, replanting native vegetation, and fire should be considered.

TABLE 2-6 (DEIS, V1, p. 2-18) "Standard Operating Procedures for Applying Pesticides" to water resources, streams, and wetlands indicates the use of,

> "Appropriate herbicide-free buffer zone for herbicides not labeled for aquatic use based on risk assessment guidance within minimum width of 100 feet for aerial, 25 feet for vehicle, and 10 feet for hand spray application."

"Dicamba can result in groundwater and surface water contamination under conditions that favor such activities … a known groundwater contaminant, and has a high potential to leach into groundwater" (DEIS, V1, p. 4-29). "Picloram can move off-site through surface or subsurface runoff, and has been detected in the ground water of 11 states … Concentrations in runoff are often reported to be adequate to prevent the growth of non-target terrestrial and aquatic plants" (DEIS, V1, 4-31). Because of the risk of contamination of our surface waterways and ground water from surface runoff, the buffers (mentioned above) do not seem adequate in protecting our watersheds. Herbicide treatments of any kind should reflect a 150 foot buffer for all channels including intermittent ones, (this figure is determined in the Northwest Forest Plan for riparian reserve protection from logging and other ground disturbing activity to ensure the least amount of surface runoff and this figure should honor the use of herbicides too as the loss of vegetation often leads to surface runoff) or a site specific tree length which ever is greater.

In addition, aerial application should be prohibited. "Herbicide particles could be transported long distances from the target location, depending on weather conditions" (DEIS, p. 4-5 & 4-6). The risk of spray drift from aerial application poses too much risk of uncertainty and potential to contaminate waterways in addition to non-target species and human health.

The Salmonid family of native fish (including Salmon and Trout, special to the Siskiyou Wild Rivers area) are the most ecologically, culturally, and commercially important to this area. "Treatments could adversely affect the health and survivorship of aquatic organisms, and indirectly impact these organisms through impacts to habitat ... Fish harmed or killed, and habitat productivity lost, from treatment would be irreversible" (DEIS, V1, p. 2-31). Removal of

vegetation along streams could contribute to increased erosion, increased water temperatures from loss of habitat shade, and reduction in surface water quality.

Our clean ground and surface water is part of what makes the Siskiyou Wild Rivers area special. Our water sources provide safe drinking water, wildlife and fish habitat, and a place for people to recreate. Such a naturally clean resource is priceless and must not be subject to the risk of chemical contamination.

Soil, Terrestrial Wildlife, Flora and Forests:

We are concerned that the use of herbicides would be harmful to the special and unique species of the Siskiyou Wild Rivers area. This area is naturally born of fire and fire (when applied during the appropriate seasons for native flora enhancement) may be the best way to maintain the natural ecosystem and native species.

Southwest Oregon is comprised of varied soil types that range from more traditional productive soils, to serpentine influenced soils. In particular the serpentine influenced soils are low in nutrients and harbor a very unique and adapted species of plant. "Herbicides may … adversely affect soil microorganisms and macroorganisms, leading to poorer soil productivity" (DEIS, p. 4-16). Serpentine influenced area should not consider be considered for the use of herbicide treatments. The Siskiyou Wild Rivers area ranks competitively in the international realm as number one for biological diversity.

Characteristic of the Siskiyou Wild Rivers area and our unique serpentine influenced landscape, "the combination of hydrologic characteristics, steep topography, and slow vegetative growth make soil erosion a serious concern" (DEIS, p. 4-10) and could lead to contamination of waterways as well as non-target species should herbicides be used. In addition, soil may be adversely affected through the use of herbicides and vegetation loss. "As vegetation is removed, there is less plant material to intercept rainfall and less to contribute organic material to the soil. Loss of plant material and soil organic matter can increase the risk of soil susceptibility to wind and water erosion" (DEIS, p. 4-16). Hand pulling first, and if necessary followed with manual spot application of herbicide would minimize unwanted vegetation loss and damages to soil microorganisms. Weed treatments should always be followed with native revegetation.

Herbicides pose the risk of harming non-targeted species and great caution should be taken when considering their use as a final resort to noxious weed control. Herbicides that enter waterways can travel and effect non-targeted species. "[2,4-D] is known that concentrations as low as 0.22 mg/L can damage sensitive plants" (DEIS, V1, p. 4-27). Chemicals that bind well to location should be considered over other chemicals. "[Glyphosate is] unlikely to enter waters through surface runoff or subsurface flow because it binds strongly to soils" (DEIS, V1, p. 4-28). However, "Glyphosate is non-selective, so it must be used carefully around desirable and non-target plants" (DEIS, V1, p. 2-8). In areas where there are sensitive native plants and non-target plants, methods other than herbicides may be preferable such as hand pulling and fire. Manual spot application of herbicides may be the last resort method of choice when all other preventative measures and noxious weed control measures fail.

In addition, 2,4-D, Dicamba, Glyphosate, and Picloram herbicides are all currently approved for aerial or ground application (DEIS, V1, p. 3-67). “Herbicide particles could be transported long distances from the target location, depending on weather conditions” (DEIS, p. 4-5 & 4-6). The risk of spray drift from aerial application poses too much risk of uncertainty and potential to contaminate non-target, native species, waterways and human health. The use of herbicides should only be considered for ground application and aerial application should be prohibited.

The DEIS claims that herbicides will restore wildlife habitat and forest health are false.

> “Over three-quarters of treatments in the Mediterranean and Marine Ecoregions would occur in evergreen forestlands. Much of these efforts would be focused on integrated weed management and forest health. The objectives of forest health treatments would be to stem the decline in old forests habitats primarily due to fire exclusion, to restore more natural fire regimes and reduce hazardous fuels to reduce the potential for catastrophic wildfires, and to restore forests recently burned by wildfires … Herbicides can be effective in improving forest wildlife habitat by 1) reducing population of invasive exotic plants, 2) creating snags and downed woody material, 3) maintaining patches of early-successional vegetation within late-successional communities, and 4) maintaining woody and herbaceous plant communities for browsing species” (DEIS, V1, p. 4-111).

Much of the Siskiyou Wild Rivers area burned in the Biscuit Fire of 2002. The result was a healthy burn and a naturally recovering ecosystem. Following the fire, woodpeckers and snag dependent species began returning by the droves. The understory began sprouting with native vegetation and young conifer seedlings. It was wrong that the Forest Service and BLM determined a need for post-fire logging. The logging that has taken place has only set back recovery of this burned landscape for generations to come if indefinitely in some areas. In addition activities such as logging have the potential to spread weed seeds.

Herbicides could harm wildlife species. The Siskiyou Wild Rivers area currently has browsing population of Elk and Deer both of which could have better population numbers. “Terrestrial herbicides with the greatest likelihood of affecting special status wildlife species, via any exposure pathway, include 2,4-D … which pose moderate to high risks to special status terrestrial wildlife at the typical application rate, under on or more exposure scenarios” (DEIS, p. 4-91). Care should be taken to avoid the use of herbicides during high use wildlife seasons such as nesting spotted owl seasons. In addition, herbicides should not be used in known spotted owl cores or in habitat of other sensitive or late-successional dependent species.

Hand pulling and native vegetation planting can help to restore the landscape damaged by logging while also creating health friendly jobs for the people. The Biscuit Fire as well as the Deer Creek Fire of 2005 (BLM lands, the fire originated on private property and BLM should work with private land-owners to fire safe their immediate home surroundings.) have left behind much snag forests, that it is not necessary to deliberately create more snags via herbicides. If more snags are necessary in some areas, such as meadow restoration, girdling trees is a far safer means than applying herbicides “to trees around the circumference of the trunk … or to cuts in the trunk” (DEIS, V1, p.2-8). In addition, because of the large amounts of burned landscape in southwest Oregon, not to mention the growing number of clearcuts, there is plenty of early-

successional vegetation within late-successional communities. Projects such as BLM's Althouse-Sucker Landscape Management Plan should not enter the LSR portions of the project planning. In addition, within the past year, the Siskiyou National Forest Service proposed herbicide treatment for weed control at a place called Onion Camp. The local residents created enough controversy as to turn the tables back to adequate attempts at hand pulling and non-chemical method of weed control.

Passive restoration needs to take place, stop the logging and reduce the grazing cattle among other things. "Prevention and early detection is the cheapest and most effective wed control method. Prevention and early detection strategies that reduce the need to vegetative treatments for noxious weeds could lead to a reduction in the number of acres treated for noxious weeds in the future by reducing or preventing their establishment" (DEIS, p. 2-16). In addition, "There are several drawbacks and limitations to herbicide use … Weeds may develop a resistance to a particular herbicide over time" (DEIS, p. 2-14) and therefore chemical treatment should only be considered as a very last resort.

Human Health:

Herbicides are known to be toxic not only to wildlife and plants, but they can also be life threatening to human health causing cancer among other illnesses and disease. Because the Siskiyou Wild Rivers area hosts one of the highest concentrations of Nationally designated wild & scenic rivers and is world renowned for biodiversity, it is also a hot spot for recreationists. Chemical treatments pose risks to local residents and recreationists. "Based on the HHRA … risk is moderate to high for drinking water if treated with 2,4-D" (DEIS, p. 4-22). "Aerial applications of herbicides pose a greater risk to the public due to off-site drift than ground applications, as herbicides applied at greater distances from the ground are able to drift farther from the target application area" (DEIS, p. 4-134 & 4-135). Aerial applications should be prohibited. In addition herbicides can "contaminate groundwater or run off into water bodies used by recreationists" (DEIS, p. 4-119) and can contaminate resources that are gathered for consumption such as mushrooms, berries, or fish.

Amphibians:

We are very concerned about impacts from herbicides on amphibians as described in the publication attached below (The Impact of Insecticides and Herbicides on the Biodiversity and Productivity of Aquatic Communities by RICK A. RELYEA Ecological Applications v.15, n.2 1apr 2005). We are particularly concerned about impacts to plethodon salamanders in the Klamath Mountains area of Southwest Oregon.

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http://www.mindfully.org/Pesticide/2005/Roundup-Aquatic-Communities1apr05.htm

The Impact of Insecticides and Herbicides on the Biodiversity and Productivity of Aquatic Communities

RICK A. RELYEA(1)

Ecological Applications v.15, n.2 1 Apr 2005

Abstract. Pesticides constitute a major anthropogenic addition to natural communities. In aquatic communities, a great majority of pesticide impacts are determined from single-species experiments conducted under laboratory conditions. Although this is an essential protocol to rapidly identify the direct impacts of pesticides on organisms, it prevents an assessment of direct and indirect pesticide effects on organisms embedded in their natural ecological contexts. In this study, I examined the impact of four globally common pesticides (two insecticides, carbaryl [Sevin] and malathion; two herbicides, glyphosate [Roundup] and 2,4-D) on the biodiversity of aquatic communities containing algae and 25 species of animals.

Species richness was reduced by 15% with Sevin, 30% with malathion, and 22% with Roundup, whereas 2,4-D had no effect. Both insecticides reduced zooplankton diversity by eliminating cladocerans but not copepods (the latter increased in abundance). The insecticides also reduced the diversity and biomass of predatory insects and had an apparent indirect positive effect on several species of tadpoles, but had no effect on snails. The two herbicides had no effects on zooplankton, insect predators, or snails. Moreover, the herbicide 2,4-D had no effect on tadpoles. However, Roundup completely eliminated two species of tadpoles and nearly exterminated a third species, resulting in a 70% decline in the species richness of tadpoles. This study represents one of the most extensive experimental investigations of pesticide effects on aquatic communities and offers a comprehensive perspective on the impacts of pesticides when nontarget organisms are examined under ecologically relevant conditions.

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INTRODUCTION

A central goal of ecology is to understand patterns of species abundance and diversity in communities and ecosystems. A great deal of research has documented the patterns of biodiversity and productivity using relatively pristine systems or experimental mesocosms that approximate natural systems (Tilman et al. 2001, Chase and Leibold 2002, Downing and Leibold 2002, Naeem 2002). However, many ecosystems are far from pristine due to a variety of anthropogenic influences, including exposure to a plethora of pesticides (Harris et al. 1998, McConnell et al. 1998, LeNoir et al. 1999, Sparling et al. 2001, Davidson et al. 2002). Herbicides and insecticides have the potential to cause dramatic changes in natural communities, yet our knowledge of pesticide effects on natural communities is largely limited to cases in which pesticides have been intentionally or accidentally applied to natural sites with subsequent floral and faunal surveys (e.g., reptiles and amphibians, Lambert [1997]; macroinvertebrates,

Leonard et al. [1999]; plankton and fish, Favari et al. [2002]). In contrast, experimental efforts to understand community effects have primarily used single pesticides and have focused on a narrow range of taxonomic groups including zooplankton (Hanazato and Yasuno 1987, 1989, 1990, Havens 1994, 1995) and larval amphibians (e.g., Boone and Semlitsch 2001, 2002; but see Boone and James 2003). The challenge is to combine the best of both approaches by examining the impact of different pesticides on a broad diversity of taxa while taking advantage of the power that comes from experimental replication.

Aquatic communities are particularly well suited to experimental investigations of pesticide effects. There is a long history of using outdoor aquatic mesocosms to create experimental communities that can be replicated and manipulated (Morin 1981, Werner and Anholt 1996, Relyea and Yurewicz 2002, Downing and Leibold 2002). Mesocosms offer the potential to assemble diverse communities of predators, herbivores, and producers and make testable predictions about the impact of pesticides based on single-species laboratory tests (i.e., LC50 tests that estimate the lethal concentration necessary to kill 50% of a test population). For example, in pond communities, one would predict that the application of insecticides at realistic concentrations should have a direct lethal impact on aquatic insect predators, but no direct impact on herbivores or producers. However, insecticides may cause trophic cascades including indirect positive effects on the herbivores and indirect negative effects on the resources. In contrast, herbicides might have a direct negative impact on producers but no direct impact on herbivores or predators. However, herbicides may cause trophic cascades including indirect negative effects on herbivore biomass and predator biomass (Diana et al. 2000). In summary, mesocosms allow investigators to examine the impacts of relevant pesticide concentrations using realistic population densities, reasonable time scales, and relatively natural conditions.

In this study, I assembled diverse communities in outdoor aquatic mesocosms and then examined the impact of two insecticides and two herbicides (applied separately) on the diversity of the communities as well as the survival and biomass of each taxon in the community. Based on the known impact of these pesticides, I tested the following hypotheses. (1) All of the pesticides will reduce overall biodiversity. (2) The insecticides will reduce the diversity and abundance of insects (USDI [U.S. Fish and Wildlife Service] 1980) and zooplankton (Havens 1994, 1995), but will have no direct impact on the snails and tadpoles (Relyea 2003*b*, 2004). (3) Because of the reduction of insect predators, the insecticides will have an indirect positive effect on the biomass of herbivores and an indirect negative effect on the biomass of producers (i.e., periphyton). (4) The herbicides will reduce the biomass of producers but will have no direct impact on the snails and tadpoles. (5) Because of the reduction of producers, the herbicides will have an indirect negative effect on the biomass of herbivores and predators.

Pesticide background

The four pesticides used in the experiment were two insecticides (carbaryl and malathion) and two herbicides (2,4-D and glyphosate). Carbaryl and malathion are both broad-spectrum insecticides that kill by inhibiting acetylcholine esterase. In the United States, $1-2 \times 10^6$ kg of carbaryl (commercial name: Sevin) are applied to rangelands, forests, oceans, homes, gardens, and 1.3×10^6 ha of crops (Donaldson et al. 2002); see the online National Pesticide Use Database.[2] The half-life for carbaryl depends on pH and ranges from 0.1 days to 4 years (Aly and

El-Dib 1971, Wauchope and Haque 1973). Malathion is applied to >800 000 ha of cropland including fruits, vegetables, and cotton at an annual amount of 14–16 X 10^6 kg (Donaldson et al. 2002, National Pesticide Use Database [footnote 2]), and is a preferred insecticide for combating the mosquitoes that carry malaria and West Nile virus. The half-life of malathion is 2–26 days, depending on pH (Guerrant et al. 1970, Wang 1991). Glyphosate (commercial names: Roundup, Rodeo) is a broad-spectrum herbicide that kills plants by inhibiting the synthesis of essential amino acids. The most popular formulation, Roundup, actually is a combination of the active ingredient (glyphosate) and a surfactant that helps the herbicide to penetrate plant leaves (polyehtoxylated tallowamine; POEA). It is the second most commonly applied herbicide in the United States, with 38–43 X 10^6 kg of active ingredient applied to homes, gardens, forests, wetlands, and 8.2 X 10^6 ha of cropland in the United States (Donaldson et al. 2002, National Pesticide Use Database). The half-life of roundup is 7–70 days (Giesy et al. 2000). The herbicide 2,4-D is a broadleaf herbicide that operates as a growth regulator by altering proper cell division in plants. It is widely used in agriculture, with 24–28 X10^6 kg applied to nearly 33 X 10^6 ha (Donaldson et al. 2002, National Pesticide Use Database). The half-life of 2,4-D is from 10 to >50 days, according to NIH data *(available online).*[3] These four pesticides are among the top 10 pesticides used in the United States for agriculture and home use (Donaldson et al. 2002), and all of them are either applied directly to aquatic habitats or can make their way into aquatic habitats via unintentional overspray, aerial drift, or runoff.

[2] (http://www.ncfap.org)

METHODS

The experiment was a completely randomized design with five pesticide treatments that were each replicated six times for a total of 30 experimental units. The experimental units were 1200-L polyethylene tanks that were filled with 1000 L of well water during 26–28 April 2002. On 6 May, I added 300 g of dry leaves *(Quercus* spp.) and 25 g of rabbit chow to serve as habitat structure and an initial nutrient source. I also added an aliquot of zooplankton and phytoplankton that was a mixture from six local ponds. On 23 May, I placed two 10 X 10 cm ceramic tiles in each tank (oriented vertically) to serve as future estimates of periphyton growth in each tank.

Five days later, I began adding macroorganisms that I collected from natural habitats, either as mixtures of 10 egg masses that were previously hatched in wading pools (four of the five tadpole species), or as larvae and adults dip-netted from ponds and wetlands (Table 1). On 28 May, I added five species of larval anurans, two species of snails, and one species of larval damselfly (predators on zooplankton). The following day, I added a third snail species. On 30 May, I added the remaining predators: larval *Anax* and *Tramea* dragonflies (predators on both tadpoles and snails), larval *Dytiscus* and *Acilius* beetles (predators on tadpoles and zooplankton, respectively), *Notonecta* and *Belostoma* hemipterans (predators on both tadpoles and snails), and recently hatched spotted salamander larvae (predators on zooplankton). All of these species naturally coexist and, for each species, I used densities that were within the range of natural densities based on seven years of quantitative surveys of natural aquatic habitats (R. A. Relyea, E. E. Werner, D. K. Skelly, and K. L. Yurewicz, *unpublished data).*

[3] (http://toxnet.nlm.nih.gov)

TABLE 1. A list of the taxa used in the experiment.

Common name	Species	Size	Density†	Trophic level
Spotted salamander‡	Ambystoma maculatum	49 ± 3 mg	2	predator
Diving beetle‡	Dytiscus sp.	28 ± 1.1 mm	1	predator
Diving beetle‡	Acilius semisulcatus	21 ± 0.4 mm	1	predator
Dragonfly‡	Anax junius	39 ± 0.9 mm	1	predator
Dragonfly‡	Tramea sp.	23 ± 0.6 mm	1	predator
Damselfly‡	Lestes sp.	15 ± 0.3 mm	1	predator
Backswimmer	Notonecta undulata	10 ± 0.3 mm	3	predator
Water bug	Belostoma flumineum	20 ± 0.2 mm	1	predator
Wood frog‡	Rana sylvatica	104 ± 10 mg	10	herbivore
Leopard frog‡	Rana pipiens	42 ± 8 mg	10	herbivore
American toad‡	Bufo americanus	45 ± 5 mg	10	herbivore
Gray tree frog‡	Hyla versicolor	4 ± 0 mg	10	herbivore
Spring peeper‡	Pseudacris crucifer	214 ± 16 mg	10	herbivore
Snail	Physa integra	62 ± 4 mg	10	herbivore
Snail	Helisoma trivolvis	434 ± 31 mg	10	herbivore
Snail	Stagnicola elodes	177 ± 20 mg	10	herbivore
Cladoceran	Daphnia pulex	···	···	zooplankton
Cladoceran	Daphnia ambigua	···	···	zooplankton
Cladoceran	Daphnia longiremis	···	···	zooplankton
Cladoceran	Ceriodaphnia sp.	···	···	zooplankton
Cladoceran	Scapholebris sp.	···	···	zooplankton
Copepod	Eurytemora affinis s	···	···	zooplankton
Copepod	Eurycyclops agilis	···	···	zooplankton
Copepod	Mesocyclops edax	···	···	zooplankton
Copepod	Leptochaptumorus siciloides	···	···	zooplankton

Notes: Standard length was used as an initial size measure for the aquatic insects, whereas mass was used as an initia

size measure for amphibians and snails. Values are means ± 1 SE. The tadpoles and snails are herbivores on periphyton,
whereas the zooplankton are herbivores on phytoplankton.

† Density is the number of individuals per 1000-L experimental tank.

‡ Larval stages were used in the experiment.

There were five pesticide treatments: controls (250 mL of water added), carbaryl, malathion, glyphosate, or 2,4-D. For all four chemicals, I wanted to simulate the impact of a direct overspray on a wetland. Thus, I purchased commercial forms of each chemical and had the concentrations of each chemical's active ingredient independently confirmed by the Mississippi State Laboratory (Mississippi State, Mississippi, USA) using high-pressure liquid chromatography (carbaryl, 22.3%; malathion, 50.6%; 2,4-D, 44.5%; glyphosate, 25.2%). Based on the surface area of the cattle tanks (2.41 m^2), I applied each chemical at the manufacturer's recommended maximum application rates (Sevin, 0.955 mL/ m^2; malathion, 0.234 mL/m^2; 2,4-D, 0.117 mL/m^2; Roundup, 6.4 mL/m^2). Thus, I added 2.3 mL of Sevin, 0.6 mL of malathion, 0.3 mL of 2,4-D, and 15.3 mL of Roundup. Because the tanks contained 1000 L of water, these application rates translated to 0.51 mg carbaryl/L, 0.32 mg malathion/L, 0.12 mg 2,4-D/L, and 3.8 mg glyphosate/L. The pesticides were added immediately after all taxa had been added to the tanks (30 May).

On 12 June, the experiment was terminated. I began by first sampling the zooplankton using a 0.2-L tube sampler that was plunged into the tanks in the center and at each of the four cardinal directions. The five samples were combined and filtered through 62- µm Nitex screening (Small Parts, Miami, Florida, USA). All zooplankton were preserved in 70% ethanol and subsequently counted and identified to species. Next, the ceramic tiles were removed and the periphyton was scrubbed (using toothbrushes) onto oven-dried, pre-weighed filter paper. The algae-covered filters were oven-dried again for 15 h at 80° C and then weighed to determine the dry mass of algae on each tile. Finally, the tanks were drained and all macroorganisms were sorted from the leaves, counted, and weighed. Amphibians were preserved in 10% formalin and invertebrates were preserved in 70% ethanol.

Statistical analyses

I analyzed the data using ANOVAs. The first t analysis examined the impact of the pesticides on total species richness of the animals in the community using a one-way ANOVA. The second analysis examined species richness and biomass of the four major functional groups: predators (insects and salamanders), large herbivores (snails and tadpoles), zooplankton, and periphyton algae (algae was not separated into species). The third set of analyses examined the abundance of individual species within each of the three animal groups (predators, large herbivores, and zooplankton). Because much of these latter data contained heterogeneous errors (some treatments had 0% survival), I first t ranked the data and then conducted a MANOVA on the ranked values. When I found a significant multivariate effect, I conducted univariate analyses. When I found significant univariate effects, I conducted mean comparison tests using Fisher's test. I weighed all animals coming out of the tanks at the end of the experiment and found no significant treatment effects on mass for any of the taxa ($P > 0.05$), so I chose to not include the mass data in the analysis. Thus any differences in biomass among treatments simply reflect differential survival across treatments. Two of the tanks developed an unusual red periphyton that was not present in any other tanks in the experiment (and had not been observed in dozens of previous mesocosm experiments). Both tanks had been randomly assigned the control treatment and both were removed from the analysis.

RESULTS

The first analysis examined the impact of the pesticides on the species richness of all animal taxa in the communities (Fig. 1). There was a significant impact of pesticides on total animal richness ($F_{4,23} = 10.1$, $P < 0.001$). Compared to the control tanks, species richness was 15% lower with Sevin ($P = 0.041$), 30% lower with malathion ($P < 0.001$), and 22% lower with Roundup ($P = 0.005$). The addition of 2,4-D had no effect ($P = 0.543$).

The analysis of species richness and biomass by functional group produced a significant multivariate effect (Wilks' $F_{28,63} = 5.5$, $P < 0.001$; Fig. 1). The richness of predators, large herbivores (tadpoles and snails), and zooplankton were all affected by the treatments ($P < 0.001$). Predator richness declined with Sevin and malathion ($P < 0.03$), but not with 2,4-D or Roundup ($P > 0.35$). Large-herbivore richness decreased with Roundup ($P < 0.001$), but was not affected by the other three pesticides ($P > 0.7$). The richness of zooplankton declined significantly with Sevin ($P = 0.044$) and malathion ($P = 0.008$), but not with 2,4-D or Roundup ($P > 0.3$).

The biomass of predators, large herbivores, zoo-plankton, and periphyton also differed among treatments (univariate tests; $P < 0.03$; Fig. 2). Predator biomass was lower with Sevin, malathion, and Roundup ($P < 0.001$), but not with 2,4-D ($P = 0.406$). The biomass of the large herbivores was higher with Sevin ($P = 0.039$), unaffected by malathion and 2,4-D ($P > 0.25$), and lower with Roundup ($P = 0.024$). The abundance of zooplankton was not different between the control tanks and the four pesticide treatments ($P > 0.09$). Periphyton biomass was unaffected by Sevin, malathion, and 2,4-D (P, > 0.15), but was 40% greater with Roundup ($P = 0.028$).

In the remaining analyses, I examined the impact of pesticides on the survival of each species in the three functional groups. In the MANOVA on predator species, I found a significant multivariate effect of the pesticides (Wilks' $F_{28,63} = 2.5$, $P = 0.002$; Fig. 3). There were no pesticide effects on the survival of *Anax junius* dragonflies, water bugs *(Belostoma flumineum)*, or damselflies *(Lestes* sp.) (univariate test, P > 0.25); marginally significant effects on the survival of *Dytiscus* beetles (univariate test, P = 0.081); and significant effects on the survival of *Tramea* dragonflies, back-swimmers *(Neonecta undulata)*, and spotted salamanders *(Ambystoma maculatum)* (univariate test, $P < 0.03$). *Dytiscus* beetles were eliminated with Sevin and malathion ($P = 0.054$), whereas *Tramea* dragonfly survival was reduced with malathion ($P = 0.016$) and nearly reduced with 2,4-D ($P = 0.065$). Backswimmer survival was increased with 2,4-D ($P = 0.035$), whereas spotted salamander survival was marginally higher with Sevin ($P = 0.075$) and significantly higher with *2,4-D* ($P = 0.011$). No diving beetle *(Acilius semisulcatus)* larvae survived in any of the tanks.

FIG. 1. The impact of four different pesticides on the species richness of predators (insects and spotted salamanders), large herbivores (tadpoles and snails), and zooplankton in aquatic mesocosm communities. Data are means ± 1 SE.

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FIG. 2. The impact of four different pesticides on the biomass (or abundance) of predators (insects and spotted salamanders), large herbivores (tadpoles and snails), zooplankton, and periphyton in aquatic mesocosm communities. Data are means ± 1 SE.

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FIG. 3. The impact of four different pesticides on the survival of individual species of predators (insects and spotted salamanders). Data are means ± 1 SE.

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FIG. 4. The impact of four different pesticides on the abundance of individual species of zooplankton. Data are means ± 1 SE.

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FIG. 5. The impact of four different pesticides on the survival of individual species of herbivorous tadpoles. Data are means ± 1 SE.

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In the MANOVA on zooplankton species, there was a significant multivariate effect of pesticides (Wilks' $F_{36,58} = 3.4$, $P < 0.001$). In univariate tests, there was no effect of the pesticides on *Daphnia longiremis, Ceriodaphnia* sp., *Scapholebris* sp., *Eurycyclops* sp., or *Leptochaptumorus* sp. *(P > 0.1).* However, there were significant impacts on *Daphnia pulex, Daphnia ambigua, Eurytemora* sp., and *Mesocyclops* sp. *(P* < 0.02; Fig. *4). Daphnia pulex* was completely absent from tanks with Sevin or malathion *(P* < 0.001). *Daphnia ambigua* showed a similar pattern, although the effects of Sevin and malathion were not significantly different from the controls *(P* = 0.063 and *P* = 0.136, respectively). *Eurytemora* was more abundant with Sevin and malathion *(P* 0.03), but nearly absent with Roundup *(P* = 0.028). *Mesocyclops* was more abundant with Sevin *(P* = 0.021), but was unaffected by the other pesticides.

In the MANOVA on the large herbivores, I found a significant multivariate effect of the pesticides (Wilks' $F_{32,61} = 2.9$, $P < 0.001$). There was no effect of pesticides on any of the three snail species (univariate tests, $P > 0.1$). Across all treatments, the mean survival (1 SE) was 3 ± 1% for *Physa integra, 24* ± 4% for *Stagnicola elodes*, and 61 ± 3% for *Helisoma trivolvis.* Among the tadpoles, there were significant impacts of pesticides on leopard frogs *(Rana pipiens),* wood frogs *(R. sylvatica),* and gray tree frogs *(Hyla versicolor)* (univariate tests, *P* < 0.01; Fig. 5) but no impacts on toads *(Bufo americanus)* or spring peepers *(Pseudacris crucifer) (P* >_ 0.09). Leopard frog survival improved from 28% to 58% with Sevin *(P* = 0.037) and 28% to 43% with malathion, but the latter effect was not significant *(P* = 0.391). Leopard frogs were completely exterminated with Roundup *(P* = 0.004). Gray tree frog survival was unaffected by the insecticides, but gray tree frogs were eliminated with Roundup *(P* = 0.003). Wood frog survival improved from 50% to 72% with Sevin *(P* = 0.054) and 50% to 67% with malathion, although the latter effect was not significant *(P* = 0.194). Wood frog survival was reduced to only 2% with Roundup *(P* = 0.012). None of the species was affected by 2,4-D *(P* > 0.5).

DISCUSSION

The results of this study indicate that pesticides can have profound impacts on the diversity and productivity of aquatic communities over relatively short time scales (two weeks). However, the impacts on the communities were very pesticide specific. . As expected, the two insecticides reduced the diversity and biomass of the insect predators, completely exterminating *Dytiscus* beetles and reducing the abundance of *Tramea* and backswimmers (the latter was only reduced with malathion). This effect was predictable from the large literature on the susceptibility of aquatic insects and crustaceans to carbaryl and malathion. The $LC50_{72\text{-}96\ h}$ values range from 0.005 to 0.026 mg/L for carbaryl (USDI 1980) and 0.005 to 0.18 mg/L for malathion (USDI 1980, Key et al. 1998, Leight and Van Dolah 1999).

Interestingly, the two insecticides had no effect on two of the insect species *(Anax* dragonflies and water bugs; few damselflies survived in any of the treatments, making it difficult to draw

any firm conclusions), suggesting that insects vary in their susceptibility to the insecticides (when applied at these recommended rates). In other words, the insecticides did not eliminate the entire insect community. Thus, although predation from aquatic insects can be reduced with the application of insecticides, major predators such as *Anax* dragonflies (Relyea 2001, 2003*a*) will continue to consume prey (although pesticide effects on the foraging behavior of these predators are unknown).

In addition to the effects on insects, the insecticides also affected the zooplankton by eliminating cladocerans while favoring copepods. The change in zooplankton community composition with acetylcholine esterase-inhibiting insecticides is in accord with a number of previous studies. At higher concentrations (1 mg/L), carbaryl (the active ingredient of Sevin) can completely wipe out nearly all species of zooplankton. However, under lower concentrations, such as those used in the current study, carbaryl only eliminates cladoceran zooplankton. As a result, the phytoplankton resource can increase and provide an indirect, positive effect on the abundance of grazing copepods (copepod body size also may have increased, but this was not measured). However, copepods typically cannot graze the smallest algae that are consumed by the cladocerans; hence, the copepod populations are unable to completely compensate for the decrease in cladoceran abundance (Hanazato and Yasuno 1990, Hanazato 1991, Havens and Hanazato 1993, Havens 1994, 1995, Wong et al. 1995). Thus, it appears that these two insecticides can have both direct and indirect effects on zooplankton.

At the concentrations used, the insecticides were predicted to have no direct negative effects on the survival of the large herbivores (snails and tadpoles). There appear to be very few comparative data addressing the impacts of carbaryl and malathion on snails (Martinez-Tabche et al. 2002), but the current study suggests minimal impacts. In contrast, we have a large number of studies on the impacts of carbaryl and malathion on tadpoles. The LC50 for carbaryl ranges from 1 to 18 mg/L (Marchal-Segault 1976, Marian et al. 1983, Bridges 1997, Zaga et al. 1998, Relyea and Mills 2001, Relyea 2003*b*) for all amphibians and from 1.2 to 3.4 mg/L for the populations of wood frogs, leopard frogs, toads, and gray tree frogs used in the current study (Relyea [2003b]; including LC50 estimates when Sevin is combined with predator chemical cues). The LC50 values for malathion range from 1.2 to 5.9 across all amphibians, including the populations of wood frogs, leopard frogs, toads, and gray tree frogs used in the current study (Fordham et al. 2001, Relyea 2004). Because the current study used concentrations of carbaryl and malathion that were well under these LC50 values(0.51 and 0.32 mg/L, respectively), there should have been minor negative impacts of insecticides on tadpole survival and this is what I observed.

Interestingly, the survival of tadpoles actually inscreased with the addition of insecticides; this was probably an indirect effect of high predator mortality. The addition of Sevin reduced the biomass of the insect predators by 44%, increased tadpole (wood frog and leopard frog) survival by 22–30%, and increased total tadpole biomass by 85%. Similarly, the salamander larvae (which were small and susceptible to insect predation) experienced a 37% increase in survival when Sevin was added. While the addition of malathion reduced the biomass of the insect predators by a similar amount as Sevin (48%), the 15–17% increase in wood frog and leopard frog survival was not significant and the salamander survival was unchanged. Thus, changes in predator biomass do not completely explain changes in herbivore survival, suggesting that we also need to examine how the different pesticides affect the foraging behavior of the surviving

predators. For example, Boone and Semlitsch (2001, 2002) found that carbaryl (in the absence of insect predators) can have both positive and negative effects on tadpole survival. In contrast to the tadpoles, snails did not experience a positive indirect effect on their biomass because the specialist snail predator *(Belostoma)* was not killed by the insecticides. This suggests that although higher concentrations of carbaryl and malathion certainly can kill many amphibians (5 mg/L; Boone and Semlitsch 2001, 2002, Relyea 2003*b*, 2004), under lower concentrations these insecticides, and perhaps other insecticides that share the same mode of action, actually can have positive indirect effects on the survival and biomass of tadpoles. Thus, in assessing the impacts of insecticides on amphibians, it is critical that we consider both relevant concentrations and relevant ecological contexts.

The two herbicides had very different effects on the community than the two insecticides. Although glyphosate and 2,4-D are designed to kill plants, they did not reduce the biomass of periphyton in the experiment. In fact, 2,4-D had few effects on any species or trophic group in the entire community during the 14-day experiment (only backswimmers and spotted salamanders increased survival with 2,4-D, although the causes are unclear). This general lack of impact from 2,4-D is consistent with past toxicity studies that have found relatively high $LC50_{96\text{-}h}$ values for 2,4-D, including 45 mg/L for lake trout *(Salvelinus namaycush),* 301 mg/ L for American eels *(Anguilla rostrata),* and 363–389 mg/L for cladocerans *(Daphnia magna;* USDI 1980, Verschueren 1983). In this system, 2,4-D appeared to have no substantial impact on a diverse aquatic community.

In stark contrast, Roundup had a major effect on the community. Roundup reduced tadpole richness by 70% by completely exterminating two species (leopard frogs and gray tree frogs) and nearly exterminated a third species (wood frogs). Roundup did not have a significant effect on toads, spring peepers, and the spotted salamanders, although few toads survived even in the control treatments, making it difficult t to assess the effects of Roundup on survival. These reductions in tadpole survival were concomitant with a decrease in predator biomass, suggesting that Roundup also caused a trophic cascade from the herbivores to the predators. In comparison to the 3.8 mg/L of glyphosate used in the mesocosm study (based on the manufacturer's recommended application rate; AI = active ingredient), concentrations of glyphosate in nature have been observed up to 2.3 mg AI/L and are capable of being as high as 3.7 mg AI/L (Giesy et al. 2000).

Giesy et al. (2000) recently reviewed the toxicity of glyphosate and found that its toxicity (expressed as mg of active ingredient per liter) to invertebrates can be quite high, ranging from 3.5 mg AI/L in crayfish *(Orconectes nais;* $LC50_{96\text{-}h)}$ to 5600 mg AI/L in midge larvae *(Chironomus riparius;* $LC50_{48\text{-}h).}$ As expected from these previous studies, glyphosate had no effect on the insect predators and snails in the mesocosm experiment. Glyphosate also has a wide range of toxic effects on fish, ranging from 3.5 mg AI/L in *Tilapia* sp. $_{(}LC50_{96\text{-}h)}$ to >1300 mg AI/L in sheepshead minnows *(Cyprinodon variegatus;* $LC50_{96\text{-}h).}$ Prior tests of glyphosate on amphibians have been rare. In four species of Australian tadpoles *(Crinia insignifera, Heleioporus eyrei, Limnodynastes dorsalis,* and *Litoria moorei),* Mann and Bidwell (1999) found that $LC50_{48\text{-}h}$ values in the laboratory ranged from 3.9 to 15.5 mg AI/ L for Roundup (glyphosate plus POEA surfactant), 108 to 161 mg AI/L for technical grade glyphosate acid, and >450 mg AI/L for glyphosate isopropylamine salt (the latter two formulations lack the POEA surfactant).

Perkins et al. (2000) conducted laboratory experiments on *Xenopus laevis* tadpoles and found $LC50_{96\text{-}h}$ values of 12.4 mg AI/L for Roundup, 6.8 mg/L for the POEA surfactant alone, and 9729 mg AI/L for Rodeo (an aquatic form of glyphosate that lacks the POEA surfactant). Smith (2001) examined the impact of Kleeraway (another form of glyphosate that includes the POEA surfactant) and found that nearly half of western chorus frog tadpoles *(Pseudacris triseriata)* died at 0.75 mg AI/L; plains leopard frog larvae *(Rana blairi)* experienced 0% and 100% survival at 0.75 mg AI/L in two separate experiments. All tadpoles of both species died at higher concentrations (7.5, 750, and 7500 mg AI/L). These studies suggest that the high mortality associated with commercial forms of Roundup is actually due to the POEA surfactant and not to glyphosate itself.

The high mortality rates of tadpoles associated with Roundup are in agreement with those of several other experiments that I have recently completed on tadpole species from the midwestern United States. Using static exposure experiments in the laboratory, I reared six different species of tadpoles under a range of Roundup concentrations to estimate the LC50 values. The estimated $LC50_{16\text{-}d}$ values for these North American species were lower than previously observed for most amphibian species (Mann and Bidwell 1999, Perkins et al. 2000), ranging from 0.5 to 2.5 mg AI/L (Relyea, *in press).* This suggests that a direct overspray at the manufacturer's recommended rate (a realized pond concentration of 3.8 mg/L) should be highly lethal to these amphibians. The current study is consistent with this prediction.

I have also conducted a second outdoor mesocosm experiment in the absence of predators (to eliminate this source of mortality) and with the addition of either no soil, sand, or loam (because soil is known to absorb the two components of Roundup (glyphosate and the POEA surfactant) and remove them from the water column; Giesy et al. 2000). I exposed communities of three tadpoles species to 3.8 mg AI/L of glyphosate (in the form of Roundup, similar to the current experiment) and found that it reduced tree frog tadpole survival from 75% to 2%, toad tadpole survival from 97% to 0%, and leopard frog tadpole survival from 98% to 4% (R. A. Relyea, *unpublished manuscript).* Moreover, the addition of soil did not diminish the toxic effect. Collectively, the available data indicate that, contrary to conventional wisdom, current application rates of Roundup can be highly lethal to many species of amphibians. This result is of particular interest in light of the global decline of amphibians (Wake 1998, Alford and Richards 1999, Houlihan et al. 2001, Blaustein and Kiesecker 2002) which, in some cases, is correlated with a proximity to agricultural areas that use pesticides (Bishop et al. 1999, Davidson et al. 2001, 2002, Sparling et al. 2001).

Although Roundup is an herbicide, two lines of evidence suggest that the widespread tadpole mortality was directly due to toxicity and not to the destruction of the tadpoles' algal food source. First, much of the mortality occurred within the first st 24 hours *(personal observations).* This mortality rate was much faster than would be expected to occur with a lack of food (Audo et al. 1995) and was consistent with our single-species laboratory experiments that did not use algal food sources (Relyea, *in press).* Second, the biomass of periphyton did not decrease with Roundup. Roundup actually caused a 40% increase in periphyton by removing a large fraction of the herbivores and allowing periphyton to attain a higher standing crop. Thus, there was a positive, indirect effect of Roundup on periphyton. This indicates that Roundup directly kills amphibians rather than indirectly causing amphibians to starve to death.

Conclusions

This study highlights the importance of examining the impact of pesticides within the natural ecological context in which the taxa live. Single-species toxicity studies are invaluable to assess the relative lethality of different chemicals on both target and nontarget species. However, when toxicity studies are embedded in the nexus of interactions that compose natural food webs, we can arrive at very different interpretations due to the prevalence of both direct and indirect effects. At realistic concentrations, the two insecticides had substantial negative effects on the predatory insects and cladocerans, but they had substantial indirect positive effects on the copepods and tadpoles. The two herbicides had quite contrasting effects; 2,4-D had no impact on the community, whereas Roundup caused a major reduction in amphibian diversity, an indirect, positive impact on the periphyton that the tadpoles consume, and an indirect, negative effect on the biomass of insect predators. It is important to note that these impacts occurred over relatively short time scales (two weeks). Over longer time scales (months to years, depending on the species), many of the taxa have the potential to recover their population sizes, provided that the pesticide exposure is not a recurring event.

Although there is currently a strong empirical and theoretical push to understand the factors that determine species diversity and abundance in relatively pristine systems (Tilman et al. 2001, Chase and Leibold 2002, Downing and Leibold 2002, Naeem 2002), few habitats are untouched by anthropogenic effects, including the direct application or drift of pesticides (Lambert 1997, LeNoir et al. 1999, Leonard et al. 1999, Favari et al. 2002). We need to understand how these effects impact natural systems and whether they contribute to the global decline in biodiversity.

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Killing evergreen broadleaf trees in Southwest Oregon

Private land foresters are conducting large scale poisoning of broadleaf evergreen and deciduous trees in southwestern Oregon (madrone, tan oak, chinkapin, black oak, white oak). We abhor this practice which turns diverse forests into a monotypic stand of commercial conifers. The BLM must disclose if they intend to mimic this practice on public lands (i.e. the killing of individual trees with herbicide hatchets). If so, an alternatives must describe this practice and the impacts on public lands need to be addressed from this heinous practice. Currently we could not find reference to this technique in the FEIS document. Please include a disclaimer in the FEIS that this practice is not being considered. This is deforestation plain and simple.

Conclusion:

Siskiyou Project is very skeptical of the use of herbicide treatment. Herbicides should only be considered for use as a last resort when all other means have failed. Aerial application of herbicides should be prohibited. Riparian reserves should receive a minimum of 150 feet no chemical zone. Fire remains the best way to restore our landscape, which is born of fire. Herbicide use should be kept to a minimum and the number of acres treated annually should by no means be tripled. If anything the number of acres treated annually with herbicides should be reduced from their current acreage of 305,000. We support the Restore Native Ecosystems Alternative (DEIS, Volume 2, Appendix G). Preventative measures should be taken to treat the cause and not the symptom of noxious weed invasion.

We assert that any project type NEPA analysis would find that the cumulative effects of the use of herbicides (private plus public) in intermingled private/public forest lands would either be unacceptable or require the need for additional local impact statements due to uncertainty about the transboundary effects of herbicide application on private lands affecting public lands and public land applications affecting private lands (already heavily dosed).

Please provide us a copy of the FEIS, response to comments, and decision.

Sincerely,

Lisa Rhode
Conservation & Outreach Coordinator
Siskiyou Project
9335 Takilma Road
Cave Junction, Oregon 97523

Appendix G

Comments on DEIS/PER by Ms. Pat Rasmussen

I've been pulling knapweed on a number of sites now for 9 years. One thing I've learned is that Diffuse Knapwed is a response to soil degradation, it actually is restricted to sites where soils have been degraded. That degradation includes herbicides that kill the micro-organisms in the soil. By spraying, it actually invites knapweed onto a site. There will be knapweed there for many years unless handpulling commences, which I don't think the BLM would want to do on such a large scale. The answer is to not degrade soils in the first place. Typically what has been happening is that agencies spray, then they have knapweed so they keep spraying every year, and the knapweed just keeps coming back.

Further, knapweed is a response to compacted soils. Knapweed will go into areas where grazing or overgrazing has compacted the soils. As the soils are compacted by the animals, the biological soil crust is destroyed, the plants in the system become weaker, the whole system is degraded. What happens next? Knapweed invades the site. The solution is not to allow overgrazing to degrade the soils.

I have great recovery going on in sagebrush sites, with recovery of biological soil crusts and native plants, it's the most exciting thing I've ever done. One thing I'm doing is remineralizing the soils with glacial rock dust and volcanic rock dust, all natural. I've just started this fall, but I expect to see wonderful results in my sagebrush systems. Once the soils are balanced again, there will be no weeds. Healthy soils grow healthy plants and the system is restored.

My discoveries are supported by and being documented by scientists. We are just in the process of getting it written up, so my comments to the BLM are short.

I presented what I've learned at the Restoration Conference at WSU in October and by working with a number of scientists and practitioners we learned how it works that knapweed recovers soils, especially in sage steppe habitat.

Pat Rasmussen
World Temperate Rainforest Network
P.O. Box 154
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Appendix H

Comments on DEIS/PER by Soda Mountain Wilderness Council

Brian Amme
EIS Project Manager
Nevada State Office
P.O. Box 12000
Reno, Nevada 89520-0006

Re: Public Comments on the BLM's Draft Programmatic EIS for Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States and Draft Vegetation Treatments on BLM Lands in 17 Western States Programmatic Environmental Report.

Founded in 1986, the Soda Mountain Wilderness Council's ("SMWC") primary mission is to protect and promote wildlands in the region which now includes the Cascade-Siskiyou National Monument. Here the globally significant Siskiyou Mountains join the Cascade and Klamath ranges in southwestern Oregon state. For the last several years, SMWC has worked for the creation and protection of the Cascade-Siskiyou National Monument as well as protection of the surrounding area. It has become quite clear that one of the most significant threats to the health and integrity of both the wild and not-as-wild lands within the Monument is the invasion of non-native invasive weeds. See Cascade-Siskiyou National Monument Proposed Resource Management Plan/Final Environmental Impact Statement (February 2005) ("The spread of noxious weeds is a problem throughout the monument, particularly in the Diversity Emphasis Area."). Unfortunately, and as you well know, this Monument is far from unique on western public lands in its role as a host to noxious weeds. It is of the utmost importance that the Bureau of Land Management ("BLM") develop an effective strategy to combat and prevent the spread of invasive species throughout the west.

Unfortunately, because both the draft environmental impact statement ("DEIS") and programmatic environmental report ("PER") fail to adequately address the *causes* of invasive species problem (-- instead opting to focus on methods to treat areas already invaded by weeds), the BLM has not yet created a successful strategy to deal with one of the West's most rampant causes of environmental degradation. For this reason, SMWC submits the following comments to encourage the BLM to rethink their approach so that BLM will come up with an effective solution to the problem of invasive weeds, rather than causing additional environmental problems by overconfidently applying herbicides to our public lands indiscriminately.[6]

The BLM states that one of the goals of the proposed analysis in the DEIS is to "improve ecosystem health by controlling weeds and invasive plant species and managing vegetation to benefit fish and wildlife habitat, improve riparian and wetlands areas, and improve water quality in priority watersheds." Overview of DEIS and PER, *available at* http://www.blm.gov/nhp/spotlight/VegEIS/ (last visited January 28, 2006). However, the BLM hamstrings itself (to the detriment of the public lands) by focusing only on herbicides and other treatments, rather than the primary vectors that cause the spread of invasive weeds (including

[6] The adverse impacts to human health and the environment caused by the application of herbicides is well documented in the scientific literature described in public comments submitted by several organizations, including the Sagebrush Sea Campaign et. al, and those comments are incorporated by reference herein.

roads and livestock grazing). To achieve the stated goal that is quoted above, it is imperative that BLM focus on the primary causes of the invasive weed problem. In addition, the BLM should not give short shrift to passive treatments that can be used as effective treatment methods, and which do not have the negative ecosystem and human health issues associated with herbicides.[7]

Indeed, the National Environmental Policy Act ("NEPA") demands such an approach. Known as the Magna Carta of Environmental Law, NEPA creates a procedural mechanism by which federal agencies can analyze the impacts of proposed projects that may impact the environment. It is simply irrational for an agency to seek to "improve ecosystem health by controlling weeds and invasive plant species and managing vegetation to benefit fish and wildlife habitat, improve riparian and wetlands areas, and improve water quality in priority watersheds" without analyzing means to curb the introduction of invasive weeds (before the spread happens) and without fully analyzing the benefits associated with passive treatments of invasive weeds. By opting to analyze only the types of herbicides that can be used on public lands, the BLM has illegally narrowed the purpose and need of the DEIS in an attempt to limit the consideration of reasonable alternatives, such as management of the vectors and passive treatment of invasive weeds. Moreover, "agencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements," 30 C.F.R. § 1502.24, and thus the BLM is required to look at all methods (deemed scientifically viable) to cure the rampant spread of invasive weeds. The single track approach that the BLM has utilized in the DEIS and PER quite frankly ignores the large quantity of scientific literature that identifies management of the causes of the spread of invasive species as the necessary focus in order for eventual curtailment of weed invasion.

The BLM has long recognized that livestock grazing leads to the invasion of nonnative plant species, especially on a sensitive ecosystem such as the Cascade-Siskiyou National Monument. See, e.g., CSNM Proposed RMP/FEIS at 75 ("Livestock are one vector associated with the spread of noxious weeds; livestock disturbance may increase site receptiveness to noxious weed invasions; and livestock movement through areas may also contribute to weed spread."); Id. at 76 ("Cattle can reduce the forage available for native species, and can reduce ground cover that may serve as habitat for various species."); Id. ("The literature indicates that direct and indirect livestock impacts can influence plant composition and, consequently, the relative abundance of weeds."); Id. ("Cattle grazing can influence populations of these rare objects [special status species], either directly from grazing or trampling, or indirectly from the successional changes described above."); Id. ("Grazing by ungulates can directly affect stream temperature through the alteration, reduction, or elimination of streamside vegetation that shades the stream."). Therefore, the BLM is legally obligated to revisit its approach to control invasive weeds and nonnative plant species and consider vectors that cause the spread of invasive weeds (such as livestock grazing).

The BLM has also acknowledged and witnessed that passive treatments (such as resting land from livestock grazing) can effectively heal an ecosystem that has previously been invaded by various weeds and nonnative species. The former Box-O Ranch property, approximately 1200 acres within the Cascade-Siskiyou National Monument, serves as an excellent example of a

[7] The BLM would not even need devote its finite resources to analyze risk assessment methodology that assesses the human health and ecological risks associated with herbicides if the agency focused its efforts on preventing the spread of invasive weeds in the first place.

passive treatment success story that BLM has made happen.[8] The former Box-O includes a 2 ½ mile stretch of Jenny Creek, which was described in the presidential proclamation creating the Monument as biologically significant because it serves as habitat for diverse freshwater snail species and two native fish species, redband trout and Jenny Creek Sucker, both of which are BLM special status species. For years, the former Box-O had been devastated by livestock grazing. The riparian areas along Jenny Creek were virtually destroyed by over-grazing and by historic channelization efforts done to facilitate the grazing that was taking place. The BLM acquired the Box-O through a land exchange in July 1995 and has not authorized grazing on the land since in order to restore riparian habitat along Jenny Creek and to curtail the invasion of non-native plant species that had been introduced by vectors such as livestock. The BLM has also decommissioned roads in order to meet these objectives.

The on-the-ground results of this passive treatment system (in combination with the active restoration measures described above) have been astounding. The Monument Manager has testified that "since BLM's acquisition of the [Box-O] and the removal of livestock grazing, streambanks have begun to stabilize and riparian vegetation has experienced remarkable growth." Jennifer Walt & The Box D Ranch v. BLM, OR-110-01-02 (Appeal of Proposed Decision Dated June 27, 2001, Denying Request to Graze Cattle on the Former Box O Ranch, Ashland Resource Area, Ashland, Oregon) (Aug. 31, 2005) at 9. The BLM has repeatedly denied requests to graze the Box-O lands, given the improvements they have seen during the rest period. In fact, the Monument Manager stated that "[r]eintroducing livestock could impede the recovery of plant communities which have been dominated by non-native annual species, slowing the recovery of native perennial species . . . . Reduction in abundance of these species through grazing would further allow for the advancement of weed species already known to be present." Id. at 13. It is the hope of SMWC that the BLM take success stories, such as progress toward recovery on the former Box-O, into account when determining the extent to which passive treatments (such as resting from livestock grazing and decommissioning of roads) should be emphasized as an alternative treatment method.

In conclusion, SMWC urges the BLM to rethink their approach to preventing the invasion of noxious weeds throughout the 17 western states. The only rational solution to this problem is an approach that focuses on controlling the causes of the spread of invasive species, rather than on a treatment regime to be utilized after-the-fact. It is the hope of SMWC that the BLM take into account the successful use of passive treatments, such as the elimination of livestock grazing and the closing and decommissioning of roads and vehicle routes, to control the spread of invasive species so that our public lands will not be further degraded by the overconfident and indiscriminate use of herbicides.

Sincerely,

Dave Willis, Chair
Soda Mountain Wilderness Council
P.O. Box 512
Ashland, OR 97520

[8] The passive treatment utilized on the former Box-O crucially included, but was not limited solely to, the elimination of livestock grazing. The BLM utilized other active restoration efforts such as burning and reseeding, removal of man-made berms along Jenny Creek, and tree planting in riparian areas which, in conjunction with the elimination of grazing, contributed to the restoration benefits that have been achieved so far.

Appendix I

Comments on DEIS/PER by Wild Watershed

CITIZENS' PREVENTION AND RESTORATION ALTERNATIVE

Executive Summary

The Citizens' Prevention and Restoration Alternative ("PRA") was developed to protect the biological diversity of the Carson and Santa Fe National Forests from the threat of invasive plants. The PRA calls for the development of a comprehensive master plan to identify and lessen conditions that cause or favor invasive plants, to restore native vegetation communities and to utilize proven non-chemical strategies to reduce what is still a small population of invasive plants on these two forests. The master plan includes sections on fire management, roads and off-road vehicles, livestock grazing, timber sales, altered hydrological regimes, oil, gas and mineral development, biological soil crusts, revegetation, active control and improved monitoring, evaluation and research. In particular, the PRA entails:

- Prohibit cross-country travel (away from roads or designated trails) by off-highway vehicles in heavily infested watersheds (i.e. Ponil Creek).
- Prohibit weed-infested hay brought into national forests to feed livestock and/or pack animals.
- Minimize ground disturbance and opening size and maintain sufficient canopy cover during thinning projects to avoid creating conditions favorable to invasive weeds.
- Develop drought management plans to limit damage to vegetation caused by livestock and elk during extended drought.
- Require post-fire re-vegetation be done with 100 percent weed-free native seed.
- Allow remote wildland areas to burn under carefully prescribed conditions where native vegetation would benefit.
- Manage livestock to ensure animals are not moving seeds of invasive species from infested to un-infested areas.
- Close or restrict non-essential, designated routes for motorized vehicle travel in areas of high risk for spread of invasive species.
- Restore native historical flow regimes whenever it is possible to minimize the introduction, establishment and spread of saltcedar.
- Use only native plant seed or native plants when revegetating burned areas, construction sites, mine sites and other disturbed areas.
- Maintain biological soil crusts as a partial shield preventing establishment or spread of invasive species.
- Monitor water quality, wildlife populations and soil conditions to ensure compliance with environmental laws and regulations.

Introduction

The purpose and need for the Invasive Plant Control Project on the Carson and Santa Fe National Forests ("project") is "to protect the abundance and biological diversity of desired native plant communities on the Forests, which in turn will help maintain and enhance wildlife and fish habitat, soil productivity and watershed condition" (FEIS, p. 2). To accomplish these objectives, the Citizen's Prevention and Restoration Alternative ("PRA") is an approach that relies upon preventing the spread of invasive species from areas where they are present and restoring native species and habitats to resist invasion, two viable strategies for the control of invasive species defined in Executive Order No. 13112.

Master Plan to Preserve Ecosystems and Restore Disturbance Regimes

To prevent the spread of invasive plants and restore native species and habitats, the PRA requires the development of a comprehensive master plan to preserve intact ecosystems from invasions and restore historical disturbance regimes. This plan is governed by the following principles:

1. Identification and lessening of the conditions that cause or favor the introduction, establishment and spread of invasive species, and methods to ameliorate those conditions;
2. Restoration of the native vegetation community, via seeding, planting and reintroduction of fire, to increase resistance to invasion; and
3. Active vegetation treatments to reduce the abundance of invasive species populations that use non-chemical strategies.

Prescribed Fire and Fire Suppression

Through an open process that utilizes the best available science and in which citizens are fully informed participants, develop a Fire Management Plan for each Forest that:

1. Allows remote wildland areas to burn under carefully prescribed conditions where native vegetation would benefit;
2. Prescribes "Minimum Impact Suppression Tactics" to fully reclaim fire lines with native vegetation after fire emergencies to prevent the spread of invasive species into fire line corridors and prevent their use as illegal off-road vehicle travelways;
3. Prohibits aggressive soil-disturbing suppression methods where they would favor invasive species (e.g. bulldozers in roadless areas, chemical retardants in riparian areas, etc.)
4. Requires that equipment be cleaned of invasive plant seeds before moving off roads to build fire-breaks;
5. Requires that burned areas (natural or prescribed) be protected from livestock grazing for at least five years or until measurable recovery criteria are met;
6. Requires that post-fire re-vegetation be done with 100 percent weed-free native seed, locally adapted and collected if available; and

7. Requires annual monitoring of all firelines, fire camps, helicopter spots, and fire retardant treated areas for invasive species for a minimum of five years.

Based on these Fire Management Plans, use fire suppression to protect:

1. Areas of high ecological values (e.g., rare forest types, a major portion of the population of a threatened or endangered species) that may be at risk from exotic species invasion following fire;
2. Areas where human life or developed property are at stake;
3. Areas that should be protected until prescribed burning or other treatments can reduce excess fuels; and
4. Important wildlife habitats (e.g., Rio Grande cutthroat Trout habitat, big game winter ranges etc.).

Livestock Grazing

In order to minimize the introduction, establishment, and spread of invasive species due to livestock grazing:

1. Develop drought management plans in an open public process with citizens as fully informed participants;
2. Retire livestock grazing permits at the earliest opportunity where grazing has promoted invasion or persistence of invasive species;
3. Prioritize invasive plant prevention and restoration activities in areas where livestock grazing permits have been retired;
4. Manage livestock to ensure animals are not moving seeds of invasive species from infested to un-infested areas;
5. Manage livestock grazing to favor native species;
6. Avoid grazing in areas dominated by native perennials, biological soil crusts, or other features known to act as natural barriers to invasion or increase of invasive species; and
7. Prohibit weed-infested hay from being brought into national forests for to fed livestock or pack animals.

Roads and Off-Road Vehicles

The introduction, establishment and spread of invasive plants due to roads, fire-breaks, and off-road vehicle route construction, use and maintenance shall be minimized through the following procedures:

1. Develop GIS maps and databases of all system (authorized and constructed) and non-system (user-created) roads and routes;
2. Prohibit all road or off-road vehicle route reconstruction and addition of illegal user-created routes to the transportation system until such actions have been fully analyzed and disclosed in a comprehensive Environmental Impact Statement;

3. Close or restrict non-essential, designated routes for motorized vehicle travel in areas of high risk for spread of invasive species;
4. Implement measures that reduce the likelihood of weed seed dispersal, such as educating equipment operators, implementing appropriate protocols for vehicle and equipment washing, restricting recreational access and seasonal travel;
5. Restrict road-grading activities in areas with high populations of invasive species;
6. Provide effective enforcement to prohibit cross-country travel (away from roads or designated trails) by off-highway vehicles in heavily infested watersheds;
7. Identify and designate for obliteration non-essential system and non-system roads and off-road vehicle routes that do not comply with native vegetation protection goals; and
8. Cease all new road construction and road reconstruction in riparian areas.

Timber Sales

The introduction, establishment and spread of invasive plants due to timber sales shall be minimized by:

1. Designing and planning timber sales to prevent introduction, spread, and establishment of invasive species;
2. Maintaining old-growth vegetation and native forest communities where fire has not been suppressed as bulwarks of vegetation resistance to invasion;
3. Minimizing disturbance of old-growth and late-seral vegetation and communities with healthy fire regimes;
4. Minimizing ground disturbance and opening size and maintaining sufficient canopy cover during thinning projects to avoid creating conditions favorable to invasive weeds.
5. Whenever possible, maintaining intact forest canopies adjacent to areas such as roads and openings where invasive species are abundant;
6. Requiring all gravel and other surfacing materials be free of invasive species seeds; and
7. Requiring steam cleaning of logging equipment and vehicles before movement into new areas.

Altered Hydrological Regimes

Peer-reviewed empirical research suggests that native cottonwood and willow vegetative communities successfully compete with invasive saltcedar (*Tamarix spp.)* when historic spring flooding is allowed to occur. Therefore, the PRA calls for:

1. Restoration of native historical flow regimes whenever it is possible to minimize the introduction, establishment and spread of saltcedar (*Tamarix spp.).*
2. Prioritize treatment of saltcedar in riparian areas where restoration is likely to be successful (e.g., areas where the natural historic flow regime is intact).

Oil, Gas, and Mineral Exploration and Development

1. Prohibit surface disturbance associated with oil and gas exploration, development and production activities in areas with steep slopes and where endangered, threatened, candidate, sensitive or rare plant species are present.
2. Minimize surface disturbance associated with gravel mining operations and oil and gas exploration, development, and production activities in areas with sensitive and/or unstable soils.
3. Require that all gravel and other surfacing materials used in oil and gas exploration, development and production activities are free of invasive species.

Disturbance to Biological Soil Crusts

Biological crusts of lower plants and cyanobacteria cover soil surfaces between individual plants in healthy arid grasslands and woodlands. While they fix nitrogen, increase soil fertility, improve water-infiltration, stabilize soils and enhance the establishment of vascular plants, they also may provide a shield that reduces or prevents the establishment and spread of invasive species. Biological soil crusts are particularly susceptible to damage from physical disturbance. The PRA requires that:

1. Biological soil crusts shall be maintained as a partial shield preventing establishment or spread of invasive species;
2. The presence and integrity of biological soil crusts at the watershed and subwatershed levels shall be mapped and described;
3. A general plan to restore damaged biological soil crusts shall be prepared and implemented; and
4. Livestock grazing shall be prohibited for at least five years following a fire in areas capable of maintaining biological soil crusts. Return of livestock shall be delayed past five years if significant recovery of the biological soil crust has not occurred.

Revegetation

1. Use only native plant seed or native plants when revegetating burned areas, construction sites, mine sites and other disturbed areas;
2. Purchase plant material for revegetation projects whenever possible from growers of locally-adapted seeds and plants;
3. Collaborate with federal, state, local and private land managers to use appropriate native species, particularly on inholdings and other lands adjacent to the National Forests; and
4. Rely on natural post-fire regeneration unless it can be demonstrated that natural regeneration is not possible. In such cases, use certified weed-free seed and plants exclusively.

Active Management of Existing Populations

To control existing populations of invasive plants, the PRA calls for non-chemical strategies such as manual and mechanical treatments that have been shown to be effective in restoring native vegetation (e.g., mowing, spot fire (flamer), mastication, weed eaters, mulching and weed wrenches) to be used in conjunction with efforts to eliminate or reduce the conditions that favor the presence of invasive plants and encouragement of conditions that resist invasive plants. Herbicides are not allowed because the Forest Service has not reformed its pesticide use policies that in the past have included illegal disposal of toxic herbicides on National Forests in violation of the Federal Insecticide, Fungicide and Rotenticide Act and herbicide application in violation of the National Environmental Policy Act. In addition, the PRA does not use herbicides because herbicides:

1. Do not address the conditions that favor the introduction, establishment and spread of invasive species;
2. Simplify the vegetation community;
3. Often render the treated site more vulnerable to return of invasive species; and
4. Can have numerous adverse toxic effects on workers; nearby residents; the chemically sensitive and other vulnerable populations such as children, the elderly and those with chronic respiratory, immune. and/or neurological conditions; beneficial soil organisms; and native plants, aquatic, terrestrial and avian species.

Monitoring, Evaluation and Research

Monitoring and evaluation are integral components of each prevention and restoration project. Currently, the Forest Service does not adequately monitor, survey and document the impacts of its management activities on habitats, native vegetation and native wildlife. Even when monitoring has occurred, the findings are not translated into improved management. Empirical research by the Forest Service has been insufficient to evaluate non-toxic materials to control existing populations. Therefore, the PRA requires that all monitoring and evaluation methods meet the following criteria:

1. Relevant: evaluates progress toward stated objectives.
2. Sensitive: quickly detects change, shows trends, identifies critical features.
3. Available: inexpensive, easily applied.
4. Measurable: accurately quantifiable with scientifically credible methods.
5. Defensible: minimizes reliance on “professional judgment”.
6. Verifiable: allows others applying the same methods to achieve similar results.
7. Inclusive: avoids reductionism, where feasible.
8. Scheduled: monitoring intervals firmly scheduled.
9. Fully Funded: projects approved only if baseline and post-treatment evaluation monies are not available.

In particular, the PRA requires that:

1. Baseline data gathered before resources are committed to modify plant communities;
2. If treatments are initiated, empirical data collected to substantiate whether measurable and verifiable goals have been met;
3. Water quality, wildlife populations and soil conditions monitored to ensure compliance with environmental laws and regulations;
4. Clear procedures established for incorporating monitoring and evaluation results into current and future projects;
5. All management actions documented so that the information can be independently reviewed by non-Forest Service scientists and the scientifically literate public; and
6. Research projects established to evaluate non-toxic materials such as potassium soaps, vinegar, stump treatments, clove oil etc. to control and/or eradicate existing populations of invasive plants.

CITIZENS' PREVENTION AND RESTORATION ALTERNATIVE
LIMITED HERBICIDES

Executive Summary

The Citizens' Prevention and Restoration Alternative ("PRA") was developed to protect the biological diversity of the Carson and Santa Fe National Forests from the threat of invasive plants. The PRA calls for the development of a comprehensive master plan to identify and lessen conditions that cause or favor invasive plants, restore native vegetation communities and emphasize non-chemical strategies to reduce what is still a small population of invasive plants on these two forests. The master plan includes sections on fire management, roads and off-road vehicles, livestock grazing, timber sales, altered hydrological regimes, oil, gas and mineral development, biological soil crusts, revegetation, active control and improved monitoring, evaluation and research. In particular, the PRA entails:

- Prohibit cross-country travel (away from roads or designated trails) by off-highway vehicles in heavily infested watersheds (i.e. Ponil Creek).
- Prohibit weed-infested hay brought into national forests to feed livestock and/or pack animals.
- Minimize ground disturbance and opening size and maintain sufficient canopy cover during thinning projects to avoid creating conditions favorable to invasive weeds.
- Develop drought management plans to limit damage to vegetation caused by livestock and elk during extended drought.
- Require post-fire re-vegetation be done with 100 percent weed-free native seed.
- Allow remote wildland areas to burn under carefully prescribed conditions where native vegetation would benefit.
- Manage livestock to ensure animals are not moving seeds of invasive species from infested to un-infested areas.
- Close or restrict non-essential, designated routes for motorized vehicle travel in areas of high risk for spread of invasive species.

- Restore native historical flow regimes whenever it is possible to minimize the introduction, establishment and spread of saltcedar.
- Use only native plant seed or native plants when revegetating burned areas, construction sites, mine sites and other disturbed areas.
- Maintain biological soil crusts as a partial shield preventing establishment or spread of invasive species.
- Monitor water quality, wildlife populations and soil conditions to ensure compliance with environmental laws and regulations.

Introduction

The purpose and need for the Invasive Plant Control Project on the Carson and Santa Fe National Forests ("project") is "to protect the abundance and biological diversity of desired native plant communities on the Forests, which in turn will help maintain and enhance wildlife and fish habitat, soil productivity and watershed condition" (FEIS, p. 2). To accomplish these objectives, the Citizen's Prevention and Restoration Alternative ("PRA") is an integrated approach that relies primarily upon preventing the spread of invasive species from areas where they are present and restoring native species and habitats to resist invasion, two viable strategies for the control of invasive species defined in Executive Order No. 13112.

Master Plan to Preserve Ecosystems and Restore Disturbance Regimes

To prevent the spread of invasive plants and restore native species and habitats, the PRA requires the development of a comprehensive master plan to preserve intact ecosystems from invasions and restore historical disturbance regimes. This plan is governed by the following principles:

1. Identification and lessening of the conditions that cause or favor the introduction, establishment and spread of invasive species, and methods to ameliorate those conditions;
2. Restoration of the native vegetation community, via seeding, planting and reintroduction of fire, to increase resistance to invasion; and
3. Active vegetation treatments to reduce the abundance of invasive species populations that emphasize non-chemical strategies.

Prescribed Fire and Fire Suppression

Through an open process that utilizes the best available science and in which citizens are fully informed participants, develop a Fire Management Plan for each Forest that:

1. Allows remote wildland areas to burn under carefully prescribed conditions where native vegetation would benefit;
2. Prescribes "Minimum Impact Suppression Tactics" to fully reclaim fire lines with native vegetation after fire emergencies to prevent the spread of invasive species into fire line corridors and prevent their use as illegal off-road vehicle travelways;

3. Prohibits aggressive soil-disturbing suppression methods where they would favor invasive species (e.g. bulldozers in roadless areas, chemical retardants in riparian areas, etc.)
4. Requires that equipment be cleaned of invasive plant seeds before moving off roads to build fire-breaks;
5. Requires that burned areas (natural or prescribed) be protected from livestock grazing for at least five years or until measurable recovery criteria are met;
6. Requires that post-fire re-vegetation be done with 100 percent weed-free native seed, locally adapted and collected if available; and
7. Requires annual monitoring of all firelines, fire camps, helicopter spots, and fire retardant treated areas for invasive species for a minimum of five years.

Based on these Fire Management Plans, use fire suppression to protect:

1. Areas of high ecological values (e.g., rare forest types, a major portion of the population of a threatened or endangered species) that may be at risk from exotic species invasion following fire;
2. Areas where human life or developed property are at stake;
3. Areas that should be protected until prescribed burning or other treatments can reduce excess fuels; and
4. Important wildlife habitats (e.g., Rio Grande cutthroat Trout habitat, big game winter ranges etc.).

Livestock Grazing

In order to minimize the introduction, establishment, and spread of invasive species due to livestock grazing:

1. Develop drought management plans in an open public process with citizens as fully informed participants;
2. Retire livestock grazing permits at the earliest opportunity where grazing has promoted invasion or persistence of invasive species;
3. Prioritize invasive plant prevention and restoration activities in areas where livestock grazing permits have been retired;
4. Manage livestock to ensure animals are not moving seeds of invasive species from infested to un-infested areas;
5. Manage livestock grazing to favor native species;
6. Avoid grazing in areas dominated by native perennials, biological soil crusts, or other features known to act as natural barriers to invasion or increase of invasive species; and
7. Prohibit weed-infested hay from being brought into national forests for to fed livestock or pack animals.

Roads and Off-Road Vehicles

The introduction, establishment and spread of invasive plants due to roads, fire-breaks, and off-road vehicle route construction, use and maintenance shall be minimized through the following procedures:

1. Develop GIS maps and databases of all system (authorized and constructed) and non-system (user-created) roads and routes;
2. Prohibit all road or off-road vehicle route reconstruction and addition of illegal user-created routes to the transportation system until such actions have been fully analyzed and disclosed in a comprehensive Environmental Impact Statement;
3. Close or restrict non-essential, designated routes for motorized vehicle travel in areas of high risk for spread of invasive species;
4. Implement measures that reduce the likelihood of weed seed dispersal, such as educating equipment operators, implementing appropriate protocols for vehicle and equipment washing, restricting recreational access and seasonal travel;
5. Restrict road-grading activities in areas with high populations of invasive species;
6. Provide effective enforcement to prohibit cross-country travel (away from roads or designated trails) by off-highway vehicles in heavily infested watersheds;
7. Identify and designate for obliteration non-essential system and non-system roads and off-road vehicle routes that do not comply with native vegetation protection goals; and
8. Cease all new road construction and road reconstruction in riparian areas.

Timber Sales

The introduction, establishment and spread of invasive plants due to timber sales shall be minimized by:

1. Designing and planning timber sales to prevent introduction, spread, and establishment of invasive species;
2. Maintaining old-growth vegetation and native forest communities where fire has not been suppressed as bulwarks of vegetation resistance to invasion;
3. Minimizing disturbance of old-growth and late-seral vegetation and communities with healthy fire regimes;
4. Minimize ground disturbance and opening size and maintain sufficient canopy cover during thinning projects to avoid creating conditions favorable to invasive weeds.
5. Whenever possible, maintaining intact forest canopies adjacent to areas such as roads and openings where invasive species are abundant;
6. Requiring all gravel and other surfacing materials be free of invasive species seeds; and
7. Requiring steam cleaning of logging equipment and vehicles before movement into new areas.

Altered Hydrological Regimes

Peer-reviewed empirical research suggests that native cottonwood and willow vegetative communities successfully compete with invasive saltcedar (*Tamarix spp.)* when historic spring flooding is allowed to occur. Therefore, the PRA calls for:

1. Restoration of native historical flow regimes whenever it is possible to minimize the introduction, establishment and spread of saltcedar (*Tamarix spp.).*
2. Prioritize treatment of saltcedar in riparian areas where restoration is likely to be successful (e.g., areas where the natural historic flow regime is intact).

Oil, Gas, and Mineral Exploration and Development

1. Prohibit surface disturbance associated with oil and gas exploration, development and production activities in areas with steep slopes and where endangered, threatened, candidate, sensitive or rare plant species are present.
2. Minimize surface disturbance associated with gravel mining operations and oil and gas exploration, development, and production activities in areas with sensitive and/or unstable soils.
3. Require that all gravel and other surfacing materials used in oil and gas exploration, development and production activities are free of invasive species.

Disturbance to Biological Soil Crusts

Biological crusts of lower plants and cyanobacteria cover soil surfaces between individual plants in healthy arid grasslands and woodlands. While they fix nitrogen, increase soil fertility, improve water-infiltration, stabilize soils and enhance the establishment of vascular plants, they also may provide a shield that reduces or prevents the establishment and spread of invasive species. Biological soil crusts are particularly susceptible to damage from physical disturbance. The PRA requires that:

1. Biological soil crusts shall be maintained as a partial shield preventing establishment or spread of invasive species;
2. The presence and integrity of biological soil crusts at the watershed and subwatershed levels shall be mapped and described;
3. A general plan to restore damaged biological soil crusts shall be prepared and implemented; and
4. Livestock grazing shall be prohibited for at least five years following a fire in areas capable of maintaining biological soil crusts. Return of livestock shall be delayed past five years if significant recovery of the biological soil crust has not occurred.

Revegetation

1. Use only native plant seed or native plants when revegetating burned areas, construction sites, mine sites and other disturbed areas;

2. Purchase plant material for revegetation projects whenever possible from growers of locally-adapted seeds and plants;
3. Collaborate with federal, state, local and private land managers to use appropriate native species, particularly on inholdings and other lands adjacent to the National Forests; and
4. Rely on natural post-fire regeneration unless it can be demonstrated that natural regeneration is not possible. In such cases, use certified weed-free seed and plants exclusively.

Active Management of Existing Populations

To control existing populations of invasive plants, the PRA emphasizes non-chemical strategies such as mechanical treatments that have been shown to be effective in restoring native vegetation (e.g., mowing, spot fire (flamer), mastication, weed eaters, mulching and weed wrenches). When it is determined that the eradication, control and containment of invasive plants cannot be accomplished by manual, mechanical, biological, controlled grazing, prescribed burning or mulching and other cultural means, then hand application, i.e. application by wick, rag etc of herbicides to individual plants could be considered in conjunction with efforts to eliminate or reduce the conditions that favor the presence of invasive plants and encouragement of conditions that resist invasive plants. When herbicides are proposed for use on invasive plants in the project area, a site-specific Environmental Impact Statement will be prepared that fully discloses and analyzes all significant direct, indirect and cumulative effects to the human environment. Herbicides are a minor part of PRA invasive plant control strategies (less than ten percent) because herbicides:

1. Do not address the conditions that favor the introduction, establishment and spread of invasive species;
2. Simplify the vegetation community;
3. Often render the treated site more vulnerable to return of invasive species; and
4. Can have numerous adverse toxic effects on workers; nearby residents; the chemically sensitive and other vulnerable populations such as children, the elderly and those with chronic respiratory, immune. and/or neurological conditions; beneficial soil organisms; and native plants, aquatic, terrestrial and avian species.

To minimize risk to human health, wildlife and water quality, herbicides cannot be used in the following sensitive areas:

1. Municipal watersheds and watersheds that provide drinking water and irrigation to traditional communities;
2. Within one mile of rivers and streams, lakes, campgrounds, trails and highway right-of-ways and private lands.
3. Wilderness and Wilderness Study Areas;
4. Inventoried Roadless Areas;
5. Wild and Scenic River corridors;
6. Research National Areas; and

7. Within designated critical habitat of threatened and endangered species.

Herbicides could be considered for use only under the following conditions:

1. When all ingredients in the formulation (including inert ingredients) are publicly disclosed and analyzed for their impacts to human health, wildlife and water quality;
2. There is notification to the public through signs, newspaper announcements and other means;
3. When surface and ground water samples are collected and analyzed for herbicides and their breakdown products;
4. When an up-to-date publicly accessible database is kept to record the formulation of herbicide, amount applied, date, time and weather conditions during application;
5. Vegetation cannot be burned the same year it was treated with herbicides; and
6. Herbicide treatments are not permitted during the bird nesting season of bird species found through site-specific surveys of the application area.

Monitoring, Evaluation and Research

Monitoring and evaluation are integral components of each prevention and restoration project. Currently, the Forest Service does not adequately monitor, survey and document the impacts of its management activities on habitats, native vegetation and native wildlife. Even when monitoring has occurred, the findings are not translated into improved management. Empirical research by the Forest Service has been insufficient to evaluate non-toxic materials to control existing populations. Therefore, the PRA requires that all monitoring and evaluation methods meet the following criteria:

a. Relevant: evaluates progress toward stated objectives.
b. Sensitive: quickly detects change, shows trends, identifies critical features.
c. Available: inexpensive, easily applied.
d. Measurable: accurately quantifiable with scientifically credible methods.
e. Defensible: minimizes reliance on “professional judgment”.
f. Verifiable: allows others applying the same methods to achieve similar results.
g. Inclusive: avoids reductionism, where feasible.
h. Scheduled: monitoring intervals firmly scheduled.
i. Fully Funded: projects approved only if baseline and post-treatment evaluation monies are not available.

In particular, the PRA requires that:

1. Baseline data gathered before resources are committed to modify plant communities;
2. If treatments are initiated, empirical data collected to substantiate whether measurable and verifiable goals have been met;

3. Water quality, wildlife populations and soil conditions monitored to ensure compliance with environmental laws and regulations;
4. Clear procedures established for incorporating monitoring and evaluation results into current and future projects;
5. All management actions documented so that the information can be independently reviewed by non-Forest Service scientists and the scientifically literate public; and
6. Research projects established to evaluate non-toxic materials such as potassium soaps, vinegar, stump treatments, clove oil etc. to control and/or eradicate existing populations of invasive plants.

Appendix J

Comments on DEIS/PER by Western Slope Environmental Resource Council

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RE: Comments on the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Draft Programmatic EIS (DEIS)* and the *Vegetation Treatments Using Herbicides Programmatic EIS on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Report (PER)*

Introduction and Setting

Please accept the following comments on the above-referenced Draft Programmatic EIS (DEIS) and PER on behalf of the members of the Western Slope Environmental Resource Council (WSERC). We appreciate the opportunity to provide these written comments.

WSERC is a grassroots non-profit conservation organization based in Paonia, CO. Our organization promotes "Healthy Lands, Healthy Lives", and is dedicated to protecting and enhancing the environment and quality of life in Delta County and Colorado's Western Slope. WSERC was organized in 1977 and now has approximately 450 members. We are one of the oldest grassroots environmental groups in the state, and one of the very few based entirely in a rural, non-resort community.

WSERC has a long-standing interest in the management of public lands administered by the BLM, since approximately 28% of lands in Delta County are under BLM administration. The majority of lands in Delta County are located in the Uncompahgre Basin Field Office (UBFO) Field Area, which includes the Adobe Badlands Wilderness Study Area. A smaller portion of BLM lands in Delta County are administered by the Grand Junction Field Office (GJFO), and include a portion of the Dominquez Canyons Wilderness Study Area.

In addition to the BLM lands in our County, a bit less than 1% of our lands are administered by the State, and the US Forest Service administers approximately 26% of our lands. Thus, over *half* of the land ownership in Delta County is in public lands. As such, our organization accepts responsibility as local land stewards to participate in public lands management decision-making processes. WSERC has an active Public Lands Committee. The Committee meets regularly in association with the Western Colorado Congress Public Lands Committee, as well as on its own, to plan and implement citizen involvement and education on public lands issues.

Our members are primarily concerned with assuring that environmental and ecosystem health is maintained on our public lands, and that cumulative impacts from activities associated with reducing fire risks, slowing the spread of invasive weeds, and energy and mineral resource development do not degrade our local clean air, water resources, wildlife, vegetation, or the environmental quality in the communities we live in.

Vegetation Management Alternatives

WSERC is greatly concerned about vegetation management proposals that involve the use of herbicides on BLM lands. The BLM preferred alternative ("Alternative B") will more than triple the area of current annual herbicide use, covering over 932,000 acres across 17 Western states with herbicides that include several persistent, mobile and toxic chemicals, including known developmental and reproductive toxicants. As an example, here in Delta County, the BLM proposes the use of herbicides for fire suppression and control of cheatgrass on BLM lands adjacent to residences in rural subdivisions north of the town of Paonia. Discussions with personnel in our local UBFO BLM office indicated a desire on the part of the project manager to use both imazapic and triclopyr applications in the fuels reduction project, which is of great concern to our organization.

The known (and unknown) risks associated with the use of the proposed herbicides, as well as the unknown risks associated with the use of any "new chemicals that may be developed in the future" (which would be allowed by the proposal) have not been properly placed in context in the Draft PEIS. The PEIS as presented is only one component of what should be a much broader approach to the issue of unwanted vegetation on BLM lands. Vegetation management needs to take into account the conditions that have led to the vegetation problems, and present methods for *preventing* those problems, as well as methods for *restoring ecological integrity* to sites where vegetation problems exist. The PEIS as it is presently configured addresses only the some of the issues associated with short-term treatments. Prevention and restoration are not addressed.

Effective management and treatment of unwanted vegetation can be performed using non-herbicide techniques, including fire, mechanical, manual, cultural and biological control methods. These types of methods have been used traditionally, and in many cases offer the most appropriate options for management that will protect and preserve our local resource lands, as well as our local populations. *These non-chemical methods should be considered and integrated into the discussion and analysis presented in the PEIS.*

Any consideration of options at a site-specific level should be based in science, and should also consider whether the approach is a short-term "fix" or part of a long-term management plan that is expected to improve habitat and resource conditions. It does no good to wipe out an entire area (including non-target species) to attempt eradication of an invasive species, and by so doing create conditions that allow recolonization by the same or another offensive invasive.

A no-herbicide alternative is included in the Vegetation Treatment proposals as "Alternative C". While we are very concerned about the impacts of herbicides on our ecosystems, and are supportive of the spirit of Alternative C, we recognize that there are specific and isolated instances where a controlled judicious application may be warranted. In such cases, follow-up

on the efficacy of a treatment and the ecological effects of that treatment on all affected organisms should be performed. Based on the application options presented in the DEIS, we are requesting that that **no applications using aerial deposition methods (from an airplane or helicopter) or large-area applications (greater than five contiguous acres) using boom/broadcast methods be allowed at any time**. In those instances where Alternative C is not feasible and all other non-chemical options have been explored, we allow that **spot applications delivered by boat, horse or human application vehicles may permitted**. **We request that the outcomes of such spot applications be monitored and analyzed for at least three years to assess the impacts on diversity of native species, attainment of ecologically effective densities by interactive species, and resilience of sensitive species and any impacted organisms.**

We are also concerned regarding the management context in which vegetation treatment decisions are made. As is emphasized in the Restore Native Ecosystems Alliance Alternative (Draft PEIS, Volume 2, Appendix G), **we request that there be written into the DEIS an explicit incorporation of an emphasis on diversity of native species, attainment of ecologically effective densities by interactive species, and resilience of sensitive species and any impacted organisms as an overall management goal in managing vegetation for fire suppression or invasive species control.**

Undesired Impacts of Herbicide Use

Pesticide drift is a serious health consideration for all organisms, and has been shown to be associated with decline in California amphibian species (1). Pesticide drift was implicated in incidents that caused more that 700 people to be sickened in the California Central Valley between 1999 and 2003 (2). In mountainous terrain in Utah, aerially sprayed insecticides were shown to move off site by several kilometers, with significant impacts to non-target lepidopterans (3). In another mountain valley study in Utah's Wasatch Mountains (4), actual spray trials were compared to modeling results for purposes of model calibration, and down-valley distances of pesticide deposition were measured at distances over 5,000 meters (over 3 miles) from origin. The dangers of pesticide drift are real and documented across all types of terrain. *We do not want to be exposed to pesticide drift in our mountains and valleys.*

In addition to concerns about drift, we have significant concerns about volatilization by evaporation of pesticide residues. Volatilization from soil and surface water can cause loss of as much as 80-90% of certain compounds within a few days of application, and the ultimate fate of those volatilized particles can impact air, water, and organisms. As noted above, pesticide residues can be transported miles on dust particles, impacting non-target organisms at great distances from their application sites.

Under the vegetation management programs proposed by the BLM, the area of public lands that will be treated with herbicides in the 17 Western States could cover over 932,000 acres. Proposed methods of herbicide application across the BLM land programs include aerial-, ground-, or boat-based applications. Proposed application vehicles include airplane, helicopter, all-terrain vehicle, boat, horse or humans. Application methods include aerial deposition, boom/broadcast, and spot applications. While all of these components of application are of

concern to WSERC, we are especially concerned with the potentials for spray drift from aerial and boom/broadcast applications, with the volatilization of pesticides in the days following applications, with the potential transport of chemicals on particulate matter, and with exposure of workers and citizens to the chemicals during and following applications.

The ENSR Exposure Assessment that is part of the PER identifies the components of an exposure pathway that results in human exposures at points of contact, following release of chemicals to the environment and transport via an environmental medium (e.g. air, water, soil). While the focus is on human "receptors", there exist in our county both plant and other animal "receptors" that are also at risk of exposures due to chemical applications. Pesticides have been shown to be harmful to a multitude of animals, including fish, turtles, amphibians, birds, butterflies and moths, mammals, reptiles, and beneficial insects. Animals can be exposed by eating other contaminated plants, insects or animals, by inhalation, absorption through skin, or drinking or bathing in contaminated water.

Similarly, humans are exposed to toxics via inhalation, ingestion, and dermal contact. The ENSR identifies and categorizes public receptors with potential for exposures as: Hiker/Hunters, Berry Pickers, Anglers, child and Adult Swimmers, Child and Adult Nearby Residents, and Child and Adult Native Americans. Since children are especially susceptible to the toxic effects of chemicals, it is appropriate that they be considered separately for analysis purposes, along with other at-risk populations including the elderly, pregnant and nursing mothers, the chronically ill, the chemically sensitive, and the immunocompromised. However, any human is at risk to the effects of pesticides, and the most risk-averse approach to preventing exposures would be to avoid any and all use of the herbicides listed in the proposal.

To take a broader perspective, we then see potential "receptors" of pesticide exposures as: our food sources, our local farms (we have an active Valley Organic Growers Association), our water sources for agriculture, our wildlife, non-target plant species, our domestic water supplies, our homes, public spaces and schoolyards. The Hiker/Hunter receptor category includes the many hunters who use our public lands, as well as birders, tourists, families, photographers, and other recreationists who come to our public lands to enjoy a more intimate experience with nature. Safe air, water and soil are expected to be a part of that experience.

Table 1 below lists selected herbicides proposed for use in the Vegetation Treatment DEIS, and contains a summary of some of the undesirable effects on human and animal health due to exposure to those pesticides. While our purpose here is not to provide a comprehensive literature review of all the proposed chemicals and their effects, this information is presented as representative of our concerns regarding these chemicals.

For example, the growing of grapes, including organic grapes for wine, is a growing agricultural pursuit in our area. Damage to grape vineyards and other crops by 2,4-D has been reported since the herbicide was first introduced in 1947 (23). We are especially concerned about the proposed use of sulfometuron methyl, one of a group of sulfonylurea (SU) compounds that are excessively persistent in the environment and cannot be detected at low levels in environmental samples (28), presenting potential long-term dangers to any human, animal or plant receptors. Sulfometuron methyl sprayed by the BLM in Idaho in 2001 to control non-native grasses and

noxious weeds on public rangeland is alleged in a lawsuit to have damaged over 100,000 acres in 11 counties and resulted in hundreds of millions of dollars lost in farm revenue (29). Local tests and expert discussion leads us to question the proposed use of imazapic (trade name Plateau), since it can kill species that should be encouraged; as well as of tebuthiuron (Spike), since it has led to substantial cheatgrass expansion in certain trials (30).

Also indicated in Table 1 are the herbicides that are reported in the most recent "US Forest Service Regional Report of Pesticide Use on National Forest System Lands" (5) as having been used on our local Grand Mesa-Uncompahgre-Gunnison National Forest (GMUG under Notes). An indication that five of the pesticides in Table 1 are on the Pesticide Action Network's list of "Bad Actor" pesticides (6) is also included in the Table (PAN-BA under Notes). The "Bad Actor" list was created to identify "most toxic" pesticides. A chemical found on the list is at least one of the following: a carcinogen, a reproductive or developmental toxicant, a cholinesterase inhibitor, a groundwater contaminant, or a pesticide with high acute toxicity (7).

TABLE 1. Health Effects of DEIS Herbicides

Herbicide	Health Effects	References	Notes/Mobility
2,4-D	**Nervous system effects:** myotonia, behavioral changes, delays brain development in lab animals; associated with ADHD and autism in farm children; increased risk of ALS (Lou Gehrig's disease) found; interferes with myelination in brain as result of lactational exposure **Circulatory system effects:** reduces blood's oxygen carrying ability and clotting ability **Genetic damage:** increased abnormal chromosomes, and breaks in human DNA; genetic damage in barley, wheat, rice and onions **Reproductive effects:** increased birth defects in children of farmer-applicators, lowered sperm quality in farmers; increased cell death in the earliest stages of embryonic development in mice at concentrations found in the environment **Cancer risks:** increased risks of non-Hodgkin's lymphoma in farmers, workers, applicators, gardeners, dogs exposed to lawns **Hormonal effects:** disruptive to blood concentrations of thyroxine and estradiol; suppresses thyroid, estrogen, testosterone, progesterone and prolactin	7,8,5,9,10, 11, 22, 23, 40, 41, 42, 43	GMUG[†]; exposures occur due to air drift, migration of contaminated soil, residential track-in, take-home exposures from agricultural uses.

	Familial effects: use by farmers increases exposure in their children **Ecological effects:** reduces successful hatching of bird eggs; toxic to fish, earthworms and beneficial insects; damage to grape vineyards and other crops *Contaminants and inert ingredients include carcinogens, reproductive and immune toxins.*		
Bromacil	**Cancer risk:** classified as possible human carcinogen by EPA	6,12,13	PAN-BA[††]; mobility from target areas shown to affect or destroy xerophytic native species
Chlorsulfuron	**Environmental effects:** may cause severe reduction in the yields of some nontarget crops if they are subjected to exposure at critical stages of development.	5,6,14, 23, 27	GMUG; PAN-BA; persistent in soil--measured in unaltered condition after 2 years
Dicamba (Banvel)	**Nervous system effects:** inhibition of enzyme acetylcholinesterase in humans **Circulatory system effects:** genetic damage to human blood cells **Cancer risks:** increases frequency of non-Hodgkin's lymphoma **Ecological effects:** toxic to fish and other aquatic organisms, toxicity varies widely by species **Reproductive effects:** increased cell death in the earliest stages of embryonic development in mice at concentrations found in the environment *Contaminants and inert ingredients include carcinogens and a dioxin shown to cause birth defects in laboratory animals*	5,6,15, 22	GMUG; PAN-BA; volatilizes easily, known to drift several miles; mobile in soil and water
Diflufenzopyr	**Ecological effects:** demonstrated synergistic effects in the field occur when used in combination with dicamba	38, 47	Metabolite (M9) persistent in water and soil
Diquat	**Reproductive effects:** increased cell	16, 22, 25,	Mobility in soil

	death in the earliest stages of embryonic development in mice at concentrations found in the environment**;** concentrations used to treat weeds in ditches could adversely affect survival and development of mallard embryos, potentially other avian species nesting in such habitats; reduces growth in neuroblastoma cells in culture **Neurological effects:** researchers in Italy observed acute and persistent Parkinsonism after use of diquat, which is also used in commercial fish agriculture.	33, 35	leads to high potential for leaching in groundwater and runoff into surface water; considered hazardous for combination of long persistence in soil, high water solubility, and low vapor pressure
Diuron (Karmex, Direx)	**Circulatory system effects:** exposure causes formation of methemoglobin, an abnormal form of hemoglobin **Genetic damage:** found in laboratory animals in developing embryos and bone marrow cells **Cancer risks:** classified by EPA as "known/likely" carcinogen **Ecological effects:** reduces photosynthesis by aquatic plants at 0.1 ppb	6,17	PAN-BA; widespread water contaminant in US rivers and streams
Fluridone	**Ecological effects:** Losses of floating-leaved aquatic nontarget plants occur during large-scale pond applications	26	
Hexazinone	**Reproductive effects:** detrimental effects in animal studies including chromosomal aberrations **Ecological effects:** half life of up to 19 weeks poses hazard to livestock and wildlife grazers; can be persistent up to six months	12, 24, 25, 31, 46	Mobility from target areas shown to affect or destroy xerophytic native species; mobility in soil leads to high potential for leaching in groundwater and runoff into surface water; half life in plants up to 19 weeks
Imazapic	**Reproductive effects:** Found to reduce	18, 32	"High"

(Plateau)	the ability of birds and other aquatic animals to reproduce **Ecological effects:** Toxic at low concentrations to aquatic plants, non-target plants susceptible at doses less than 1% of recommended application rate; ongoing development of genetically modified tolerance to this and other imidazoline herbicides raises issues of gene flow to weeds and creation of herbicide-resistant weeds. *Contains crystalline silica as an inert ingredient, associated with a variety of health hazards and classified as a carcinogen.*		potential to be leached by water below plant root zones; potential for runoff high for several months following application
Picloram	**Reproductive effects:** Embryo loss in laboratory rabbits, testicular atrophy in male rats **Ecological effects:** Toxic to juvenile fish at less than 1 ppm; extremely phytotoxic causing hazards to nontarget plants due to drift and runoff *Hexachlorobenzene (HCB) contaminates picloram during manufacture; HCB is a probable human carcinogen.*	5,6,19	GMUG; PAN-BA; persistent and highly mobile in soil
Sulfometuron Methyl (Oust)	**Reproductive effects:** Caused testicular lesions and atrophy and increased the incidence of fetal loss in laboratory tests; minute amounts disrupt plant reproduction in peas, canola, and soybeans **Environmental effects:** difficult to assess in some situations since many sulfonylureas have biological effects below levels that can be detected by standard analytical methods	20, 23	Persistent in soil for a year in quantities to kill desirable vegetation; Crop damage totaling millions of dollars due to drift
Tebuthiuron (Spike)	**Ecological effects:** Use to control sagebrush can decrease sage-grouse habitat and nesting and foraging activities; phytotoxic to algae; represents risk to native freshwater plant species of phytoplankton and floating macrophytes	36, 25, 37	
Triclopyr	**Cancer risks:** Increase in breast cancer in laboratory tests **Neurological effects:** Major metabolite	5,21	GMUG

	shown to be disruptive to nervous system development in laboratory animals **Ecological effects:** Highly toxic to fish; inhibits the growth of mycorrhizal fungi; interferes with nitrogen fixation; decreases survival of nestlings in birds		
† GMUG -- reported use on GMUG National Forest (See Reference 4) †† PAN-BA -- listed on the Pesticide Action Network's "Bad Actor's" list			

Herbicides and Our Towns

While our organization is concerned with detrimental effects of herbicide exposures on all organisms and ecosystems, we are especially concerned with the potential for exposures to citizens of our towns were herbicides to be applied on BLM lands adjacent or nearby towns. Using Geographic Information Systems (GIS) analysis, we created one- and three-mile buffers around the Delta County towns of Paonia, Hotchkiss, Cedaredge, Delta, Orchard City, and Crawford. Then we intersected those buffer zones with a map layer of BLM lands in the County.

There are over 12,000 acres of BLM lands found within the 1-mile buffer zone outside our towns, and nearly 50,000 acres of BLM lands found within a 3-mile buffer zone outside our town boundaries. Thus, any herbicide application on those lands has a real potential to impact plants, animals and humans within our town boundaries. While there are higher densities of residences within town boundaries, there are also many citizens of the county who don't live within town boundaries, who could be impacted where they live in rural areas due to off-site impacts of herbicide applications. As noted above, we are also at risk from applications of chemicals on other public lands in our county.

Cumulative and Synergistic Effects

As mentioned above, over 50% of Delta County lands are public lands. The portion of public lands that are managed by the US Forest Service is also subject to herbicide applications, as are agricultural areas on private lands. Thus, management actions by the BLM should be analyzed in a broader context that includes and considers other possible herbicide applications that could contribute to cumulative effects on receptor organisms in an area.

We are also concerned that the synergistic effects of combining herbicides is very poorly understood and not well-addressed in the analyses presented in the DEIS and PER. The EPA does not require pesticides to be studied for synergistic effects for registration of these chemicals, however they are known to occur. Often these effects are exploited in the development of herbicide products for field application (see study on the synergistic effects of diflufenzopyr with dicamba, 47). With the multitude of chemicals being used in environmental settings, the potential for unknown toxic effects on organisms resulting from synergistic mixtures of chemicals is very real. Herbicides interact cumulatively and synergistically in aquatic and terrestrial environments, and such effects are likely responsible for the decline is species abundance, as evidenced by studies on the decline of frogs and toads over the past twenty years (44, 45). By reducing vastly the amounts of herbicides used on BLM lands, risks will be lowered

for all organisms. The web of life is vast--for example, pond contamination due to drift and runoff can impact microorganisms, fish and larger aquatic life, and eventually the mammals that may ingest the fish. This is another ways of noting that impacts of herbicide applications do not occur in isolation, and can magnify up the food chain.

In addition, organisms and ecosystems in today's environments are subject to a number of stressors, including the impacts of climate change, increased population pressures, threats to habitat due to fragmentation and loss of connectivity. Herbicides are only one of the potentially detrimental stressors that can cause impacts. As environmental stewards, we are committed to working to protect all organisms and ecosystems. For this reason, and supported by the comments above, we are against the use of herbicides on BLM lands, and take the position that alternative methods of vegetation control be used in all instances.

While birds are only one of the classes of nontarget species affected by herbicide applications, a quote from Carolyn Cox (editor of the Journal of Pesticide Reform) on the effects of pesticides on birds is apropos of our position:

"Pesticides will continue to kill birds, reduce their food resources, and disrupt their normal behaviors as long as pesticides continue to be used. The only way to eliminate the effects that pesticides have on birds is to *use nonchemical resource management techniques* [emphasis added]. On farms, in forests, on lawns, and elsewhere that pesticides are used, managers are finding that these techniques work well and make economic sense. Our job is to see that they are implemented more widely.

This is not a simple task, but one that is essential if we are to seriously heed the message of our miners' canaries (39)."

Summary of WSERC's Comments

1. No herbicide applications using aerial deposition methods (from an airplane or helicopter) or large-area applications (greater than five contiguous acres) using boom/broadcast methods should be allowed at any time.

2. In those instances where Alternative C is not feasible and all other non-chemical options have been explored, we allow that spot applications of herbicides delivered by boat, horse or human application vehicles may permitted.

3. We request that the outcomes of such spot applications be monitored and analyzed for at least three years to assess the impacts on diversity of native species, attainment of ecologically effective densities by interactive species, and resilience of sensitive species and any impacted organisms.

4. We request that there be written into the DEIS an explicit incorporation of an emphasis on diversity of native species, attainment of ecologically effective densities by interactive species, and resilience of sensitive species and any

impacted organisms as an overall management goal in managing vegetation for fire suppression or invasive species control.

We thank you for your consideration of our comments. Please feel free to contact us using the contact information below to discuss our comments.

Sincerely,

Andrea Robinsong

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_____

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