Sierra Forest Legacy
Protecting Sierra Nevada Forests and Communities

June 27, 2014

Lawrence Crabtree, Forest Supervisor
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Sent via email to: lcrabtree@fs.fed.us

Re: Power Fire NOI to prepare an Environmental Impact Statement: Scoping Comments

Fifty years for natural reestablishment of forest cover is not a particularly long period. –Dr. Jerry Franklin, Professor of Ecosystem Analysis, College of Forest Resources, University of Washington.

Dear Mr. Crabtree:

The Power Fire event of October 2004 burned approximately 17,005 acres on the Eldorado National Forest and on private timberlands. The fire perimeter included pre-existing plantations on Forest Service lands and was (and is) surrounded by homogenous industrial plantations that are highly fire prone and lack important elements of *ecological integrity*. Portions of the fire burned old forest emphasis areas, containing protected activity centers for owls and goshawks, and spotted owl home range core areas. Subsequently, the FS salvage logged 60% of the area, then re-planted the pre-existing plantations that burned; the salvage logged areas were also planted, adding to the number of plantation acres existing in the area. A total of 2,500 acres of new + pre-existing plantations were planted.

According to the scoping letter, the primary objective for the project is to "move the project area from its existing condition, which is primarily early-seral conditions, toward the desired future conditions" [for the land allocation in the forest plan].

The scoping letter states "currently 20% of the planted areas have failed," and proposes to replant conifers on 500 acres of the 2,500 acres that was already planted after the fire. The FS also proposes mechanical methods to clear an additional 1,080 acres (mastication, tractor piling and burning). Herbicide applications would occur on approximately 450 acres of that prior to planting of 1,080 acres. Herbicide spraying would occur on approximately 3,025 acres to accomplish "release." This will be followed up in subsequent years with additional amounts of spraying based on monitoring the response of the first spraying.

Three planting arrangements are proposed for this project:

- Planting Arrangement A would plant seedlings in clusters to permit heterogeneity and allow for the needs of species associated with early forest conditions. This would occur on 1,400 acres.
- Planting Arrangement B would attempt to "accelerate" the development of dense, old forest conditions "in a relatively rapid timeframe." This would occur on 125 acres.
- Planting Arrangement C would "accelerate" the development of more open forest to provide for wildlife associated with early forest habitats. This would occur on 60 acres.

General Comments:

The May 19, 2014 cover letter for the Proposed Action asked that we identify issues (areas of dispute, debate or disagreement) regarding potential effects of the Proposed Action. We have several issues and we also include information the Forest Service may not be aware of or has not chosen to highlight in the Power Fire proposal. Finally, we have included and request consideration of a reasonable alternative to your proposal, as required by NEPA 40 CFR 1501.14.

Overall, we will demonstrate that there is no scientific support for the idea that increasing planting in this area will improve heterogeneity, or that it will improve the needs of species associated with early forest conditions; there is also no evidence that the proposal will accelerate development of old growth forest, improve ecological integrity, or promote fire resiliency. We believe this proposal will promote the opposite which history has already proven to be the case on October 6, 2004.

The best available science actually supports the opposite view: plantations increase fire hazards, plantations decrease forest biodiversity and reduce adaptive resiliency for wildlife. Further implementation of plantation management activities is counter to supporting ecological integrity and will likely reduce the ability of the forest to respond to climate change with resiliency as evidenced by the fire severity in Rim Fire plantations south of the Power Fire landscape.

The proposal is currently not in alignment with the new 2012 Planning Rule's ecological integrity requirements, the draft Planning Directives, or the Regional Forester's Ecological Restoration-Leadership Intent for Ecological Restoration. National policy goals for ecological integrity, restoration, and commitments to use the best available science are not supported by this proposal. Activities proposed for the area must be consistent with the current state of the science regarding the adverse impacts of plantation forests on post-fire early successional forest ecosystems. These complex early seral conditions should not be seen as a "troublesome stage" where all tools should be employed to "rapidly accelerate" past early seral forest evolution to get to somewhere else in forest development. Complex early seral conditions should be valued as a valuable stage of biodiversity and forest evolution, critical to supporting ecological integrity and critical to affirming Forest Service ecological integrity guidance.

Finally, because the Eldorado National Forest has received $30 million dollars to support restoration of the 17,000 acre Power Fire burned landscape, we request a broader vision for this proposal that includes development of a robust, social-economic component based upon Community-based Restoration and the creation of a local restoration cadre to support the short and longer term restoration needs of the area. A portion of the $30 million could be committed in contracts to a variety of local and regional restoration organizations and programs that are explicitly identified as part of the proposal (see below).

This Community-based Restoration and Education demonstration proposal has been discussed with the Regional Office and various restoration and natural resource focused organizations described below. For example, rather than accepting the simple math associated with the costs of herbicide control of someone's idea of undesirable native vegetation, we propose and request consideration and evaluation of the short and long term commitment to the local and regional communities (improvement of people's lives, skills, job security, etc.) that would flow from a true social commitment to an education and ecological restoration workforce embedded in the Power Fire proposal.

Projects should be identified for each resource area (wildlife habitat enhancement all species), streams and riparian areas restoration, increasing fire use as the primary disturbance, road repair eliminating connectivity between roads and stream systems, native plant enhancement, protecting archaeological sites, promote cultural burning for Native American uses, culturing existing trees, documenting habitat use, providing refugia for displaced aquatic and terrestrial wildlife, building and using a bio-climatic map to project climate driven vegetation shifts in vegetation and use of that map to manage for the future restoration work.

Specific Comments:

1. **The Power Fire Proposal is not supported by current Regional or National forest policy.**

The 2012 Forest Planning Rule explicitly spells out the definition for ecological integrity: "The quality or condition of an ecosystem when its dominant ecological characteristics (for example, composition, structure, function, connectivity and species composition and diversity) occur within the natural range of variation and can withstand and recover from most perturbations imposed by natural environmental dynamics or human influence" (36 CFR § 219.19).

While the Power Fire Proposal purports to restore the burned landscape, it is actually attempting to accelerate past the current rare ecological condition rather than valuing its ecological integrity. The large area surrounding the Power Fire is comprised of industrial forest plantations which are traditionally, fire prone, overstocked and lacking natural complex early seral conditions found in naturally evolving stands.

Google Earth Photo Captured on July 26, 2014

This photo calls out for a different approach that avoids the intensive forestry of the surrounding landscape.

The current Draft Forest Planning Directives also strongly support managing for all stages of ecological integrity in forest systems:

23.11c - **Ecosystem Integrity** (from Draft Directives)
219.8 Sustainability (a) Ecological sustainability. (1) **Ecosystem Integrity**. The plan must include plan components, including standards or guidelines, to maintain or restore the ecological integrity of terrestrial and aquatic ecosystems and watersheds in the plan area, including plan components to maintain or restore structure, function, composition, and connectivity, taking into account:
(i) Interdependence of terrestrial and aquatic ecosystems in the plan area.

(ii) Contributions of the plan area to ecological conditions within the
broader landscape influenced by the plan area.
(iii) Conditions in the broader landscape that may influence the sustainability of resources and ecosystems within the plan area.
(iv) System drivers, including dominant ecological processes, disturbance regimes, and stressors, such as natural succession, wildland fire, invasive species, and climate change; and the ability of terrestrial and aquatic ecosystems on the plan area to adapt to change.
(v) Wildland fire and opportunities to restore fire adapted ecosystems.
(vi) Opportunities for landscape scale restoration.
(emphasis added)

Finally, the Region 5--Ecological Restoration Leadership Intent (2011) p.3 states:

"Ensure that vegetation and fire management efforts are grounded in concern for biodiversity and ecological processes both before and after disturbances like fire."

This statement clearly suggests the Power Fire proposal should highlight (document) the biodiversity in the early seral landscape and support ecological process (like returning fire) to build resilience in this evolving landscape. The early seral conditions on the Power Fire landscape are not conditions to rapidly escape, but conditions to support and foster.

2. **The effects of the proposal on complex early seral forest habitat is not justified or sustainable.**

Natural succession is an ecological process that often begins with fire, and proceeds through multiple stages of forest development, in various degrees throughout the forest depending upon fire severity and pre-existing forest composition (Franklin et al 2002). Disruption of this natural process through salvage logging and planting interrupts the natural successional process, and results in reduced biodiversity (Lindenmayer and Franklin 2008). Salvage logging on 60% of the fire in 2005, and subsequent planting on XXX acres, has already disrupted natural ecological processes, biodiversity, and as a result, the overall ecological integrity of the area and its ability to be resilient to climate change and other perturbations has already been compromised. There is no scientific justification made in the proposal for further planting within areas that are currently undergoing regeneration under natural evolutionary processes: the rarest type of forest now (see discussion, below). The cumulative effect that such actions would produce must be addressed in the EIS:

> "Habitats and environmental resources appear to be relatively limited in a fully stocked young forest (Spies and Franklin, this volume). As a result, species diversity, as well as structural and functional diversity, is probably lowest in this stage of forest development" (Franklin and Spies 1991)

In order to preserve natural ecological processes and biodiversity, leading scientists today emphasize the importance of naturally evolving early successional forests, noting that they are now **the rarest type of forest today:**

"Alpha (species) diversity of both plants and animals is often highest early in succession before tree-canopy closure occurs, lowest in the heavily shaded young forest, and recovers to intermediate as the forest matures and evolves into old growth" (Franklin and Spies 1991).

"Young forests growing within a matrix of unsalvaged snags and logs may be the most depleted forest habitat type in regional landscapes, particularly at low elevations (Lindenmayer and Franklin 2002)" (in Brown, Agee, and Franklin 2004).

"Currently, early-successional forests (naturally disturbed areas with a full array of legacies, i.e. not subject to post-fire logging) and forests experiencing natural regeneration (i.e. not seeded or planted), are among the most scarce habitat conditions in many regions" (Noss et al 2006).

"While scientific and management focus has been on the structural complexity of large-stature forests and the habitat relationships of associated organisms, an emerging body of literature shows that a similar or even greater number of species such as songbirds and butterflies are closely associated with the structural and compositional features of small-stature pre-forest vegetation (Betts et al. 2010)" (in Donato, Campbell, and Franklin 2012).

Swanson et al (2014) confirmed the importance of early successional forest for rare species in Oregon forests:

> "... widespread management practices have emphasized dense, homogeneous conifer establishment and rapid canopy closure in young stands (e.g., Oregon Forest Practices Rules, 2013), effectively truncating or skipping the early seral pre-forest stage. This approach is highly proven in terms of efficient fiber production, but has greatly reduced the abundance of the early-seral pre-forest stage relative to pre-settlement ranges."
>
> "Our research, while exploratory in nature, suggests that complex early-seral communities have importance on par with complex late-seral forests in providing habitat for conservation- listed species."
>
> "Traditional intensive forest management encouraging prompt reforestation and few legacies is unlikely to approximate the role of naturally generated early-seral conditions" (Swanson et al in press 2014).

Here in California, in comments for the draft 2001 Sierra Nevada Forest Framework, senior CDFG biologists Eric Loft and Dave Smith submitted data demonstrating the high value of early seral forests where primary productivity is high. Key points from the paper include:

> "Fire suppression and timber management over many decades has resulted in an increase in dense, younger tree canopies with a corresponding loss of understory

vegetation, largely a consequence of the reduction in sunlight and increased competition for soil moisture and nutrients."

"Alaback (1982) reported a vigorous understory following disturbance that gave way to a 'depauperate, unproductive understory' after 25-35 years. The understory did not reestablish for 150-200 years post-disturbance. Deer ecologists have lamented this vegetative trend in forests for a long time" (Loft and Smith 1999).

The silviculture model for the Sierra Nevada proposed in the recent Sierra GTR 220 (North et al 2009), and GTR 237 (North, ed. 2012) provide ample documentation of the need to increase heterogeneity, patchiness and a fire adapted landscape of diverse species and structures in the Sierra Nevada. The Power Fire area is an opportunity to implement the GTRs' prescriptions.

Swanson et al (2011) recommend avoiding the activities in the Power Fire proposal:

"Natural disturbance events will provide major opportunities for these ecosystems, and managers can build on those opportunities by avoiding actions that (1) eliminate biological legacies, (2) shorten the duration of the ESFEs, and (3) interfere with stand-development processes. Such activities include intensive post-disturbance logging, aggressive reforestation, and elimination of native plants with herbicides" (Swanson et al 2011).

Franklin and Johnson (2012) summarize the situation:

"Areas devoted to intensive timber production generally provide little high-quality early seral habitat for several reasons. First, few or no structures from the preharvest stand (e.g., live trees, snags, and logs) are retained on intensively managed sites but are abundant after severe natural disturbances (Swanson et al. 2011). Additionally, intensive site preparation and reforestation efforts limit both the diversity and the duration of early seral organisms, which may also be actively eliminated by use of herbicides or other treatments (Swanson et al. 2011). Consequently, many MF [moist forest] landscapes currently lack sufficient representation of high-quality early seral ecosystems because of harvest, reforestation, and fire suppression policies on both private and public lands (Spies et al. 2007, Swanson et al. 2011)" (in Franklin and Johnson 2012).

Finally, the proposal has not made a case for additional planting. A 20% "failure" of the planted areas need not be viewed as a failure, but rather, a net benefit for biodiversity and ecological process. For example, a review of planted forests and biodiversity concluded:

"The need to pay more attention to biodiversity issues in plantation design and management is supported by observational, experimental, and theoretical studies that indicate that biodiversity can improve ecosystem functioning, i.e., it is not just the importance of biodiversity per se but its role in improving the overall resilience of the new ecosystem" (Carnus 2006).

In comments submitted to the FS for the forest plan revisions, DellaSala et al (2013) describe the importance of "complex early seral forests" (CESF). These are forests that have not been salvage logged and planted after fire, and retain the species and structure (including snags and dead and down wood) of naturally evolving forest communities. Land managers should "reduce the successional debt across forest seral stages," and "retain biological legacies following fires such that the ensuing early seral stage remains complex" so that important functions can carry through progressive seral stages (the "lifeboat" function) (DellaSala et al 2013).

In GTR 237, North and Manley (2012) describe a model for managing forests for the benefit of wildlife communities in situations where our knowledge is still imperfect:

> "A cautious approach is to increase habitat that is currently rare, or underrepresented compared to active-fire forest conditions, avoid creating forest conditions that do not have a historical analog, and emulate the spatial heterogeneity of forest conditions that would have been created by topography's influence on fire frequency and intensity" (North and Manley in North 2012).

In sum, post-fire activities that include mastication, seeding, replanting, and herbicides will not improve ecosystem integrity or resiliency in the Power Fire region, and may do more harm than good. The Forest Service needs to incorporate the current scientific findings that are relevant to how forest ecosystems recover from natural disturbances. Restoring non-conifer key components and processes of these ecosystems is essential for full recovery of the habitats and food web dynamics across trophic levels, and restoration of the characteristic fire regime.

3. Fire and Fuels

There is no evidence that the proposed action will result in forests that are more resistant to fire or more resilient to fire effects. Based on climate change impacts on vegetation, the goal of returning the early age forests in the Power Fire landscape to an old growth forest fire resistant structure is speculative and too far in the future to justify actions that have undesirable effects on the biodiversity and ecology of complex early seral forests. Certainly, increasing tree density cannot serve this goal, since it will increase the likelihood of high tree mortality in future fires. We have learned this lesson several times over the 60+ year fire history on the Rim Fire landscape just to the south. "Attempting to return landscapes to a given historical state is unlikely to create either resilience under current and future conditions or socially desirable outcomes" (Franklin and Johnson 2012).

Second, the Power Fire proposal (Purpose and Need, p. 5) miss-states the fire regime as simply burning "on a frequent basis (every 11-26 years) and [fires] were of low severity." Based on the recent (2013) NRV work from Hugh Safford the picture suggests something different: "Under presettlement conditions, yellow pine and mixed conifer forests in the Sierra Nevada supported fire regimes characterized by frequent, low to moderate (or "mixed") severity fires (Agee 1993, Arno 2000, Skinner and Taylor 2006, van Wagtendonk and Fites-Kaufman 2006, Barbour et al. 1993,2007). These characteristics placed presettlement YPMC forests in Fire Regime I (fire return intervals 0-35 years, low to moderate severity), using the Schmidt et al. (2002) classification, which has become somewhat of a national standard."

Future fire predictions for the Power Fire landscape are likely to significantly increase fire effects and size. Information from Safford's 2013 NRV work suggests landscapes such as the Power Fire are at even higher risk due to increased effects at higher elevations. Safford (2013) states that, in "Westerling et al. (2011) modeled burned area across California under a range of future climate and development scenarios. They found that, under the most realistic future climate and emissions scenarios and compared to the average of the period 1960-1990, area burned by wildfire increased by over 100% by 2085 for most of the forested area of northern California. Middle and higher elevations forests in the assessment area were among the most severely impacted, with some future climate scenarios producing increases in burned area of more than 300%."

Recent studies have produced robust information that should inform proposals to reduce fuels in plantations. In a study of the effects of fuel reduction in plantations that burned in the 2008 American Complex Fire on the Tahoe NF, FS ecologist Hugh Safford reported:

> Of three masticated plantations visited, one resisted fire on a day of moderate fire behavior, two were burned through with loss of the plantation on the day of severe fire weather. A fuel treatment which incorporated mastication also burned. Plantations with medium to high cover of live shrubs mostly survived fire (Safford 2008). (Emphasis added)

In the Sierra Nevada, Stephens et al (2005) modeled fire behavior in both thinned and un-thinned plantations and found overall tree mortality above 80% regardless of the modeled fire conditions, and 100% mortality in 5-year old plantations. Mastication resulted in higher tree mortality due to the increased fuel load. Mastication was also identified with spreading disease in managed stands. Prescribed burning of masticated plantations, however, was found effective in reducing potential fire behavior at moderate to extreme weather conditions. This suggests opportunities for improved ecology-based prescriptions utilizing cluster planting and prescribed fire to reduce competition.

In another recent study, modeling and experimental fuels reduction using mastication and prescribed fire were in agreement that in contrast to mastication alone, mastication plus prescribed fire, or fire only, was more effective in reducing fire effects and severity (Kobziar 2009).

In summary,

> "Humans create uncharacteristic fuel loadings both actively and passively. With wood production as a primary management objective, foresters have established dense, fully stocked forest stands on sites formerly occupied by open stands with fewer trees. In national forests on the western slopes of the Sierra Nevada, thousands of acres of open forests dominated by old-growth pine have been converted to dense single-age plantations during the past 50 years. In many areas

throughout western North America, uncharacteristic stand-replacement wildfires have been followed by reforestation programs that recreate the dense young forests, providing the potential for yet another stand-replacement fires" (Franklin and Agee 2003).

4. Climate Change

> *"We will increase our focus on restoration of our forest and grassland ecosystems; restoration to increase resilience to ensure these systems are able to adapt to changes in climate."*
> ~ Forest Service Chief Tom Tidwell

In the Sierra Nevada, resilience to climate change is best arrived at by allowing fire to regulate structure and succession (Hurteau and North 2010). In other words, "Naturally regenerated ESFEs [Early Successional Forest Ecosystems] are likely to be better adapted to the present-day climate and may be more adaptable to future climate change" (Swanson et al 2011).

The relationship between climate change and forests was explored in detail in a 2008 report from the Secretariat of the Convention on Biodiversity, where the Forest Service was a co-author. These are some of the key findings of the report that relate to the Power Fire:

> "The ecological stability, resistance, resilience, and adaptive capacities of forests depend strongly on their biodiversity. The diversity of genes, species, and ecosystems confers on forests the ability to withstand external pressures, and the capacity to 'bounce back' to their pre-disturbance state or adapt to changing conditions.
>
> "Forest biological diversity results from evolutionary processes over thousands and even millions of years which, in themselves, are driven by ecological forces such as climate, fire, competition and disturbance. Furthermore, the diversity of forest ecosystems (in both physical and biological features) results in high levels of adaptation, a feature of forest ecosystems which is an integral component of their biological diversity. Within specific forest ecosystems, the maintenance of ecological processes is dependent upon the maintenance of their biological diversity.
>
> "Plantations and modified natural forests will face greater disturbances and risks for large-scale losses due to climate change than primary forests, because of their generally reduced biodiversity."

Recommendations from the report:

- Maintain stand and landscape structural complexity, using natural forests and processes as models.
- Maintain biodiversity at all scales (stand, landscape, bioregional) and of all elements (genes, species, communities) by, for example, protecting tree populations which are isolated, disjunct, or at margins of their distributions,

> source habitats, and refuge networks. These populations are most likely to represent pre-adapted gene pools for responding to climate change and could form core populations as conditions change (excerpted from Thompson et al 2008).

5. GAO report on reforestation recommends natural regeneration

A March, 2005 report to Congress from the General Accounting Office found large data reporting inaccuracy prevalent in the way the FS determines reforestation needs. The report also found that:

> "In some places, regional culture that reflects a former management emphasis and budgetary situation influences current practices. For example, when reforesting an area, **officials in the Pacific Southwest region almost always rely on planting—a more expensive method than natural regeneration—because they have always done so** and, according to agency officials, this practice has been reinforced by the regional culture. When the agency-wide management emphasis was timber production, reforestation standards called for prompt reforestation and tightly spaced trees to maximize timber volume; so officials rarely relied on natural regeneration, which does not necessarily ensure rapid reforestation or result in tightly spaced trees. In addition, when timber revenues were higher and reforestation efforts centered on harvested areas, the region could always afford to plant. Now, as the agency's management emphasis has shifted to ecosystem and forest health, and as budgets have become increasingly strained, officials in the Pacific Southwest region said they are beginning to encourage greater reliance on natural regeneration, but it remains to be seen whether forests and districts will adjust their practices, accordingly."

The GAO made specific recommendations to the FS that were agreed upon by Chief Dale Bosworth in his response to the GAO report. These included a recommendation to establish criteria for prioritizing the use of reforestation funds:

> "The shift in management emphasis from timber production to ecosystem management, combined with constrained budgets and changing sources of reforestation needs, has changed the context in which the reforestation and timber stand improvement program operates. However, the Forest Service has not updated its goals and policies for the program to reflect this change. Until the agency does so, it will be difficult to establish criteria for prioritizing the use of reforestation and timber stand improvement funds. In the current budget environment, such criteria are crucial for identifying the best investments to minimize possible adverse effects so that the Forest Service can fulfill its stewardship responsibility and ensure the lasting health and productivity of our national forests" (GAO 2005).

Natural regeneration is generally prolific after fires in the Sierra Nevada, although it is hindered by salvage operations (Donato et al 2006). In a recent study of regeneration in the Fred's Fire, also on the Eldorado National Forest, areas that had not been planted showed “prolific” regeneration in the majority of plots, and even in those which burned with high severity occurred at seedling densities of 872 seedlings/acre in severity 4 and 224 seedlings/acre in severity 5 (Bohlman 2012). Seedlings were 97% conifers. The need for action on the Power Fire should be judged in conjunction with the results of the Bohlman (2012) assessment of the unplanted plots in this recent Fred’s fire on the Eldorado NF.

We can assume that sections of the Power Fire that were not salvage logged, and were not planted, can be identified as Complex Early Seral Forest ecosystems, as described in DellaSala et al 2013. These may be the rarest type of forest, besides true old growth ecosystem, and they must be preserved in order for natural succession to proceed; planting and herbicide spraying will irretrievably alter this process (Swanson et al 2011, Franklin and Johnson 2012). NFMA requires tree planting only when there is a need. Planting is not necessary unless there is a known, measurable shortage of natural regeneration in the area. This is not the case in the Power Fire.

In addition to facilitating the growth of new conifer seedlings, prescribed fire applied in previously planted areas can promote fresh growth on shrubs with high forage value for deer and other browsers, while reducing shrub density in areas where conifers are planted.

6. The use of herbicides to kill native understory species (shrubs, hardwoods) is not warranted and is not consistent with building ecological integrity in forest management.

The EIS must assess direct, indirect, and cumulative effects to sensitive species, management indicator species, and early successional forest ecosystems. The EIS must include analysis of the *ecological impacts* of destroying wildlife habitat. This is a long term impact for two reasons. First, habitat has been altered via salvage logging and planting, with its obvious impacts to structure and composition and the species which require complex early seral forest; and secondly, habitat is destroyed via herbicides used to kill the native vegetation community that supplies food and habitat for the entire food web in young forests. This effect will perpetuate impacts into future successional stages that will continue to lack key structure and components. The silvicultural models in use on the Eldorado NF to maximize growth of crop trees have resulted in a shortened interval between planting and canopy closure and thus reduced the time interval for establishment of early-successional plant species. Additionally, “increased competition control may result in reduced seed rain of early- successional species, thereby impacting potential plant community responses following subsequent disturbances” (Miller and Miller 2004).

Herbicides are applied in quantities and at repeated intervals that effectively eliminate the early successional phase of forest development. The timing of herbicide applications must be disclosed for analysis as well, since glyphosate is usually applied in the spring when vegetation is growing rapidly. At this time, birds, amphibians, mammals, and invertebrates are all actively reproducing and rearing young. Since this chemical in its various formulations has been implicated as an endocrine disruptor or hormone mimic (see references below), wildlife will be exposed to chemicals that can interfere with normal reproduction and development. The additional use of this chemical and others by industrial timber owners within the range of wildlife in the Power Fire area is a cumulative impact that cannot be mitigated, since wildlife cannot be restrained from moving through areas where the chemicals are applied.

A. Impacts to MIS and TES species

Under the ESA, NFMA, NEPA, and the forest plan, the Forest Service is required to analyze potential effects to threatened, endangered, and sensitive species as well as to management indicator species (MIS). The EIS must disclose the impacts of the proposal on habitat and populations.

The Forest Service Handbook defines the preferred alternative as "the alternative that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources" (FSH, Zero Code—05 –Definitions). The use of agricultural chemicals to kill native vegetation that has been identified as the rarest type of forest type today, e.g., the complex early successional forest ecosystem (Swanson et al 2011, 2014; DellaSala et al 2013) is not congruent with FSH, current regional and national policy, and the new planning rule.

For MIS, the MIS amendment for the Sierra Nevada forests requires an analysis of the status and impacts of the following species: Nashville warbler, warbling vireo, yellow warbler, fox sparrow, golden-mantled ground squirrel, hairy woodpecker, and black-backed woodpecker. A complete analysis of potential effects to these species should be based on species surveys, population data and trends, and viability analysis. Explicit monitoring and mitigation records and plans should be displayed.

If the proposed project may affect species listed under the Endangered Species Act (ESA), or species that are candidates for listing, the environmental impact statement for this project should include the results of consultation with the USFWS, the Regional Water Quality Control Board, and the EPA.

The effects of herbicides used in the context of forestry on amphibians at all stages of development must be evaluated. The U.S. Fish and Wildlife Service (FWS) examined the use of the herbicide Round-Up in its recovery plan for the threatened California red-legged frog. The surfactant in Round-up was determined to have "severe negative effects on amphibians (USFWS 2002). All herbicides are considered to have a negative impact on amphibians due to destruction of plant cover. The EIS should review the records for the foothill yellow-legged frog to determine if the project will impact this species. Both glyphosate and triclopyr are listed among the 25 "chemicals of greatest concern" for the survival of red-legged frogs, fish, and their habitats (FWS 2002). Wildlife effects analysis must also address the endocrine disrupting effects of the proposed herbicides and inert additives.

Analysis must include the full range of effects to individuals, populations, and to habitat that may result from herbicide use at this scale. Planning alternatives should be defined and evaluated in terms of both amount and quality of habitat, and of population trends of the TES and management indicator species, impacts on deer, and the cumulative impact of the project when considered in aggregate with the number of acres of native forest that have already been converted to plantations both on public and adjacent private industrial timber lands.

The EIS should also address effects to non-target species, including pollinators such as Western bumble bee, a Region 5 and ENF sensitive species, and other native solitary bees, moths, and butterflies. Herbicides affect these species directly through contact and also by destruction of the plants necessary for species' survival. Researchers have found that pollinators will not cross over fragmented habitats in search of nectar sources (Kearns et al 1998). A literature review of plant-pollinator interactions found that widespread use of herbicides were even more detrimental to pollinating insects than insecticides (ibid). Pesticides, including herbicides, have been identified as one of the main causes of bee extinctions nationally (Xerces Society), on a par with habitat loss.

Many butterflies and moths are dependent upon only one or a very limited number of plant species in their larval stage. *Asclepias* (milkweed) and *Apocynum* sp.(dogbane) are both important plants for a variety of insect species, including the monarch butterfly. Several native moths use *Ceanothus* exclusively as larval host plants. Impacts to Ceanothus moths should be disclosed and mitigated.

B. Impacts to sensitive plants

The Sierra Nevada Forest Plan Amendment directs the agency to minimize or eliminate direct and indirect impacts from management activities on threatened, endangered, proposed and sensitive plants ("TEPS") unless the activity is designed to maintain or improve plant populations (SNFPA Standards & Guidelines, Vol. 1, p. 366). This standard was affirmed on November 18, 2004 by the Chief of the Forest Service during his review of the SNFPA appeals decision made by the Regional Forester.[1] Since many TEPS plants are dependent upon fire for their long term viability, any actions that destroy potential TEPS habitat in the post-fire environment, or that will result in permanent elimination of post-fire habitat (such as reforestation), would not be in compliance with this direction. The post-fire habitat must be evaluated with the assumption that new TEPS plants not previously known to occur in the area have now made their appearance. Long dormant seeds could easily be triggered to germinate after the fire.

Fire suppression has contributed to widespread loss of species that cannot survive without fire, but they also cannot survive in uniform, densely planted tree plantations. Floristic surveys must be conducted--in other words, all species seen should be identified and reported in documentation of the survey. This is the only means to ensure that rare species will not be missed. Surveying should take place in the spring and summer. The ENF must design the proposal in order to *maintain or improve sensitive plant habitat and known populations for long-term viability as required by the forest plan.*

[1] Bosworth, D.N. Nov. 18, 2004 Sierra Nevada Forest Plan Amendment Appeal Decision. Washington, D.C.

C. The EIS must also analyze the effect on flammable, non-native grass expansion due to herbicide use.

Herbicides are known to increase the prevalence of flammable grasses (Rinella et al 2009; McGinnis et al 2010). This has been hypothesized to be due to the opening up of the area to more light, but is more likely due to the historical use of hexazinone, atrazine, triclopyr, and 2,4-D—all of which are herbicides that don't kill grasses. The proposal includes the use of the herbicides triclopyr and aminopyralid, both of which do not kill grasses. As a result, their use will artificially select for the maintenance and explosive increase of grass species, in all likelihood, these will be non-native invasive grasses, which already occur in the area. The result is a flammable configuration of small, densely growing plantation pines in a sea of grass, frequently which is non-native.

> "Herbicide-treated areas may be in danger of recurrent grass fires, especially in areas with frequent anthropogenic ignitions. This is because alien grasses and forbs are stimulated to grow when shrubs are killed; creating highly flammable fuel beds that may burn more frequently, though less intensely, than the native vegetation. Furthermore, reburning herbicide-treated areas increases grasses and forbs; therefore, subsequent fires may increase the probability of a reburn intense enough to kill young conifers. Also, herbicide-treated areas have more alien grass and forb species than areas with high shrub cover" (McGinnis et al 2010).

D. The agency should set aside the proposal to utilize chemical herbicides for conifer release. The science the agency is continuing to rely upon is now outdated, new science has been ignored, and the FS is not meeting its obligation to scientific integrity.

In order to meet the need for best available science, the EIS must disclose the potentially significant effects of the chemicals proposed for use as they are actually applied in the field, as mixtures with surfactants and other adjuvants. The effects must be analyzed in terms of endocrine disruption, reproductive toxicity, on human health and wildlife.

Since 1990, numerous researchers have documented that certain chemicals act as endocrine disruptors or hormone mimics. The hormonal effects of many common chemicals, even those with little or no hormonal activity, increased exponentially when combined with other chemicals. Some inert ingredients are known to be extremely active biologically and several are powerful endocrine disruptors (Porter et al 1999). Hormone mimicking chemicals are now known to be responsible for many reproductive disorders in the environment. Pulse doses of even low levels of pesticides at critical times when developmental windows are open can lead to permanent changes in the embryo or fetus (Ibid). The herbicide risk assessments utilized by the Forest Service, the SERA reports, and the 1989 Regional Vegetation Management EIS do not provide sufficient information on mixtures regarding potential effects of the chemicals proposed for use in the Power Fire area, including hormone mimicking chemicals, to allow the Forest Service to make an informed decision regarding possible effects, including direct and synergistic effects on reproduction. New information regarding these and other synergistic effects indicates that potential impacts on wildlife must be gathered and assessed. A new Vegetation Management region-wide EIS is really necessary to do the level of assessment that is necessary to bring the agency up to speed with the most current and relevant science.

- Analyze the environmental impacts of the chemicals as they are actually applied in the field, as a formulation or mixture
- Disclose the environmental impacts of the degradates and secondary metabolites of the chemicals
- Include data for endocrine disruption at environmentally relevant (dilute) exposures as a toxicological endpoint
- Analyze the ecological effects to ecosystems from use of herbicides to manipulate vegetation. Ecological references should be supported by citation and footnote. The analysis must not be limited to toxicological effects analysis.
- Document the monitoring protocols and criteria, and data proof that herbicides are necessary to achieve the desired goals for project area.

The following excerpts from some of the key literature demonstrate concerns regarding the chemicals proposed for use in the Power Fire plant communities.

Triclopyr

Triclopyr is similar chemically to 2,4-D, and photo-degrades to TCP within hours it is in water (Perry et al 2003). Nevertheless, it is listed by the state of California as a groundwater contaminant due to its frequent detection in well water (see CCR Title 3, Div. 6, Ch. 4, Subch. 1, Article 1. § 6800). The BEE form of triclopyr (Garlon 4) proposed for use can cause paralysis or death of ranid frog tadpoles. Berrill et al. (1993) tested the formulations of triclopyr to determine their impacts on frogs and concluded, "Ranid tadpoles are likely to be paralyzed or killed by residues of the ester formulation [BEE or Garlon 4] of triclopyr that could occur in small ponds as a result of forest management spraying programs. Paralysis is likely to render tadpoles more vulnerable to predation, and when it is associated with slower growth it could also reduce later reproductive fitness." Triclopyr products are among those under a court ordered restriction for use in listed salmonid habitat; however, that restrictive information is not found on the labels. Currently, triclopyr cannot be applied within 20 yards of salmonid bearing streams. Similar impacts can be expected to non-listed species. Clearly, simply following the label in not a sufficient precautionary measure.

According to the Calif. Department of Pesticide Regulation (CDPR 1997) 88 percent of triclopyr rapidly converts to a major secondary chemical, TCP. As reported in the federal EPA RED (registration decision document) for triclopyr, the principle degradate of triclopyr is TCP which is "relatively mobile and persistent and has the potential to contaminate ground water" (US EPA RED p. 98). EPA found the metabolite 3,5,6-trichloro-2-pyridinol (TCP) comprised a significant portion of the residue in meat, meat byproducts and fat, suggesting that the chemical may accumulate in animal flesh (ibid, p.18). Despite this, the EPA did not conclude any concern for TCP or its degradates. Baskaran et al (2002) found TCP was significantly more likely than triclopyr to leach into ground water. Given the longevity of both aminopyralid and clorpyralid in the environment, also proposed for use in the project, the likelihood of contamination of surface and groundwater may be significant.

Another widely used chemical insecticide, chlorpyrifos, also breaks down to TCP. Sparling et al. (2001) found 50 to 100% of the precipitation and water samples collected at Sequoia National Park and Lake Tahoe Basin had measurable concentrations of chlorpyrifos and other pesticides. Tadpoles exposed to water samples from these areas experienced "reduced activity, uncoordinated swimming, increased vulnerability to predators, depressed growth rates, and greater mortality" with depressed cholinesterase levels. According to Dr. Sparling, since chlorpyrifos--like triclopyr--has a relatively short life in tissues, it is likely that the metabolite TCP is the cause of the effect in tadpoles (pers. communication, Dr. Sparling). These effects are representative of neurotoxic effects. The cumulative impact on amphibians from pesticide drift from agriculture, TCP contamination from forestry applications of triclopyr, loss of food plants needed by tadpoles, and exposure to glyphosate products (see below) may be complex and potentially significant.

In a study of the effects of commonly used herbicide mixtures (products containing surfactants), researchers found significant endocrinologic differences from controls. Free testosterone levels were significantly elevated in post-season measurements and follicle-stimulating hormone (FSH) was significantly decreased at the height of the season and in the post-season as compared to controls (Garry et al 1999). In 2005, Xie et al (2005) tested common herbicides for their estrogenic activity on rainbow trout. They used environmentally relevant exposures of 4 common herbicides, including glyphosate, 2,4-D, triclopyr, and diquat dibromide. Triclopyr with surfactant caused the most significant increase in estrogenic activity, although all of the herbicides tested caused an increase in plasma vitellogenin, which is normally only found in female fish.

The EIS must include full disclosure regarding the surfactants and their effects when used with the herbicides proposed for use. In evaluating the risks from adjuvants and surfactants when applied with triclopyr and glyphosate in the upper San Francisco estuary, Siemering (2005) writes:

> "A loophole in the FIFRA registration process allows applicators to mix lightly regulated adjuvants with highly regulated aquatic-use-labeled herbicides after separate purchase of the materials. This process allows applicators to, in effect, recreate a form of the terrestrial-use herbicide, which would not have, had it been sold as the mixture, been approved for aquatic use."

Glyphosate

The key issue with glyphosate is that the environmental effects must be disclosed relevant to the products as they are actually applied in the field, **as mixtures**. There are numerous toxicological issues relative to glyphosate, as research scientists have now focused on studying how glyphosate products behave in real life usage, in other words, as mixtures with surfactants and other adjuvants. The EIS must be able to analyze the impacts of the herbicide products as they will actually be used.

In 2004 and 2005, research published from University of Pennsylvania documents the severe effects from glyphosate products containing the surfactant POEA (in Monsanto's Roundup) upon frog tadpoles at exposure concentrations considered "environmentally relevant"—in other words, at dilute concentrations easily encountered by the organism in the field where run off may occur (Relyea 2005a, b, c). Further, Relyea found that different species react differently to the same chemical exposures. For example, Roundup exposure at realistic concentrations killed all leopard and gray tree frog tadpoles and 98 percent of wood frog tadpoles, but did not significantly effect spring peeper and American toad tadpoles.

Glyphosate products were also implicated as endocrine disrupting chemicals (Richard et al. 2005) and found to interfere with transcription during cell mitosis (Marc et al. 2002, 2005). A summary of problems associated with Roundup—and not just glyphosate—were compiled by the New York State Consumer Fraud division of the Attorney General's office (Attorney General of New York 1996). Monsanto was fined $50,000 and found guilty of false advertising in New York in 1996. Monsanto was also fined in France, in 2007, for false advertising of the product Roundup.

Amphibians are particularly vulnerable to exposure to toxins because of their ability to absorb chemicals through their thin skin. Effects to amphibians must be analyzed in terms of acute and chronic toxicity as well as endocrine disruption, immunotoxicity, neurotoxicity, and reproductive toxicity. Sources of exposure must be analyzed relative to drift and run-off, puddles/ephemeral pools etc. and the surfactants used with glyphosate products must be disclosed and discussed in the analysis of environmental impacts.

Claims of the safety of Roundup's active ingredient, glyphosate, in aquatic environments is not supported by recent scientific studies. In one study, Perez et al (2007) concluded: "In contrast to the manufacturers' claims on the environmental safety of glyphosate, several studies have demonstrated that glyphosate alone or in combination with the additives used in commercial formulations may be damaging to aquatic biota."

Surfactants such as POEA in Roundup may be the principal toxic component in the formulated glyphosate products to aquatic organism (Tsui and Chu, 2003). In a review of toxicological data, Giesy et al. (2000) found POEA to be more toxic to fish than glyphosate. Recently, studies of human cell line responses to agriculturally relevant, diluted glyphosate based herbicides were found to "present DNA damages and CMR effects on human cells and *in vivo*. The direct G action is most probably amplified by vesicles formed by adjuvants or detergent-like substances that allow cell penetration, stability, and probably change its bioavailability and thus metabolism" (Gasnier et al 2009). The role of surfactants to allow G to permeate through animal cell membranes has been demonstrated in numerous scientific studies (see Benachour and Seralini 2009, also see summary in Gasnier et al 2009). Benachour and Seralini (2009) also used highly diluted, environmentally relevant dilutions to test the effects of glyphosate products on human cell lines, finding cell death and DNA fragmentation from all formulations tested, but the damage was worse in the formulations with surfactants added.

Aminopyralid and Clopyralid

These two chemicals are similar in their action, and both have been identified as potential groundwater contaminants due to their longevity in the environment, therefore they are lumped together here. Both been the object of numerous lawsuits due to their use on grass pastures, where the grass clippings are subsequently composted. In the case of clopyralid, even after one year of composting, the composted grass clippings continued to have herbicidal properties, resulting in high losses for growers. Aminopyralid sprayed on hay remained active in horse manure three years later (Houck and Burkhart 2001, Sullivan 2011).

These chemicals pass relatively unchanged through mammals after ingestion and break down slowly in organic matter. They are probably an inappropriate choice to limit the effects of invasive weeds where the goal is to promote native plant species. They will kill non-target native species, and potentially, could have long term effects in native areas.

In a 16 year long-term study of the effects of picloram to control invasive species in Montana, researchers found that "herbicide provided little benefit;" all exotic species recovered after 16 years to their former density, but several native plants became extinct from the plots; the native species did not disappear from control plots where no herbicides were used (Rinella et al 2009). Picloram has been used to control plants like yellow star thistle, much the same way that aminopyralid and clopyralid are now being used; and they are very long lived in the soil (Ibid). Picloram, triclopyr, and aminopyralid are related chemically in the same family of herbicides (picolinic acids). The labels for both of these products clearly state that at best they will only suppress the targeted plants, but even "small amounts" can drift causing harm to non target species. Rinella et al (2009) suggests that a cautionary approach is needed to doing long term irreparable harm to native species onsite, and this family of herbicides is likely to do more harm than good.

Like triclopyr, aminopyralid and clopyralid do not kill grasses (see labels). Their use in the Power Fire region is likely to exacerbate the profusion of non-native grasses which increase fire hazard (see Weatherspoon and Skinner 1995, Miller and Miller 2004, McGinnis et al 2010). Clopyralid was banned in California in 2002 due to its contamination at composting facilities state-wide and its potential as a ground water contaminant; restrictions are now in place that limit its use (see CCR Title 3 § 6576 and 6950). Aminopyralid is almost identical, but it appears to break down even more slowly than clopyralid in soil. Both chemicals are able to kill plants at extremely low doses. Both clopyralid and aminopyralid are likely to be groundwater contaminants given their longevity in the environment, but to date no action has been taken by any regulatory agency to address this issue either by the state or the federal government. SERA conducted an analysis of aminopyralid for the Forest Service in 2007, and at that time there was still no registration eligibility decision made by the federal EPA. As a result there is very little published information about the chemical. The same can be said for clopyralid. There is however, a great deal of information in the press, due to the losses suffered by consumers and growers due to the potency of these two herbicides.

Finally in regards to the USFS SERA analyses of impacts from forestry herbicides in general, and for these chemicals in particular, we caution that the GLEAMS model for predicting water contamination rates may not be sufficiently precise to qualify as relevant to the Power Fire area (SERA 2001). The model was created for agricultural lands that are basically flat. Run-off is likely to be significantly greater in the Power Fire area, and impacts from run-off to non-target plants and animals is likely to be underestimated using the GLEAMS model.

7. Analysis of impacts from the proposed action and the proposed Early Seral Ecological Integrity alternative on burned forest species, early seral associated wildlife species, sensitive species, native plants, aquatic-riparian plants and wildlife, fish and amphibians in and adjacent to the Power Fire restoration project.

- Using Manly and Tarbill (2012) and other key early successional forest literature assess the importance of keystone species, their abundance and diversity and enhancement opportunities.
- During the MIS analysis assess the abundance and diversity of early successional wildlife use of the existing vegetation components in the Power Fire area.
- During the normal Wildlife Biological Evaluation process, consider opportunities for introduction of the Western Bumble Bee (*Bombus occidentalis*) into this early seral forest landscape for the purpose of sensitive species enhancement.
- Request support from the Remote Sensing Lab, PSW and Regional Ecology staff to build a bio-climatic map of the Power Fire Landscape and surrounding lands. Use this map to inform decisions about maintaining refugia areas and managing lands expected to change vegetation types, fire regimes in the near term.
- Identify issues with fish passage, excessive sedimentation, large woody debris levels, streambank instability etc., and utilize woody material considered in excess to support stream and meadow restoration or to enhance wildlife habitat.
- Request ideas for fish, wildlife and native plant enhancement for Forest Service staff, stakeholders and community partners.

8. Community-based Restoration, Education and Training

We request that the Power Fire proposal broaden its scope to include more direct integration with conservation-restoration training organizations and highlight in the Power Fire Proposed Action and EIS (socio-economic chapter) a commitment to utilized local community capacity for short and long-term restoration at the Power Fire site and adjacent lands as discussed in the memo titled Supplemental Instructions for Fire Settlement, in your procession. The fire perimeter or the “closest suitable sites adjacent to the fire perimeter” are appropriate for restoration activities. We seek to engage the Eldorado NF and the Regional Office in enhanced social, cultural and economic commitments for Power Fire Restoration. We seek to explore a broadened but appropriate use of Power Fire-Fire Settlement Funds for long-term community engagement.

A partial list of organizations the Forest Service (Amador District, Eldorado NF S/O and the Regional Office) should collaborate to conduct active outreach to the following groups is below:

1. Calaveras Healthy Impact Product Solutions (CHIPS) and other local restoration professionals in the ACCG-Cornerstone CFLRP.

2. Student Conservation Association, Jay Watson Regional Dir.
   1230 Preservation Park Way
   Oakland, CA 94612
   510-832-1966 X-5301
   https://www.thesca.org/

3. The California Conservation Corp. State Office and Central California Office.
   1719 24th Street
   Sacramento, CA 95816
   916-341-3100 or 916-341-3224
   http://www.ccc.ca.gov/

4. Hands on the Land is a program for youth focused on environmental education and experience in America's natural resources. This program in

   http://www.handsontheland.org/

9. We request a revised project vision for the Power Fire Landscape and full consideration of an Ecological Integrity Alternative.

We seek a new revised proposed action or alternative that is focused on restoring and enhancing the Ecological Integrity of Complex, Early Seral Forests and lands judged as needing restoration by a broad collaborative. Such an alternative would validate the ecological integrity language in the 2012 Forest Planning Rule cited above and will be aligned with the Ecological Restoration Leadership Intent and the Best Available Science.

We also request the Eldorado NF develop a local, community-based restoration element in the socio-economic analysis that commits to building local, broad scale restoration capacity (not just veg. management), to education and outreach to youth and young adults and that utilizes both local and regional groups to conduct the long and short-term restoration of the Power Fire and adjacent fire landscape.

Element should include:

- Creation of a collaborative team of scientists from PSW and the Regional Ecology cadre who would lead an effort to design the restoration and enhancement plan for the Power Fire proposal.

- This collaborative team could be augmented by biologists from Point Blue, aquatic ecologists, Trout Unlimited and others with interest in and respect for enhancement of Complex, Early Seral Forests and aquatic ecology.
- The bulk of the hands-on restoration and enhancement work would be overseen by the Forest Service but conducted by a Community-based Restoration Cadre maintained over time by the forest.
- Herbicide use would be replaced with hands on restoration where needed and by fire.
- The Eldorado NF commits to a forest-based fire and landscape restoration cadre that only works on the forest in support of the existing Forest Service fire cadre and aquatic specialists.
- The analysis of the value and social and economic benefits to the local communities and to youth and young adults from organizations cited above would be conducted by the Regional office as a pilot for future community social, cultural and economic integration.
- The focus of the project would be on enhancement of the current early stage of forest succession and not the altering or rapid acceleration past this early evolutionary phase.
- Rigorous identification of enhancement opportunities for burned forest species, early seral associated wildlife species, sensitive species, native plants, aquatic-riparian plants and wildlife, fish and amphibians would be supported throughout the life of the project.
- Restoration of all road levels would be supported to enhance damaged areas (priority 1) and other existing aquatic-riparian and meadow areas. Breaking all connections between the road system and streams would be actively supported throughout the project.
- Monitoring of all key restoration outcomes would be supported in the project. The adaptive monitoring plan would be created with PSW, the R-5 Ecology Cadre, ENF staff, stakeholders and community-based workers. Community based monitoring teams (supervised by scientists and FS staff) are adequately trained and supported in the project. Clear objectives, thresholds and triggers and adaptive protocols would be established.
- If there are areas with the collaborative restoration team feels that planting is need, all appropriate species would be considered including conifers, native shrubs, native forbs and grasses.
- Fire is established and the primary disturbance and resiliency tool as soon as appropriate for each portion of the landscape.

The Power Fire Project could be a model of deep restoration ecology wherever fire settlement money is used for restoring a burned forest landscape. The more diverse the restoration focus and the more diverse the local/regional restoration social-economic commitment the better.

Sincerely,

s/Craig Thomas, Conservation Director

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Data needs

We have identified the following data or information needs that should be addressed in the DEIS.

1. How many acres of the project proposal were pre-existing plantations that burned? Were all of these replanted? Of those, how many acres of these are part of the current proposal? Please identify these in the Power Fire Reforestation Project Data Table. This is a cumulative effects issue that should be disclosed and analyzed in the EIS.

2. The scoping letter states that 60% of the project was harvested in 2005. Please disclose how many acres of the project area were salvage logged, and of these, how many acres have been replanted.

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Excerpt:

"However, the rapidly emerging technologies to maximize growth of crop trees have resulted in a shortened interval between planting and canopy closure (Borders and Bailey 1997), and thus reduced the time interval for establishment of early-successional plant species. Additionally, increased competition control may result in reduced seed rain of early- successional species, thereby impacting potential plant community responses following subsequent disturbances. Clearly, additional field studies are needed to determine means of maintaining plant communities and wildlife habitat values in intensively managed stands."

However, on a landscape scale, a shortened period of suitable habitat and lower snag abundance may reduce populations of some disturbance-associated species (Freemark et al. 1995). Clearly, additional research is requisite to verify the general trends observed and to investigate avian responses to increased intensity of silvicultural treatments at stand initiation."

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