IV.2 Responses to Individual DEIR E-Mail Comments E-27 to E-40

This section presents responses to individual public comments (i.e., not form letter or form letter based) received via e-mail. The responses immediately follow each letter and are organized in the same order as the comments in each letter. Several of the letters included attachments. Attachments were not included herein if our response did not directly reference the attachment.

E-mail submissions with multiple copies of a single letter format will be addressed in one sample from each type of form letter. Those with additional comments added will be addressed individually if the comment is substantive and thus warrants a separate response.

There will not be comment letters for every number within the series because some letters dropped if they were duplicates or if they were found to be form letters. Form letters are responded to in their own section of the FEIR.

E-27

February 27, 2006

Board of of Forestry
Post Office Box 944246
Sacramento, CA 94244-2460

Re. Comments on
Jackson Demonstration State Forest
Draft Management Plan and DEIR

Thank you for the opportunity to comment on the proposed Forest Management Plan (FMP) and the draft Environmental Impact Report (DEIR) for Jackson Demonstration State Forest.

I am Director of the Bay Area Coalition for Headwaters, and comment on behalf of that organization.

Bay Area Coalition for Headwaters (BACH) calls for rejection of the Draft FMP. We are strongly opposed to the Plan's calls for clearcutting, large-scale commercial logging, cutting of the oldest (and
1 therefore most valuable for habitat) second growth stands, and lack of a clear plan to create opportunities for recreation, education and research, which should be the mission of a demonstration forest.

2 The FMP also fails to provide adequate plans for restoration of old growth habitat. The best
3 alternative regarding restoration, Alternative E, does promote restoration of old growth, but fails to commit funds for repair or decommissioning of hundreds of miles of roads which are causing
4 damaging sedimentation into salmon-bearing streams. Restoration of salmon habitat is also not provided for adequately.

MARBLED MURRELET RECOVERY

Working on public education projects regarding forest issues of Northern California for many years, we have become acutely aware of the precipitous state of many of the forest-dependant species. One of the species of particular concern is the marbled murrelet. Given that so much of the murrelet's habitat is on privately held forestland, and given the poor management of that forestland, there is precious little acreage that represents high quality murrelet habitat and potential habitat for its recovery that the public has avenues to affect. Given the status of Jackson State Forest as the only large public forest in the redwood region north of San Francisco and south of Humboldt County,
5 there are significant public trust issues .

While the the Draft FMP seems to recognize the potential for murrelet habitat, the attention it gives to existing habitat and future habitat after restoration, or habitat that would be lost if proposed logging takes place is grossly inadequate, given the disturbing decline in murrelet populations documented by wildlife agencies.

The Five Year Murrelet Status review (McShane et al 2004) assessed status and trends of marbled murrelet populations with the six recovery zones identified by the U. S. Fish and Wildfie Service. The independent scientific analysis completed in March of 2004 shows populations are still declining at a rapid rate.

The 2004 U.S. Fish and Wildlife Service 5-Year Status Review Scientific Findings include:

6 · Continued declines in murrelet population in Washington, Oregon, and California due to loss of nesting habitat from logging and urbanization are predicted.

6

· Models indicate that murrelet populations are declining more rapidly than previously understood, and may disappear from the Pacific Northwest within 100 years if more habitat is not protected.

· In California, predicted probability of extinction is 100% within the next 40 years.

· Murrelets will not recover until there is significant improvement in the amount and distribution of suitable nesting habitat.

· Protection of nesting habitat on Federal land could be severely compromised if the Northwest Forest Plan is altered.

7

Given these findings, the FMP should incorporate the recommendations of the federal Recovery Plan for marbled murrelets, as this document represents the best available science regarding conservation of this species. As this is a species covered by state and federal statutes (CESA and ESA), there is a mandate for CDF to follow, and this mandate requires conservation of the species. Along with careful protection for known murrelets, suitable nesting habitat should be protected where it exists and large tracts should be developed. Murrelet experts should evaluate the old second growth near the South Fork of Hare Creek for suitability along with other areas they determine to have potential. Doing this is well within Jackson's demonstration mandate. Jackson encompasses approximately 30% of the Critical Habitat designated in California for marbled murrelets. CDF has a duty to conserve listed species under the California ESA. Failing to implement feasible conservation activities such as implementing the federal Recovery Plan is a violation of CESA that has not been identified by the DEIR.

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9

According to the federal Recovery Plan:

"The very small nesting and at-sea population of marbled murrelets along the coast of Mendocino, Sonoma and Marin Counties is important to future reconnection of marbled murrelet populations in northern and central California, if they can survive over the short term. Almost all of the older forest has been removed from this area, although small pockets of old-growth forest occur in State parks and on private landsŠ. Much of the remaining marbled murrelet nesting habitat in this Zone [Zone 5, Mendocino County] is located on private lands.

"The maintenance of this population will require considerable cooperation between State, Federal and private management representatives. Recovery efforts in this Conservation Zone could enhance the probability of survival and recovery in adjacent Conservation Zones by minimizing the current gap in distribution. The population is so small that immediate recovery efforts may not be successful at maintaining this population over time and longer term recovery efforts (e.g. developing new suitable habitat) may be most important. However, if this small population can be maintained over the next 50 years, it will greatly speed recovery in this Conservation Zone. Whether or not marbled murrelets can recolonize regenerated old-growth forests over such a large geographic area is not known." (page 129)

10

Because the region's forestland is overwhelmingly held as private property, Jackson Demonstration State Forest is the only opportunity available in the region where it would be possible to develop marbled murrelet habitat on a large scale. In the interest of species recovery, this should be done. Some of the very few known murrelets in the region are nesting adjacent to JDSF on parkland in Russian Gulch. They must be protected by protecting all the adjacent forest stands located in Jackson. A very large area around the nesting birds must be left intact to minimize any threat to their nesting success. Finally, research on how best to accomplish this is needed and doing so is squarely

10 within Jackson's "demonstration" mission. The FMP as proposed fails to make a substantial
11 contribution to recovery of marbled murrelets and this is a significant adverse effect of the plan that the DEIR has not identified and for which no mitigation is currently proposed by the Department.

Action taken in Jackson State Forest will impact significantly the existence of marbled murrelets in the region and likely the population's survival and viability throughout its range. Murrelets' status as endangered under the California ESA makes it incumbent on Jackson to implement the federal recovery plan strategy. The FMP as proposed also violates CESA.

Under CESA, state agencies have a duty to help recover endangered species as per Fish and Game Code sections 2053, 2055, and 2061:

2053. The Legislature further finds and declares that it is the policy of the state that state agencies should not approve projects as proposed which would jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of those species, if there are reasonable and prudent alternatives available consistent with conserving the species or its habitat which would prevent
12 jeopardy.

2055. The Legislature further finds and declares that it is the policy of this state that all state agencies, boards, and commissions shall seek to conserve endangered species and threatened species and shall utilize their authority in furtherance of the purposes of this chapter.

2061. "Conserve," "conserving," and "conservation" mean to use, and the use of, all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary. These methods and procedures include, but are not limited to, all activities associated with scientific resources management, such as research, census, law enforcement, habitat acquisition, restoration and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking.

In addition, there is evidence in or near JSF noted by reports (Cota and Papke 1994, Ralph el al 1994, Georgia-Pacific SYP 1997.

AESTHETICS

Proposed Alternative C1 would substantially degrade the existing visual character and quality.

13 The timber industry has eliminated most old second-growth redwood from their holdings. The DEIR claims the Plan intends to develop late succession forest stands as soon as possible but does not explain how logging the oldest second-growth stands would accomplish that. Jackson is a public forest that must give as much consideration to public trust values and aesthetics as it does to logging. To protect the beauty of the forest and its recreation potential, none of the old 80-110 year old second growth stands should be logged.

Other issues:

14 *Clearcutting should be eliminated.
15 *Herbicide use should be avoided
16 *Stream protection should be increased.

Sincerely,

Karen Pickett
Director, Bay Area Coalition for Headwaters
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Email Letter E-27

Response to Comment 1
The commenter calls for rejection of the Draft Forest Management Plan. The attributes of a forest plan that incorporates the concerns of the commenter are assessed as alternatives in the Draft Environmental Impact Report.

Response to Comment 2
The programmatic DEIR evaluates a range of Alternatives, some of which would markedly increase the acreage of forest placed on a successional path toward old-growth conditions. Site specific prescriptions that would restore old-growth habitat are well beyond the scope of a programmatic DEIR but could be addressed at the scale of individual project planning, review and implementation.

The Administrative Draft Final Forest Management Plan (ADFFMP) would designate one-third of the forest for the development of late seral and older forest characteristics.

Response to Comment 3
The commenter statement that "hundreds of miles of road are causing damaging sedimentation into salmon-bearing streams" is a significant overstatement of fact. Components of the Road Management Plan addressing sedimentation issues are detailed on DEIR Pages VII.6.1-92-94. The Road Management Plan would also apply to Alternative E. Alternative E proposes expanded watercourse protections for all watercourse classes. Decreased levels of harvesting activity associated with the Alternative will also contribute to a reduction in the potential for sediment generation. Similarly, hillslope sediment sources are addressed in the Hillslope Management Guidelines of the DFMP.

Funds generated from the limited amount of timber harvest expected under Alternative E and other sources could be applied to remedy problem areas identified under Alternative E and implementation of the Road Management Plan.

Response to Comment 4
The comment does not specify a specific environmental concern that can be addressed. Restoration of salmonid habitat is provided for under Alternatives C1 through F, as well as alternative G, which was examined in the RDEIR and incorporated into the ADFFMP.

Response to Comment 5
The DEIR includes a Contribution to Recovery of Marbled Murrelet Habitat management measure (DEIR Page VII.6.6-118-119) and identifies areas specifically for the recruitment of Marbled Murrelet habitat DEIR Page VII.6.6-78-82. Final identification of murrelet management areas will include collaboration with and participation of State and federal wildlife agencies, adjacent landowners (such as State Parks) and other interested parties as detailed in the management measure. The Contribution to Recovery of Marbled Murrelet Habitat management measure would apply to DEIR Alternatives B, C1, C2, D and E. In addition, the ADFFMP would designate the 1,549-acre Russian Gulch/Lower Big River area for the development of late seral forest as a means to provide potential Murrelet habitat. Additional potential habitat may develop in the Class I and Class II Watercourse and lake Protection Zones, which are designated in the DFMP and ADFFMP for the development of late seral forest. Further, the 6,800-acre Older Forest Structure Zone provided in the ADFFMP also may develop suitable Murrelet habitat over time.

Response to Comment 6
CAL FIRE and the Board are familiar with the 5 year Status Review Findings of the US Fish and Wildlife Service and cite that document extensively in the DEIR Marbled Murrelet species account. The recommendations of the federal recovery plan for Marbled Murrelets in addition to consultation with federal and State wildlife agencies and other sources of Marbled Murrelet expertise guided the development of the Contribution to Recovery of Marbled Murrelet Habitat management measure. Site specific evaluation of the areas identified in collaboration with State and federal wildlife agencies and others is part of the management measure (DEIR Pages VII.6.6-78-82 and DEIR Pages VII6.6-118-119). See also the response to comment 5.

Response to Comment 7
The DEIR and DFMP provide protection for known Marbled Murrelet nest sites. Similarly, suitable nesting but currently unoccupied (as determined by survey) habitat are also provided protections when that habitat exhibits certain characteristics of importance to Marbled Murrelets as described in the DEIR. Evaluation and development of habitat in the vicinity of Hare Creek as suggested by the commenter as well as in other areas is part of the Contribution to Recovery of Marbled Murrelet Habitat management measure described in the DEIR Pages VII.6.6-78-82 and DEIR Pages VII.6.6-118-119. See also the response to comment 5.

Response to Comment 8
CDF and the BOF are aware of and will meet their responsibilities under the California Endangered Species Act (CESA). Failure to implement the recommendation of the federal Marbled Murrelet Recovery Plan is not a violation of CESA. DEIR pages VII.6.6-89 to -90 summarize recommendations identified in the recovery plan pertinent to JDSF.

Response to Comment 9
The biogeographic importance of JDSF relative to Marbled Murrelet habitat extent and population sustainability is described in detail in the Affected Environment and Environmental Setting section of the DEIR (section 6.6 Page VII.6.6-1-33 and section 6.3 Page VII.6.3-1-5) as well as in the Marbled Murrelet species account DEIR Page VII.6.6-52-90. Contrary to the comment, JDSF does not represent the “only” opportunity where Marbled Murrelet habitat will develop. Existing and recently acquired State Park lands also represent viable opportunities for habitat development assuming that habitat can be created or develop in a time frame that contributes to murrelet habitat needs. The DEIR proposes a Contribution to Recovery of Marbled Murrelet Habitat management measure.

Response to Comment 10
The Marbled Murrelet sightings and breeding behavior exhibited by those birds in the vicinity of Russian Gulch is noted in the DEIR Marbled Murrelet species account. The DEIR also recognizes the relevance of murrelets in Russian Gulch and has developed the Contribution to Recovery of Marbled Murrelet Habitat management measure to include continued collaboration with State and federal wildlife agencies and other sources of Marbled Murrelet expertise. In

addition, the ADFFMP would designate the 1,549-acre Russian Gulch/Lower Big River area for the development of late seral forest as a means to provide potential Murrelet habitat.

JDSF has established management buffers adjacent to other ownerships. Buffer widths adjacent to State Park lands are a minimum of 200 feet as noted in the DEIR Page VII.6.3-42 and Forest Practice Rule 913.1(a)(7) and 913.4(a).

Response to Comment 11
The comment is incorrect. The DEIR has proposed a Contribution to Recovery of Marbled Murrelet habitat management measure that would apply to Alternatives B, C1, C2, D and E. The ADFFMP designates an additional 1,549 acres in the area of upper Russian Gulch and lower Big River for late seral development prescriptions specifically intended to recruit habitat for the Marbled Murrelet (see RDEIR Map Figure 1).

Response to Comment 12
CDF and the BOF recognize their responsibilities under CESA regarding murrelet conservation as "conservation" is defined in Fish and Game Code section 2061. The Regulatory Framework for the Protection of Wildlife Measures is described on DEIR Pages VII.6.6-110-113. The Board does not believe that the management plan violates CESA. The DEIR and ADFFMP found that the Murrelet would not be significantly adversely affected by either the DFMP or the ADFFMP.

Response to Comment 13
The ADFFMP and DEIR/RDEIR provide significant consideration of public values and aesthetics. It must be noted that statutes and Board policy recognize recreation as a secondary, but compatible use of the forest (Board Policy 0351.5). The ADFFMP designates one-third of the forest for the development of late seral and older forest conditions (see RDEIR Map Figure 1), and also includes provisions for maintenance or creation of managed stands with a significant component of large trees, including a substantial element of trees greater than 80 years of age.

The Board recognizes that timber operations can lead to negative impacts on the aesthetics of an area, however determining specific "thresholds of significance" is highly personal and subjective (see General Response 6). Many of the potential impacts of logging are temporary and do not result significant impacts to associated resource values. Mitigation measures have been developed to reduce the potential aesthetic impacts of timber operations to less than significant. This includes implementation of restrictions on the use of even-aged silvicultural practices and timber operations adjacent to special concern areas. See also General Response 9 and 14.

A detailed discussion of Aesthetic Resources, including impacts, thresholds of significance, and mitigation measures can be found in section VII.2 and VIII.9 of the DEIR. Additional analysis of aesthetics and recreation can be found in DEIR section VII.14. Further analysis of potential impacts to aesthetic and recreation resources relating to Alternative G and the ADFFMP can be found in RDEIR section III.2 and III.14.

The DEIR includes a map of forested habitat available on JDSF and private lands within the assessment area (see DEIR Map Figure J). There is no inventory of young redwood forest by age class that exists for either the assessment area or the region. Many stands of young forest have been selectively harvested, so a considerable area of young stands that are dominated by large young trees exist on private lands within the assessment area.

Response to Comment 14
See General Response 10.

Response to Comment 15
See General Response 7.

Response to Comment 16
See General Response 11.

E-28

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February 14, 2006

Mr. George D. Gentry
Executive Officer
California Board of Forestry and Fire Protection
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Re: Jackson Demonstration State Forest DEIR

Dear Mr. Gentry,

The activities that are planned for in the Jackson Demonstration State Forest (JDSF) Draft Environmental Impact Report (DEIR) are of particular concern to our members.

CATs is a public interest organization that for 24 years has been concerned about activities undertaken by the California Board of Forestry and other public lands management agencies that directly involve the use of pesticides, including herbicides, or create conditions that can lead to the use of pesticides. Members of CATs depend for their livelihood, health, culture, education and well being on the health and productivity of forests in California. Members of CATs live near, depend for their culture and/or livelihood, or visit for study and recreation the JDSF. Water used by many of the members of CATs is discharged from this area; the quality of the air they breathe is affected by activities conducted in the JDSF. Members observe, recreate, gather or otherwise enjoy the resources of the JDSF, or simply derive satisfaction from knowing that it is there, alive with wildlife, still beautiful and available to visit when they choose. JDSF is public land that, as such and as a part of the State of California, holds immeasurable value for CATs members.

CATs commends the California Board of Forestry and Fire Protection (hereafter referred to as "the CBF") for its recognition of and proposed efforts to manage invasive exotic species while protecting native species biodiversity. However, we are concerned about several aspects of the JDSF DEIR especially that vegetation treatments may include chemical (herbicide) methods for both forest regeneration and invasive species management. We do not believe the DEIR can support these actions and more analysis and avoidance of significant impacts are required by CEQA.

CATs supports Alternative D (pg. VI-11) and hopes the CBF has the foresight to adopt such a progressive alternative. We are strongly supportive of the fact that "no herbicides would be used" in this alternative. The conversion of the forest to an all-aged forest will be good for native species biodiversity. Protection of riparian zones for all watercourse classes will be key for protecting the limited historic amphibian and salmonid habitats.

2 Emphasizing recreation, with research, demonstration, and conservation is a sustainable way to manage the JDSF. It is important to the health of our ecosystems that we begin to shift away for intensely managed forests. For these reasons, CATs is also supportive of Alternatives E and F.

3 CATs is opposed to Alternatives C1 and C2. Intensive forestry practices are causing irreversible damage to our native ecosystems. Intensive forestry leads to an unnecessary and dangerous reliance on toxic chemicals for vegetation management. CATs is against intensive forestry practices, the damage they cause and the toxic chemicals that are included in their actions. We do not agree with the need to use herbicides for invasive species management nor for forest regeneration efforts as proposed for in Alternatives C1 and C2.

Below we will discuss inadequacies of the EIR and provide information not provided in the EIR in the following order:

Invasive species and IPM
5-12 *Real IPM
13-19 *prevention and restoration focus, not just treatment of symptoms
20-31 *Prevention (logging, grazing, off-road vehicles, etc)

Alternatives weed treatments
33-37 *non-toxic alternative options including volunteers work forces
38-64 *list of alternative treatment in literature by pest species listed

Herbicide toxicity problems
65-66 *can't use chemicals not listed in EIR w/out new CEQA analyses
67 *just because it's registered doesn't mean its safe (see GWSS appeal decision)
68-71 *risk assessments don't cover inerts, adjuvants, degradates, or tank mixes
73-134 *give toxicity info for each herbicide listed

35 Potential impacts of herbicides (that the Board has failed to mitigate for)
136 *water quality
137 *listed salmonid and amphibians
138 *sensitive vegetation
145-158 *sensitive parts of population (human health)
139-144 *workers
159-165 *herbicides as a disturbance factor
166-167 *cumulative impacts

IPM and invasive species

4 If the CBF expects to be taken seriously in it efforts to remove invasive species from JDSF, then it must employ a long term chemical free IPM strategy. The only viable alternative for control of invasive plant species is Integrated Pest Management (IPM). The following is from a report called "Invasive plants and their biology, impact and control options" (White and Haber 2003): IPM involves combining elements of the various treatment methods with preventative measures, increased knowledge of the target species biology and ecology, and restoration of the biotic and abiotic components of a habitat before or concomitant with the removal of the invasive exotic (Achuff et al., 1990, Thomas 1986, Thomas 1991). Invasion of a community by an alien plant usually occurs because that community has been disturbed, either in terms of its vegetation structure, composition, or its topography (Thomas 1986). For an exotic to be successfully removed from a community, the

disturbance factor that allowed the alien to invade in the first place must be removed and the habitat restored to as near to its original condition as possible (Thomas 1986). This habitat restoration can involve restoring the native dominants, filling vacant niches with natives, restoring natural densities, restoring age and class structures, and correcting any disturbed physical conditions (Thomas 1986). If these steps are not taken, the removal of an exotic species may be followed by either reinvasion or establishment of another exotic (Thomas 1986).

Lack of and Defining of IPM

5 At this point the CBF has failed to include an integrated pest management (IPM) strategy for dealing with invasive plants in the JDSF in the EIR. This is a major failure of the EIR and any plan that does not include IPM as part of weed control efforts is likely to fail. As we will show below, the scientific literature is dominated by the importance of using IPM for long term successful control of invasive exotic species. Below CATs will discuss what IPM is and the different components of it that should have been included in the EIR.

6 The state of California defines IPM as: "...a pest management strategy that focuses on long-term prevention or suppression of pest problems through a combination of techniques such as monitoring for pest presence and establishing treatment threshold levels, using non-chemical practices to make the habitat less conductive to pest development, improving sanitation, and employing mechanical and physical controls. Pesticides that pose the least possible hazard and are effective in a manner that minimizes risks to people, property, and the environment, are used only after careful monitoring indicates they are need according to pre-established guidelines and treatment thresholds" (www.cdpr.ca.gov).

7 CATs is concerned that the CBF has failed to discuss and disclose established weed treatment threshold levels for this project. The CBF needs to establish that current treatments are failing to control weed infestations at pre-established threshold levels before even considering the use of toxic chemicals. CATs also expects the CBF to quantify any weed increases above threshold levels. How much are populations increasing? How big were infestations when treatments began and how big are they now? Where are the monitoring results to determine whether past treatments have been effective or if new treatments are needed?

8 Published scientific literature provides overwhelming evidence that one-time herbicide applications for the purpose of weed eradication will only deliver short-term results. Over time, the seed bank of existing populations will allow weed populations to re-establish in project areas, often in greater density, abundance, and extent (Zouhar 2003, CDFA Encycloweedia website, Huckins and Soll 2004, Raj 2002, Hoshovsky 1986). Herbicide use for noxious weed management has been shown to be neither the lowest impact nor the most environmentally or economically effective control treatment method (CDFA Encycloweedia website, Kedzie-Web et al. 1996, Huckins and Stoll 2004, Hoshovsky 1986).

The key to any IPM strategy is to know the ecology, biology, and life cycle of the invasive species. "Integrated pest management is a proven approach to managing pest problems, including invasive nonnative plants. Integrated pest management is based on a sound understanding of the ecology and biology of a pest and its environment" (Andrascik et al. 1996). The CBF must include within CEQA documentation a demonstrated
9 knowledge of the biology and life cycle of the targeted invasive species as the first part of forming an IPM strategy to deal with them. How the species reproduces, spreads, and colonizes are all essential information. Some species are know for being prolific seed producers and maintaining extensive seed banks, while other
10 reproduce vegetatively and can clone themselves. What about the targeted invasives in JDSF?

11 Effective weed control has shown to be dependent on the integrating combinations of treatment techniques (Archer 2001). Weed management used in any other fashion is not likely to successfully reduce, suppress, and/or eradicate weed populations.

3

12 Successful weed management is a direct result of proper timing (DiTomaso 2001, Kedzie-Webb et al. 1996, CDFA website, Pitcher 1986, WA Noxious Weed Control Board). Timing for treatments must be included in the analysis of how the project will achieve the overall goal of returning the area to the desired status of a "biologically and structurally diverse forest", but it is not. Significant effects must be analyzed, and improper timing of weed treatment is recognized as a contributor to a significant effect, the spread and establishment, and eventual dominance of invasive plants.

EIR needs a prevention and restoration focus, not just treatment of symptoms

13 CATs is concerned that CBF has failed to discuss, analyze, or evaluate weed vectors as part of the EIR. Mitigation measures to prevent the spread of current invasive plant infestations and prevent new infestations must be included in the EIR to avoid significant environmental impacts. The CBF needs to determine the major sources of weed spread (waterways, vehicles, area visitors, livestock grazing, wind and/or wildlife) in JDSF and include a plan to prevent the cause of weed spread, not just treat the symptoms. Including preventative measures as part of any treatment strategy is critical for long-term control of invasive species and noxious weeds. The CBF's weed control efforts in JDSF are doomed to be unsuccessful without first focusing on the cause of the weed infestations and utilizing a holistic native species ecosystem health approach to combating exotic species.

14 Focusing non-chemical control efforts along the river corridors, at trail heads and recreation locations, and along side roads would be an obvious starting point for reducing weed vectors.

15 The standard Region 5 Forest Service weed prevention methods of washing heavy equipment and vehicles, weed free straw, and education of area users are a good start (USDA Forest Service 2000). The CBF must include those and additional methods as part of the proposed actions for this project to be successful. Immediate action, digging or pulling new infestations, post and pre project monitoring, and flagging and avoiding large infestations are all recommended (Clark 2003). These are basic prevention methods commonly referred to by weed experts and utilized with success by many public land managers.

The CBF needs to develop a plan to deal with prevention, and eliminate disturbance factors that led to past, and will lead to future, invasive species distribution and establishment. Re-vegetation with desirable and competitive natives is essential, but timing and reduction of the seed bank first is essential to rehabilitation
16 success. What specific activities on CBF public lands have facilitated invasive species infestations? What can
17 the CBF do to limit future invasions?

18 The EIR fails to even outline efforts to keep vehicles, machinery, or workers (shoe treads, clothing) clean of exotic seeds, the very least that can be expected. Unfortunately, while cleaning efforts will reduce the likelihood of seed dispersal, this approach is not fail-safe and in most cases avoidance is not feasible. It is possible however to set strict guidelines that weed infestations exceeding specific magnitudes of density or area will be avoided. Recent land management policy (USDA Forest Service) has suggested buffers established around weed populations are necessary to ensure their isolation (Clark 2003). Such mitigation will reduce the extent of future herbicide treatments deemed necessary for weed suppression. For this reason, among others described below, a more thorough analysis is required so that mitigations can be formed.

CATs will briefly discuss four activities, grazing, logging, off-road vehicles, and re-vegetation, that the CBF should be looking at and analyzing in the EIR and evaluate how they can be dealt with to reduce weed spread in
19 JDSF. This is by no means an exclusive list of weed vectors that should be part of the EIR invasive species analyses.

Grazing

20 Grazing has been suggested as being a significant factor contributing to changes in forest structure leading to both high fuel levels and invasive plant species (Belsky and Blumenthal 1997). Livestock typically prefer to graze perennial native grasses and forbs thus reducing their biomass, density, diversity, and reproductive capabilities. This culmination of adversity eliminates native competition from exotic annuals. Additionally, the soil disturbance resulting from livestock trampling and the bare ground produced by grazing of grasses not adapted to such pressure provides ample opportunity for noxious and invasive weed seed germination. Livestock are also responsible for weed seed dispersal by carrying seeds stuck in their fur and hooves and by ingesting seed and later excreting the seed in new locations, often scarified and prepared to germinate. Finally, through soil compaction from trampling, livestock are responsible for reducing infiltration rates in soil thus reducing soil moisture levels. Exotic annuals have been observed out-competing natives for soil moisture (Weed Research Information Center). This is critical when soil moisture may be limited as a result of soil compaction or already limited due to interspecific competition. The exclusion of grazers from sensitive areas where weeds exist already or may spread to in order to facilitate the restructuring of soil, provide a competitive advantage to native perennials, and eliminate an additional vector of seed dispersal, is necessary to achieve the desired goals of the EIR. The exclusion of grazers from existing infestations is most crucial and should be the bare minimum expected.

21 Conversely, grazing could be considered as a tool for weed suppression and vegetation management. Such a technique is usually most successful when used in combination with other weed control techniques and employed over several seasons with cautious and restrictive rotational grazing practices (CDFA Encycloweedia website, Pitcher 1986, WA Noxious Weed Control Board). However, as previously mentioned, the use of grazers in weed management is a delicate tool that must be applied with great responsibility and commitment, not without careful planning, full analysis and monitored implementation. There is no hint of this level of awareness in the EIR.

Logging

Logging, whether part of fuel reduction thinning efforts, or timber harvesting, changes canopy levels, causes disturbances to soil and vegetation, and opens lands to possible invasive species infestations. For example, the scotch and french brooms both grow best in dry, disturbed soils with plenty of sunlight, such as those created with new partial cutting timber harvest techniques (Raj 2002). The literature also says that brooms rapidly invade following logging and land clearing and coversly don't do well in heavily forested, heavy shade areas (CDFA Encycloweedia website, Huckins and Soll 2004, Hoshovsky 1986). Logging equipment, vehicles, and workers also facilitate the movement of exotic weed seeds. The CBF needs to analyze the impacts of logging
22 activities will have on the spread of invasive species and noxious weeds in the JDSF in the EIR.

Timber harvesting and fuel reduction efforts inherently increase light availability and disturb the soil surface. These actions will create optimal conditions for the invasion of noxious and invasive plant species as well as undesired natives. In such an instance, undesired vegetation, or early seral species, are typically represented by annual grasses and weeds, and woody shrubs (Merriam et al. 2005, Zouhar 2003, Raj 2002, CDFA Encycloweedia website, Huckins and Soll 2004, Hoshovsky 1986). The successful establishment of such a stratum could result in high fuel levels in as little as three to five years, depending on vegetation types, and may require maintenance. CATs fears such an outcome will prompt the CBF to adopt a chemical dependent
23 maintenance strategy. CATs is opposed to and will not support any forest management actions that will result in the potential for future herbicide use.

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24 Thinning can have both positive and negative effects depending on the forest type and its existing structure and age (Graham et al. 1999). Pre-fire fuel reduction projects have been shown to facilitate invasive species infestations both in fuel brakes and in adjacent wildlands (Merriam et al. 2005).

25 In addition to the proliferation of vegetation, logging areas will experience reduced surface fuel moisture and increased flammability (Countryman 1955 as cited in Weatherspoon 1996). The greater the stand opening, the more pronounced the change in microclimate is likely to be. Increased ladder fuels and decreased surface fuel moisture can be a catastrophic combination. These effects must be analyzed within the EIR.

26 Abundant surface and ladder fuels, and dense stands pose a high risk for any prescribed burning efforts. However, studies have shown that following the mechanical treatment, underburning every 5-8 years is required to stabilize the system in order to reintroduce any type of natural fire regime (Stephens 1998).

27 Consistent prescribed burning has shown to be the most effective treatment for reducing a fire's rate of spread, fireline intensity, flame length, and heat per unit of area (van Wagtendonk 1996).

28 The CBF should include consistent prescribed burning as an element of their typical management practices. The EIR should include evaluation of a maintenance strategy, founded on prescribed burning, into the proposed JDSF action plan. The restoration of a site to pre-historically natural conditions is unlikely to be achieved with the omission of a reoccurring fire regime. We fear that negligence of future maintenance could lead to circumstances where the CBF incorrectly feels that chemical treatment of vegetation would be the only viable solution. We are opposed to any land management actions that will likely lead to future vegetation management strategies dependent upon herbicides.

Off-road vehicles

29 Vehicles are well accepted as a major contributor to movement of invasive species. Seeds and reproductive parts can be picked up by tires, attach themselves to vehicles, and be relocated many miles away. Off-road vehicles are even more of a problem as a invasive weed vector. Off-road vehicles may be traveling over public lands, thru or near weed infestations and frequently provide transportation necessary for weed migration and movement into previously undisturbed uninfested natural areas. Off-road vehicles can disturb natural plant communities, creating open spaces where exotic weeds can proliferate. The following is an excerpt from the Nature Trails and Water Coalition (http://www.naturaltrails.org/issues/): Weeds are carried across the landscape by the wind, water, wildlife, people and vehicles. While most vehicles disperse weeds along well-established transportation routes, dirt bikes, all-terrain vehicles (ATVs) and other off-road vehicles traveling cross country can spread invasive weeds over a wide area in only a few hours. A study in Montana demonstrated that a single ATV can disperse more than 2,000 invasive knapweed seeds over a 10-mile radius. The research also found that these seeds are more likely to germinate and crowd out native plants in areas where soil has been compacted by off-road vehicles. (Montana State University Extension Service, 1992). Research in Wisconsin in 2002 found that ATVs commonly transport a variety of weed seeds. This study concludes that ATVs could spread nearly 200 million seeds, many of them noxious weeds, statewide over the next 20 years. (Tom Rooney, University of Wisconsin). The CBF needs to include steps to prevent the spread of weeds by both vehicles and especially off-road vehicles as part of its weed management strategy. The EIR must analyze and mitigate for the the impacts that vehicles and off-road vehicles are having on the spread of invasive weeds in the JDSF.

Re-vegetation

30 CATs promotes the re-vegetation of project areas with native forbs and grasses. Such actions will increase wildlife habitat values, promote soil stability, and provide competition against noxious weeds and undesirable

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woody species. Native forbs and grasses are often absent from the understory of intensively managed forests. The establishment of this vegetative component is critical in restoring our public lands to their historical conditions and preventing the occurrence and continued spread of noxious weeds.

31 CATs comments that establishment of native plants (specifically native perennials) will be crucial to the suppression of exotic plants and fuel reductions. Native perennial grasses have been observed as being capable of successfully competing against exotic annuals and "pest" shrubs, as well as being considered integral in achieving pre-European low intensity fire regimes (Belsky and Blumenthal 1997). The omission of re-vegetation, in the forms of grasses and forbs, from the any timber, vegetation control, weed removal or restoration actions will not achieve the desired conditions of a "biologically and structurally diverse forest". The herbal layer will most likely consist of significant areas dominated by annual exotic grasses and weeds, which contribute to catastrophic fire, soil destabilization, and increased soil moisture loss. If the PEIS is not altered to avoid these consequences, an analysis of their effects must be undertaken due to the significant impacts that may be anticipated. This concern was not addressed in the PEIS.

Realistic goals (control vs. eradication)

32 The goal of an invasive species management program could be to eradicate completely a plant everywhere, it could be to eradicate it only in a specific area, or it could be to reduce its population to a level that does not significantly displace native flora and fauna (Dahlsten et al. 1989). The Draft EIR does not make this analysis regarding the targeted invasive plants. Furthermore, it does not provide an adequate system for making decisions for each site.

Alternatives weed treatments

33 The CBF's EIR for the JDSF has failed to evaluate a reasonable range of feasible alternatives to treat targeted invasive plants. The number one goal of the JDSF is research and demonstration (pg. III-2). As this is the case, the CBF has an unique opportunity to demonstrate the effectiveness a true integrated pest management strategies, controlling invasive species infestations in the long term without introducing toxic chemicals into the forest. The CBF also has the option to conduct research and study newer, previously untried treatment methods, in an attempt to find out what non-toxic treatment methods will have the best results of both controlling invasives and protecting native biodiversity in a coastal forest system. Below CATs will discuss some of what is missing from the EIR in more detail.

34 The CBF has failed to include alternatives that treat invasive plant infestations with strategies based on ecological healing and prevention. The current EIR is focused purely on treatment of symptoms, rather than prevention of the conditions that lead to the problem. CATs supports an alternative with a focus on restoring native ecosystems in the JDSF. In such an alternative the CBF would view vegetation management in the context of first, prevention of conditions that have led to introduction, colonization, proliferation, and spread of invasive species and fuels hazards; and then second, restoration of healthy forests to strong native ecosystems; thereby third, reducing the need for continued treatments (passive restoration).

35 The CBF has neglected to consider the use of non-toxic organic herbicides and other weed control methods utilized by organic farming practices. For example St. Gabriel Laboratories produces an organic herbicide called Burn Out. It is advertised to work faster than Roundup (the glyphosate the CBF is proposing to liberally apply) and by meeting NOP Organic Farming Requirements is less likely to have adverse impacts to the environment or human health. If the CBF insists on using herbicides, why not use ones that are least likely to have adverse environmental impacts? What about hot foam that the BLM has used before? What about mulching/covers and solarization? What about organizing volunteer weed pulling days? What about flaming or

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torching? Goats? Bio-control agents? There are many options that the CBF can try, why focus only on the old toxic pill of herbicides?

36 CATs is cognizant of the magnitude of the exotic species infestations California and we are sensitive to the need to protect native biodiversity. We appreciate the CBF's recognition of the problem caused by invasive plants and desired actions to deal with invasives in the JDSF. We recommend that the CBF attempt to recruit volunteers to manually remove weeds, especially for necessary long-term follow-up treatments. This strategy has been effectively used in many parts of California, but perhaps nowhere as successfully as by the Klamath National Forest's partnership with the Salmon River Restoration Council (SRRC). The SRRC is an excellent model to follow for using volunteer labor to effectively remove and eliminate invasive species without herbicides. The SRRC is happy to not only share their model, but also to help teach recruitment and training of workers/volunteers. Specific SRRC information can be found on the web at http://www.srrc.org/. As another applicable example, the Marin chapter of the California Native Plant Society has been successful at getting volunteers to pull broom. Other possible volunteer/work groups the CBF should look into include youth groups, civic and non-profit conservation organizations, and sheriff's SWAP programs. There are several options for increasing the work force for manual weed and vegetation management efforts with little to no extra costs to the CBF that should be attempted and evaluated in the EIR.

37 Each invasive weed must be analyzed individually. What will work as the best control method may be different for each species and different locations. Below CATs will discuss several non-herbicide treatment methods the CBF should be including as part of integrated treatment alternatives. The below discussed treatment options cover a reasonable range, are feasible, avoid potentially significant impacts inherent with herbicides, and meet the project's objectives.

Pampas grass (*Cortaderia jubata*)

38 Physical removal of pampas grass is effective for smaller plants (Peterson 1988). Seedlings and small plants can be very effectively eradicated by hand pulling or grubbing (DiTomaso undated, Peterson 1988, Gosling et al. 2000). Larger plants can be effectively removed by digging them up using a pulaski, mattock, or shovel (DiTomaso undated, Peterson 1988). Access for crown removal is best accomplished by cutting the rest away with a chainsaw or weed whacker (DiTomaso undated).

39 Good success has been reported by simply pulling pampas grass plants out of the ground using vehicles (Peterson 1988).

40 Cattle grazing on pampas grass has been shown to be an effective control in commercial forests of New Zealand (DiTomaso undated, Gosling et al. 2000).

41 It is clear that after initial removal of above ground biomass, the goal is then to remove or kill the roots system to prevent resprouts. Since pampas grass produces many seeds, it is important to continue retreatments until the seed bank is exhausted. We recommend, at the minimum, pulling out all seedlings and smaller plants while the soils are wet and loose. Then cut larger plants, before they can go to seed, and remove all above ground biomass. Then if possible, dig or pull up and remove the crown and root system. Continued cutting / pulling / digging retreatments could be done by volunteer work forces. Or try using goats to eat the resprouts. Another method would be to cover and deny sunlight to any pampas grass that may try to resprout. After several years of treatments it is then time to aggressively revegetate the area with desirable competitive native species. This should be a combination of planting and seeding.

Scotch and French broom (*Cytisus scoparius* & *Genista monspessulana*)

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42 The literature on scotch and french brooms states that they both grow best in dry, disturbed soils with plenty of sunlight, such as those created with new partial cutting timber harvest techniques (Raj 2002). The literature continues on that line saying that the brooms rapidly invade following logging and land clearing (CDFA Encycloweedia website, Huckins and Soll 2004, Hoshovsky 1986). The brooms do not do well in heavily forested areas and don't tolerate heavy shade (CDFA Encycloweedia website, Huckins and Soll 2004, Hoshovsky 1986).

43 The literature states that because of extremely long-lived seeds broom control requires long-term management to exhaust the seed bank and prevent rapid recolonization of treated areas (CDFA Encycloweedia website, Huckins and Soll 2004, Raj 2002, Hoshovsky 1986). Many non-herbicide methods are recommended in the scientific literature for effective scotch and french broom control/removal. An integrated approach, requiring several years of treatments is accepted as the most effective, economical, and environmentally sound strategy (Huckins and Stoll 2004, Hoshovsky 1986). Established broom infestations will require persistence and retreatments each year for ten years or more, regardless of methods chosen (Huckins and Stoll 2004, Parker, Miller and Burrill 1998).

44 Manual hand methods are highly selective and can remove broom without impacts to desirable vegetation (Huckins and Soll 2004, Raj 2002, Hoshovsky 1986). Experts suggest hand pulling as a good and preferable manual broom removal method. It should be done in moist soils (Huckins and Soll 2004, Hoshovsky 1986). Also there are several hand tools for pulling broom plants including: weed wrenches, root jacks, pulaskis, and more (Huckins and Soll 2004). The weed wrench is mentioned as one of the most effective techniques for complete broom removal (CDFA Encycloweedia website). Hand hoeing and grubbing out crowns effectively control large plants (Parker, Miller and Burrill 1998, Hoshovsky 1986). Hand digging is a sure way of removing broom plants (Hoshovsky 1986). Well timed (before seeds mature) and executed cutting, especially effective manual cutting methods (at ground surface level) which can nearly eliminate re-sprouting, are recommended as an important first step in an integrated broom management plan (CDFA Encycloweedia website, Huckins and Soll 2004, Raj 2002). Experts conclude that the key to long-term broom control is prevention of seed set after the initial clearing takes place (Huckins and Soll 2004).

45 Mechanical control has shown to be practicle is some instances, using tractor mounted mowers or scythes, depending on terrain (CDFA Encycloweedia website, Huckins and Soll 2004, Raj 2002, Hoshovsky 1986). Repeated mowing/cutting can exhaust broom plant food supplies (Hoshovsky 1986). The literature contains examples of grazing, using goats (Angora and Spanish) as shown to be effective in controling broom (CDFA Encycloweedia website, Parker, Miller and Burrill 1998, Hoshovsky 1986). Some expert sources suggest that goats are the most effective for controlling regrowth as a follow up control method after burning or cutting (CDFA Encycloweedia website, Huckins and Stoll 2004). Goats can be less costly, can negotiate steeper slopes, and don't pose the environmental dangers inherent with herbicides (Huckins and Stoll 2004, Hoshovsky 1986)).

46 Experts support the use of tourching (flame thrower or weed burner) to heat-girdle the lower stems as spot treatments (Huckins and Stoll 2004, Hoshovsky 1986). This technique is reported to be less costly than herbicide treatments (Hoshovsky 1986). Large infestations can be removed using prescribed fire, but follow up methods are needed as fire can stimulate broom seed germination (CDFA Encycloweedia website, Huckins and Stoll 2004, Raj 2002, Hoshovsky 1986). This can be preferable for reducing the remaining seed bank far more quickly (Huckins and Stoll 2004). The literature states that burning of broom should be followed by re-burning, manual seedling removal, and re-vegetation with competative native species (Huckins and Stoll 2004). Re-vegetating with, at first, native perennial grasses and forbes, and later with native broadleaf plants will be necessary for long-term control (CDFA Encycloweedia website, Huckins and Stoll 2004, Hoshovsky 1986).

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47 For large infestations, the Bradley method is recommended as a sensible approach for manually controlling weeds (Fuller and Barbe 1985). This method consists of hand weeding small areas of the infestation, starting with the best stands of native vegetation (those with the least weeds) and working towards those stands with the worst weeds. Initially, single and small groups of weeds should be removed from the edges of the infestation. Next, work on areas with at least two natives to every weed. The native populations will stabilized in each cleared area, and then one should progressively work deeper into the center of the most dense weed patches. This method has great promise for sensitive natural areas with low budgets.

Yellow starthistle (*Centaurea solstitialis* L.)

48 There is an abundance of literature regarding the control and management of yellow starthistle (YST). California governmental sources often rely on the expertise of Dr. Joseph DiTomaso of the University of California, Davis, in regards to YST management and control. DiTomaso states in UC Davis's Weed Research and Information website that viable non-toxic treatment options include grazing, mowing, manual removal, perennial grass reseeding, burning, and biological control. With a myriad of low-impact effective and commonly used treatment options available, why spray?

49 Hand pulling, hoeing, and other manual removal methods are most effective for smaller infestations. They are an "important tool in steep or uneven terrain" and "typically cause minimal environmental impact" (DiTomaso 2001).

50 In areas where the starthistles are working against other competitive vegetation, hand pulling is particularly easy and effective. Using the "Bradley method", it is possible to control large starthistle infestations at low costs while risking low impacts (DiTomaso 2001).

51 Other non-toxic management methods recommended by experts are tilling, mowing, grazing, and prescribed burning. Mowing, a cost effective late season tool, is a popular treatment method (DiTomaso 2001). Properly timed mowing (or weed whacking) can limit YST ability to produce seeds, provide excellent control, and reduce seed banks and populations.

52 Grazing has been shown to be effective controlling young yellow starthistle plants (DiTomaso 2001). If integrated with mowing, burning, bio-controls, or as a treatment for re-growth after hand pulling, grazing can be efficiently and effectively utilized for controlling yellow starthistle.

53 Properly timed grazing (early season) or prescribed burning (late season) have both been used with success as controls (DiTomaso 2001). DiTomaso states that grazing can help competitive vegetation and that it is good for use in both the first year of control program and as maintenance in later years (2001). He also highly recommends prescribed burning, calling it very effective, especially when used in conjunction with re-seeding methods. Burning is recommended for use in the first, second, and third years of long-term management strategies (DiTomaso 2001).

54 The literature shows that bio-control agents have proven effective on yellow starthistle. Six different insects have become established in California for controlling Yellow starthistle. Two in particular, the false peacock fly (*Chaetorellia succinea*) and the hairy weevil (*Eustenopus villosus*), have been shown to have significant impact on seed production (DiTomaso 2001). DiTomaso (2001) also states that several plant pathogens have shown promise as bio-control tools, and in particular the naturally-occurring and host-specific *Ascophyta spp.* DiTomaso accerts that bio-control is recommended to be part of any integrated management strategy and that they provide the possibility of long-term and sustainable management (2001). Isn't that the ideal goal of noxious weed management? Bio-controls should be evaluated for all YST management projects, especially those with large populations in sensitive, hard to access areas.

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55 DiTomaso mentions problems with using herbicides as part of an integrated, long-term management strategy for YST. DiTomaso reports that herbicides are not effective in the early years of a long-term strategy and do not provide control of seeds germinating after treatment.

Himalayan blackberry (*Rubus discolor*)

56 Blackberry seedlings and young plants less than 3 feet tall can be hand pulled (Hoshovsky 1989). Claw mattocks have been reported to be effective for removing root crowns of plants up to 12 feet tall (Hoshovsky 1989). Rootstocks can also be dug out (Hoshovsky undated and 1989).

57 Cutting for initial clearing of above ground biomass is an important step for removing large blackberry patches (Oregon St. U. Extension undated, Hoshovsky 1989). Hand cutting and tractor mowing all efficiently clear infestations (Hoshovsky undated and 1989). Repeated cutting is necessary to exhaust underground parts' reserve food supplies and kill the plant (Oregon St. U. Extension undated, Hoshovsky 1989). Using covers or mulching after cutting or mowing will kill roots and prevent regrowth (Drliik 1996).

58 Prescribed burns are another good way to remove large mature stands of blackberries (Hoshovsky undated and 1989). Fires are most effective when followed by subsequent reburning to exhaust seed banks and underground food reserves and revegetation with fast growing native species (Hoshovsky 1989).

59 Experts recommend using goats to control blackberries (AgResearch Crown Research Institute 1988, Hoshovsky undated and 1989). Goats will eat blackberries all year long, regardless of other available food sources and are cheaper than both mechanical and chemical controls (Hoshovsky 1989). It is recommended that goats are most effective when used clear new infestations or regrowth of mature patches (Hoshovsky 1989). On older study in Australia showed that using goats was cheaper than herbicides to manage unwaned blackberries on pasture lands (Vere and Holst 1979).

60 Experts recommend revegetating with fast growing shrubs or trees to prevent reinfestations since blackberries are not shade tolerant (Cox 2003, Hoshovsky undated).

61 It is reported that some herbicides stimulate sucker formation and vegetative growth on lateral roots (Hoshovsky undated and 1989). Evidence exists that herbicides are not more effective than cane removal techniques (Hoshovsky 1989). Himalayan blackberries often grow in riparian areas and herbicides used then have the added danger of contaminating waterways and relocating to new areas (Hoshovsky 1989). Blackberries usually regrow following herbicide applications (U. Cal. Ag. and Nat. Res. 2002).

Tasmanian blue-gum (*Eucalyptus globosus*)

62 Mechanical control methods are thought to have the lowest impact on the surrounding area when treating eucalyptus. Cutting down the trees and then returning twice a year to cut regrowth will result in a high kill percentage after only three years. Seedlings and small saplings (up to an inch diameter) can effectively prevent the spread of eucalyptus infestations (Bean 1986).

63 Integrating buring with manual removal efforts is though to be an effective method of control. Work in the Jepson Prairie Preserve has shown that burning did increase eucalyptus mortality. Use of a flame gun has shown to work as well. The flame gun is most effective on already stressed plants or to kill regrowth (Bean 1986).

64 Eucalyptus stumps can be removed with either a stump grinder or tractor. After removal of above ground biomass is it a good idea to cover the area with dirt or black plastic to prevent (or slow) regrowth (Bean 1986).

Herbicide analysis problems

The herbicide analysis and toxicity information for the JDSF in the EIR is inadequate and incomplete. The CBF has failed to provide the most recent information, including scientific studies that discuss significant impacts to human and environmental health from the listed herbicides. The CBF needs to provide adequate
65 information, including valid scientific opinions against the use of these herbicides, for the public and others to completely evaluate this proposed actions.

can't add new chemicals post hoc

66 The CBF states that the list of herbicides given in Appendix 13 of the EIR may change in the future. Does this mean that the CBF may attempt to use other herbicides or new herbicide products without additional CEQA analysis? CEQA does not allow for unanalyzed use of toxics on state lands. The CBF may not use any herbicide or herbicide product not fully evaluated in this EIR in the future on the JDSF.

registration and label directions don't replace CEQA required agency analysis

The CBF seems to have the misconception that if a herbicides is registered and label directions are followed that the herbicide products are 'safe'. This is an incorrect and dangerous assumption. The use of herbicides comes with inherent risks. Herbicides are designed to kill and for numerous reasons may significantly impact (kill, harm, etc) non-targeted species. These impacts must be included in analyzing the impact of any alternative that includes the use of herbicides in the JDSF. California state appeals court has recently ruled that registration
67 does not replace necessary agency project specific analysis under CEQA (Californians for Alternatives to Toxics et al v. California Department of Food and Agriculture, __ Cal.Rptr.3d __; 2005 WL 3549483; 2006 Daily Journal D.A.R. 1204.). "Save Our Ecosystems v. Clark (9th Cir. 1984) 747 F.2d 1240 is instructive. There, the United States Forest Service had determined that certain herbicides could properly be used for defoliation activities, relying solely on their EPA registration under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The Ninth Circuit Court of Appeals held that "[t]he EPA registration process for herbicides under FIFRA is inadequate to address environmental concerns under NEPA [National Environmental Policy Act] . . . ." Instead, an agency must conduct independent research on the safety of herbicides it proposes to use.6 (Id. at p. 1248; see Northwest Coal. for Altern. to Pesticides v. Lyng (9th Cir. 1988) 844 F.2d 588, 596.) An agency can appropriately fulfill this duty of independent investigation by considering the registering agency's data on herbicides in the specific context of the
area targeted for proposed application. (Save Our Ecosystems v. Clark, supra, 747 F.2d at p. 1247.)"

risk assessments inadequate and incomplete (don't cover inerts, adjuvants, degradates, or tank mixes)

68 The EIR is missing estimates of amounts that quantify the amount of herbicides to be used in the JDSF, and to some extent, according to CBF supporting toxicity analysis, the toxicity, and thus the risks associated with the preferred actions. The CBF must at least make good faith estimates of the amounts of each herbicide product to potentially be applied in JDSF as part of the EIR analyses.

69 A glaring deficiency found in the EIR is it's lack of analysis of potential negative effects from all toxic substances proposed for use in this project. The substances in need of analysis include all components of the final tank mixture that is then applied into the environment. All inerts, adjuvants and active ingredients. The analysis should also include any known degradates and contaminants that could cause negative impacts. The

70 CBF has instead chosen to give cursory analysis to certain active ingredients (AIs), while piggybacking on limited, outdated and bias information, and refusing to perform any analysis whatsoever for potential impacts from the use of the toxic substances the CBF is proposing to introduce into the environment as inerts, adjuvants and degradates. It is impossible for the CBF to mitigate or avoid potentially significant impacts without first disclosing what they are. Left as is, the CBF must abandon the inclusion of herbicides in the JDSF.

71 The CBF is disregarding the adjuvants, inert ingredients, and known degradates, even though it has been clearly established in the scientific literature that these substances can be highly toxic, and often more toxic than the active ingredient (see information below). The CBF must include analysis of these ingredients.

HERBICIDE TOXICITY INFORMATION

72 Below CATs will provide toxicity information, including risks for both human and environmental health, that needs to be included and mitigated for within the EIR if herbicides are to remain a possible alternative. CBF is required to avoid (easy, don't use herbicides) or mitigate potential significant impacts due to herbicide use in this project. At this point the EIR has failed to do so.

Clopyralid

Basic overview

73 Clopyralid is used to kill annual and perennial broadleaf plants, including thistles and knapweeds. High persistence and high mobility increases toxicity and makes it likely to impact non-targeted species (especially native and desirable broadleaf species), as well as contaminate water sources. Transline, a commonly used clopyralid product for weed control (on thistles and knapweeds) made up of 40.9% clopyralid, and 59.1% of water, isopropyl alcohol, and a proprietary surfactant, which may be more toxic than the active ingredient. Public land management agencies must include persistence and mobility and entire product formulation toxicity into any potential effects analyses and NEPA/CEQA evaluations.

Human Health Risks

74 The labels for common clopyralid products (including Transline) state Caution, causes eye injury, harmful if inhaled or absorbed through skin, avoid contact with eyes, skin, or clothing, and avoid breathing spray mist (Information Ventures 1995, Transline Label 1999).

75 According to an EPA reviewer, laboratory tests have demonstrated that exposure to clopyralid results in "substantial" toxicity to fetuses and birth defects (US EPA 1991). In a test with rabbits, clopyralid caused a statistically significant decrease in the weight of the fetuses at both the low and high dose tested. In the same study, the EPA also found that "developmental toxicity in the form of skeletal abnormalities was evident at all dose levels tested" (US EPA 1991).

Environmental Fate

76 Clopyralid is considered persistent in soils by the EPA with a half life of up to 11 months (EPA 1992). Clopyralid is considered active in soils, is not strongly absorbed by soils, and is usually absorbed by plants from soils (Information Ventures 1995). In field studies clopyralid persisted in soils for between two and fourteen months (9.5 months in Pacific Northwest), depending on factors such as soil types and climates (Pik et al 1977, Bovey and Richardson 1991, Tanphiphat and Burrill 1987). Enough clopyralid was shown to persist in soils after 220 days (7.3 months) to damage desirable plants (Tanphiphat and Burrill 1987).

77 Compost and mulches made from clopyralid-treated plants contain toxic residues. A study from Michigan State University measured clopyralid in grass clippings composted for up to one year (Vandervoort et al 1997). Due to problems with its persistence and concern over its presence in lawn clippings and compost, the Washington State Department of Agriculture, in 2002, banned the use of clopyralid on lawns and most turf (Washington Dept. of Ag. 2002).

78 The EPA describes clopyralid as very mobile and very soluble in water and thus concluded that it has the potential to leach to ground water and or contaminate surface waters (EPA 1997). Transline's label warns that clopyralid is a chemical which can travel through soil and contaminate groundwater (1999). Information Ventures warns that because clopyralid is highly soluble in water, does not adsorb to soil particles, and is not readily decomposed in some soils, it may leach into groundwater, with areas with very permeable soils and shallow water tables at the greatest risk for water contamination (1995).

79 Clopyralid is considered volatile according to the EPA (EPA 1990). This means that it can evaporate from foliage and soil after application, move away from the application site, and "adversely affect nontarget broadleaf plants" (EPA 1990). The EPA has calculated that volatilization of only one percent of applied clopyralid would be enough to damage nontarget plants (EPA 1990).

Environmental Risks

80 Very small quantities may injure susceptible plants (Information Ventures 1995). The Transline label warns that it can affect susceptible plants directly through foliar contact and indirectly by root uptake from soil in treated areas (1999).

81 A study conducted in Glacier National Park found that clopyralid based restoration has mixed results. The herbicide treatment reduced the abundance of native broad-leaved plants and increased the abundance of nonnative grasses (Tyser et al 1998). Another study in the United Kingdom showed similar results. Clopyralid treatment reduced the abundance of one seeded broad-leaved species by about 75 percent while completely eliminating flowering by that species. Clopyralid treatments also eliminated flowering by two other species and reduced flowering of a third species by 90 percent (Pywell et al 1996).

82 The Transline label warns not to spray pastures containing desirable forbs, and especially legumes (1999). It also warns that while grasses are generally tolerant to Transline, new grass seedlings may be injured to varying degrees until well established. This may present a problem for land managers who want to use clopyralid to eliminated weeds and restore native grasses at the same time.

83 Clopyralid is also toxic to some beneficial insects, ones that are economically important due to their reduction of agricultural pest populations. The International Organization for Biological Control found that clopyralid is toxic to three species of beneficial insects, including a ladybug, a pirate bug, and a lacewing (Hassan et al 1994).

Other Information

84 It is not recommended to use clopyralid products for fall treatments, only apply to actively growing brush or weeds during the spring or early summer (Information Ventures 1995).

85 It is important to avoid drift (Information Ventures 1995), especially near susceptible plant species or water sources. The Transline label warns to avoid spray drift since very small quantities, which may not be visible, may severely injure susceptible plants (1999).

86 Information Ventures recommends that when considering clopyralid use to avoid situations where treated soil particles may blow into areas where susceptible plants grow (1995). This should be a major concern in noxious weed restoration projects, where clopyralid and other herbicides are used to kill weed dominated areas. Following the weed kill soil and plant parts can blow around and impact nontargeted species.

Glyphosate

Human Health Risks

87 Glyphosate eye and skin irritation is sometimes quite severe and can persist for months (Temple and Smith 1992). The Roundup formulation is a potential endocrine distrupter, depressing cyochrome P450 activity in human placental cells and thereby potentially compromising toxin metabolism (Richard et al 2005). This raises the concern about inerts in chemical formulations.

88 A Swedish study has linked glyphosate exposure to the lymphatic cancer non-Hodgkins lymphoma (Hardell and Eriksson 1999). Glyphosate is nitrosated "very readily" to the contaminant N-nitrosoglyphosate, a member of a chemical family of which approximately 75% are know carcinogens (Sittig 1980, Young and Khan 1978, Lijinsky 1974). While the EPA thus far considers that contaminant to be "not toxicologically significant", consideration of its carcinogenic potential has thus far relied exclusively on the results of unpublished studies conducted by Monsanto, hardly an unbiased source (Rubin 1996, US EPA 1993).

89 Glyphosate exposure has resulted in sperm abnormalities in rabbits, suggesting reproductive toxicity (Yousef et al 1995). Maternal exposure to glyphosate induced a variety of enzymatic abnormalities in pregnant rats and their fetuses, indicating possible developmental toxicity (Daruich et al 2001).

90 Varying percentanges of Roundup formulations are composed of polyethoxethyleneamine (POEA), which is a surfactant added to enhance glyphosate's ability to permeate cell walls. POEA is three times as acutely toxic as glyphosate (Sawada et al 1988). One study showed that Roundup formulations with POEA (but not glyphosate alone) inhibited progesterone production (Walsh et al 2000). Many glyphosate formulations contain other possibly harmful "inert" products such as diethanolamide, which is listed by the EPA as "potentially toxic" (US EPA 1987).

Environmental Fate

91 Between 14% and 78% of glyphosate applied as a ground spray drifts off site (Freedman 1991). Glyphosate has been documented to affect plants as far as 131 away from spray sites and residues have been detected 1,313 feet downwind (Marrs et al 1993, Yates et al 1978). "Product labeling does not preclude off-target movement of glyphosate by drift. EPA therefore is requiring three additional terrestrial plant studies to assess potential risks to nontarget plants" (US EPA 1993).

92 Glyphosate is highly persistent in soils, taking on average about 90 days for one-half of the chemical to transform or degrade, and even longer for its primary degradate AMPA (US EPA 1993, Torstensson et al 1989). It's persistence is highly dependent on soil types and weather conditions, with some studies showing half-lives of 140 to 172 days (USDA 1995, Oppenhuizen 1993).

93 Glyphosate has been found in surface water as the result of agricultural and other applications run-off (Frans 2004, US EPA 1993). A 2002 study testing surface water contamination of fifty-one streams throughout the Midwest found that glyphosate was detected in 36% of the samples, with its breakdown product AMPA found

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in 69%. Most surprisingly, the pesticide was found in 31% of the harvest-time samples, several months after application, indicating a persistence previously downplayed the Monsanto (Scribner et al 2002).

Environmental Risks

94 Roundup has been long recognized as highly toxic to fish and aquatic organisms (US EPA 1993). Recent evidence is emerging that it may also serve as a serious threat to amphibians at environmentally relevant levels. A recent study showed that Roundup reduced aquatic species richness by 22% and completely eliminated two species of tadpoles, most likely due to components other than the active ingredient, such as surfactants and inerts (Relyea 2005). While Roundup applications are currently restricted around aquatic areas, Relyea points out that most amphibians actually breed in small pools and other unprotected, and often seasonally, wet areas. Another study has shown that long-term exposure tests reduced algae populations (Pan et al 2003).

95 As with its human health effects, much of the toxicity of Roundup formulations have been attributed to components other than the active ingredient, namely the surfactant POEA. Roundup formulations containing POEA are thirty times more toxic to fish than glyphosate itself (Servizi et al 1987). The Surfactant POEA has accounted for more than 86% of Roundup toxicity in a study using an array of aquatic organisms (Tsui and Chu 2003).

96 Glyphosate has been shown to adversely affect microorganism composition of soils, by inhibiting the growth of beneficial mycorrhizal fungi, organisms that are essential to ecosystems and enhance plant survival (Sidhu and Chakravarty 1990). Other studies have shown that standard applications of the pesticide on grapevines and on Roundup Ready soybeans could cause increased disease levels in the crops by promoting pathogenic fungal growth on roots of the desired plants (Kremer 2003, Lotter et al 1999).

97 The EPA acknowledges that "many endangered plants may be at risk for the use of glyphosate on the registered use patterns" (US EPA 1993). No information is currently available regarding long-term effects to mammals, birds, and bees from glyphosate and other Roundup products.

Other concerns

18 Monsanto, the primary manufactuer of commercial glyphosate products, has sponsored risk assessments of glyphosate that can hardly be considered unbiased. Laboratories contracted by the manufacturer to conduct toxicological analysis on glyphosate have twice been documented as falsifying data for these tests (US EPA 1994, US Congress 1984). Monsanto use to advertise that Roundup can be used "where pets and kids play" and that it "breaks down into natural materials when its work is done." But in 1996 the New York Attorney General fined Monsanto $50,000 for these false claims.

MORE GLYPHOSATE INFORMATION (sorry if any of it is a repeat – let us know and we can provide actual documents supporting this information)

99 Glyphosate is the active ingredient of numerous herbicide formulations including Roundup, Rodeo, Sting, Spasor, Muster, Tumbleweed, Sonic, Glifonox, Glycel and Rondo. Glyphosate is a broad-spectrum herbicide which inhibits the enzyme essential for the formation of aromatic amino acids in plants

Mammalian Health Risks

100 The herbicidal toxicity operates in a pathway found only in plants and microorganisms, thus not considered to be a risk for humans and other mammals. Nevertheless, studies of the effects of glyphosate and glyphosate formulations have shown genotoxic, hormonal,and enzymatic impacts in mammals. These effects must be taken

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into consideration in a program advancing the use of glyphosate so that the environmental conditions can be taken into account in light of the potential adverse impacts of use of the herbicide. Such environmental impacts include those occurring to workers, people who use the forest and/or live nearby, and wildlife in the forest.

101 The line of study that is gradually illuminating the genotoxic, hormonal,and enzymatic effects to mammals, and potentially other animal species, through research include: sperm abnormalities (Yousef 1995); functional abnormalities in specific activity of cytolsolic enzymes in liver, heart and brain of pregnant animals and their fetuses (Daruich 2001); depressed function of cytochrome P450 and two other enzymes (Heitanen 1983); dose-dependent formation of DNA adducts in the kidneys and liver (Peluso et al.1998); changes to the activity of some serum enzymes and marked differences to polyacrylamide gel electrophoretic patterns of serum proteins (El-Demerdash 2001); and inhibited progesterone production (without causing cellular toxicity) by disruption of StAR protein mediation (Walsh 2000).

102 In areas of the country where pesticides are used, and particularly among children of men who apply pesticides, birth defects are significantly higher. Higher incidence of neruobehavorial defects from children conceived in spring when glyphosate formulations are used indicates that the chemical may be involved. (Garry 2002)

103 These findings indicate that the use of glyphosate and its formulations are linked to adverse health and, potentially, developmental and reproductive harm not investigated in the earlier years of glyphosate's use but is nevertheless compelling information that must be understood in light of the current proposed project.

104 The glyphosate formulations often studied are Vision and Roundup; study results sometimes indicate toxicity of other, unknown compounds of these formulations. Studies have found slightly greater toxicity of the Roundup formulation compared with glyphosate, in terms of acute toxicity (Folmar et al. 1979; Martinez et al. 1990; Mitchell et al. 1987).

105 The Roundup formulation is a potential endocrine distrupter, depressing cyochrome P450 activity in human placental cells and thereby potentially compromising toxin metabolism (Richard et al 2005). This raises the concern about inerts in chemical formulations.

106 The U.S. Environmental Protection Agency and the World Health Organization reviewed the toxicology data on glyphosate and concluded that glyphosate is not mutagenic or carcinogenic. Despite this conclusion, three recent case–control studies suggested an association between reported glyphosate use and the risk of non-Hodgkin lymphoma (NHL) (De Roos et al. 2003b; Hardell and Eriksson 1999; Hardell et al. 2002; McDuffie et al. 2001).

107 Though not considered a carcinogen by the U.S. EPA, a population study linked glyphosate use to the lymphatic cancer non-Hodgkins lymphoma, interpreting the result conservatively due to limitations of the study, but considering the association worthy of concern, citing related toxicologic findings for glyphosate including excess mutations and chromosome aberrations in mouse lymphoma cells, excess sister-chromatid exchanges (SCEs) in human lymphocytes, and increased incidence of various cancers in a carcinogenicity study of mice (Hardell and Eriksson 1999). Another recent study involving human populations found a suggested association between glyphosate and the risk of multiple myeloma. (deRoos 2005)

Environmental Fate

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17

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Environmental Risks

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111 With global declines of amphibian on the rise, research looking at the effects of pesticides on amphibians has garnered much attention throughout the last few years. However, with such an extensive list of pesticides being used on a world-wide basis, scientists have focused their attention on those that are widely used and globally common such as formulations with the active ingredient glyphosate (Roundup, Vision, ext). Such research has found that exposing amphibians to such formulations can produce larval mal-development such as craniofacial and mouth deformities, eye abnormalities, bent curved tails (Lajmanovich, 2003), gonadal abnormalities, decreased snout-vent length at metamorphosis and increased time to metamorphosis (Howe, et al. 2004). Other studies have shown that exposure to such pesticides can reduce tadpole survival and biomass by 40% (Relyea, 2005a), as well as reduce amphibian richness in a given area (Relyea, 2005b). Furthermore, when amphibians are also exposed to predator cues (which are naturally occurring), glyphosate formulations can be twice as lethal to these animals (Relyea, 2005c). This last study emphasizes the fact that although amphibians can withstand certain doses of these pesticides in the laboratory, we must also take into account other environmental stressors (such as predator cues, water temperature, ph, ext.) that can make amphibians even more susceptible too much lower doses. For this reason we must be very cautious when deciding what levels of pesticides are acceptable in surrounding environments.

Relyea, R. A.; Schoeppner, N. M.; Hoverman, J. T. 2005a. Pesticides and Amphibians: the importance of community context.. Ecological Applications, 15(4): 1125-1134.

Relyea, R. A. 2005b. The impacts of insecticides and herbicides on the biodiversity and productivity of aquatic communities. Ecological Applications, 15(2): 618-627.

Relyea, R. A. 2005c. The lethal impacts of Roundup and predatory stress on six of North American tadpoles. Environmental Contamination and Toxicology, 48: 351-357.

Howe, C.M.; Berrill, M.; Pauli, B.D.; Helbing, C.C.; Werry, K.; Veldhoen, N. 2004. Toxicity of glyphosate-based pesticides to four North American frog species. Environmental Toxicology and Chemistry, 23(8): 1928-1938.

Lajmanovich, R. C.; Sandoval, M. T.; Peltzer, P. M. 2003. Induction of mortality and malformation in Scinax nasicus tadpoles exposed to glyphosate formulations. Bulletin of Environmental Contamination and Toxicology, 70(3): 612-618.

112 Glyphosate has been shown to adversely affect microorganism composition of soils, by inhibiting the growth of beneficial mycorrhizal fungi, organisms that are essential to ecosystems and enhance plant survival (Sidhu and Chakravarty 1990). Other studies have shown that standard applications of the pesticide on grapevines and on Roundup Ready soybeans could cause increased disease levels in the crops by promoting pathogenic fungal growth on roots of the desired plants (Lotter et al 1999, Kremer 2003).

Imazapyr

Human Health Risks

113 In a study of acute toxicity, bleeding and congested lungs were observed from dermal exposure to imazapyr. Congestion of the kidney, liver, and intestine were also observed. Imazapyr can also cause rashes, redness and swelling at the site of exposure on skin (US EPA 1984). The primary concern is contact with eyes, as imazapyr is listed as "corrosive" and "causes irreversible eye damage" (Tu et al 2004, US EPA 1984). The Center for Ethics and Toxics warns that the primary route of potential harm would occur during the application process (www.cetos.org).

114 The Center for Ethics and Toxics (www.cetos.org) reports that one of imazapyr's primary breakdown products is quinolinic acid, which is a primary breakdown product in soils (Mangels 1991), which is irritating to the eyes, respiratory system, and skin (Sigma Chemical Co, et al 1993). It is also a neurotoxin and can cause symptoms similar to those in Huntington's chorea, such as loss of coordination and trembling (Schwarcz et al 1983, www.cetos.org).

Environmental Fate

115 Imazapyr is considered persistent. The EPA reports that the half-life of imazapyr is 17 months (US EPA 1984). Persistence in soils has been detected at a level high enough to cause plant damage for over one year (Coffman et al 1993, Lloyd et al 1986, Heering and Peeper 1991). Imazapyr doesn't usually bind to soils, meaning that it is very mobile in soils and a likely risk to be a water contaminant (Tu et al 2004, Cox 1996, www.cetos.org). Although when it is adsorbed by soils, movement of soil particles that contain imazapyr can damage desirable species (Tu et al 2004). While imazapyr has a relatively short half-life in water of 4 days (Information Ventures Inc 1995), it may be toxic to aquatic plant species for even longer (like in soils). If released into water, or it moves through soils into the water, imazapyr does not adsorb to suspended solids and sediment based upon the adsorption coeffecient (www.cetos.org), and thus remains available and toxic.

116 Imazapyr has been found in surface water in the southeastern US (Michael and Neary 1993), in groundwater from ground hand applications (Berisford et al 1995), and again in surface water, this time in the Pacific Northwest (Rashin and Graber 1993).

Environmental Risks

117 Imazapyr is an efficient plant killer and therefore puts non-targeted vegetation at risk. It is readily adsorbed through foliage and roots and thus can be injurious by drift, runoff, or leaching from the roots of targeting plants (Tu et al 2004). Field studies report that imazapyr can be exuded from the roots of targeted plant species (Tu et al 2004). This is extremely hazardous for non-targeted and desirable native vegetation in the project area. Imazapyr can be mobile within roots and transferred between intertwined root systems of many different plants and /or to several species (Tu et al 2004). Again, this puts desirable native vegetation in the project area (that would be close enough to hopefully take over treated areas) at high risk. Use of one imazapyr product, Arsenal, is stated by the EPA as putting a number of terrestrial and aquatic listed plant species in "jepordy" (US EPA 1987).

19

Sulfometuron Methyl

Triclopyr

Human Health Risks

118 Triclopyr formulations have shown to have effects on the kidney and liver weight and functioning in test animals and it has been shown to be slightly fetotoxic (US EPA 1998).

119 One study showed that triclopyr's primary degradate, TCP (3,5,6-trichloro-2-pyridinol), may disrupt neural maturation at small concentrations (Das and Barone 1999). Another study revealed that maternal exposure to TCP caused the degradate to concentrate in the fetal brain (Hunter et al 1999).

120 A study by the California Department of Pesticide Regulation (CDPR) of hand applicators of triclopyr in forest settings found that exposure measured by urinary excretion was higher than predicted, while dermal patches showed exposure levels that should not have resulted in such high absorption levels (Spencer 2000).

Environmental Fate

21 Triclopyr is recognized by the EPA as being moderately persistent and highly mobile, with considerable potential to contaminate surface and ground water (US EPA 1998). In some cases triclopyr has been shown to persist for more than two years (Stark 1983).

22 One CDPR study done to determine pesticide residues in Native American gathering areas collected application-day samples that showed the presence of triclopyr up to 50 to 100 feet down slope for the treatment sites (Ando et al 2002). A monitoring study in the Tahoe National Forest verified triclopyr's mobility (and persistence), finding it in sample over 200 feet beyond the spray buffer strip nearly two months after application (Tahoe National Forest 1997).

23 Garlon 4, which is a mixture of the active ingredient triclopyr butoxyethyl ester (61.6%) with unidentified amounts of inert ingredients kerosene and "proprietary" surfactants (total 38.4%) (Material Safety Data Sheet). Kerosene is characterized as "slightly toxic" for acute, or immediate, effects and is not regarded as a cause of cancer or mutations, but it has significant chronic toxicity and causes skin irritation.

124 According to the 1998 US EPA Reregistration Eligibility Decision, "While triclopyr TEA and BEE are the forms applied, both readily form the acid. The acid and its degradate, TCP, are of concern in the ground water assessment. Triclopyr acid is somewhat persistent, with persistence increasing as it reaches deeper soil levels, where there are anaerobic conditions; it is also very mobile. TCP is both mobile and persistent. Pesticides with similar properties have been found in ground water. Due to the environmental fate characteristics of triclopyr acid, the Agency believes this chemical has a potential to leach to ground water."

125 The half-life of triclopyr in soil is in effect extended when it metabolizes to pryridinol (EPA 1998), which is as mobile, but more persistent in soil than triclopyr, in addition to being more toxic. As a result, pyridinol has the potential to degrade groundwater and be transported in surface runoff waters to a degree that surpasses that of triclopyr. The EPA recommends a ground water label advisory for the Garlon label based on the toxicity and environmental persistence of pyridinol (id). Pyridinol has been detected in the blood for as long as 30 days after exposure to another chemical that metabolizes to pyridinol (Chanda and Pope 1995). Pyridinol may also exhibit reproductive toxicity, although this issue remains controversial.

126 The results of recent studies have made the fate and effects of pesticide degradation products such as pyridinol the subject of closer scrutiny. The U.S. Geological Survey (USGS) has reported that when it looks for products of herbicide degradation in surface water, for example, degradates occurred frequently at similar concentrations as the parent compounds. The U.S. Fish and Wildlife Service noted in referring to the California red-legged frog that "risk assessments of pesticides typically fail to evaluate the breakdown by-products". Recent research suggests these by-products may pose a threat to amphibians (La Clair 1998).

Environmental Risks

127 A USGS study of a watershed near Seattle, Washington, found triclopyr at 90 percent of the sited sampled (USGS 1999). This indicates that contamination of streams with triclopyr may be widespread and its impacts to water quality should not be taken lightly.

128 One study found that even at low concentrations (2.4 – 4.8 ppm), triclopyr proved paralyzing or deadly to three native species of newly hatched tadpoles, who were found to be much more sensitive to the pesticide than the standard laboratory surrogate used in toxicity tests (Berrill et al 1993). Another study emphasized the varying effects of the different formulations on amphibians, with the ester form (Garlon 4) having a much higher toxicity than others (Perkins et al 2000).

129 The EPA has labeled Garlon 4 and other butoxyethly ester forms of triclopyr as moderately to highly toxic to fish and aquatic invertebrates. The agency recognizes the threat posed by triclopyr to various listed species, and states that it is awaiting further limitations on the chemicals' use (US EPA 1998).

130 Triclopyr poses a risk to the health of fish species, as described by Wan et al. 1987: "To sum up, this bioassay study indicates that Garlon 4, the ester formulation of triclopyr is highly toxic to salmonids of the Pacific Northwest". Triclopyr also poses a risk to the health of amphibian species, as described by Berrill et al. 1994: Newly hatched tadpoles of all species were very sensitive to 2.4 and 4.8 ppm triclopyr (...), either dying or remaining paralyzed following exposure."

131 Even sublethal concentrations have been shown to adversely affect fish growth, due presumably to the chemical's persistence (Kreutzweiser et al 1995). One study indicates that even recommended (aerial) application rates would result in aquatic concentrations high enough to cause behavioral changes and mortality (Johansen and Geen 1990).

132 Triclopyr can also impact insects adversely. Aquatic insects (*Isogenoides* and *Dolophilodes* species) are adversely affected at concentrations less than 80 ppm (80 mg/Liter). Direct studies of triclopyr applications to stream channels showed clear cut evidence of toxicity from drift exposure as low as 3.2 mg/Liter for *D. distinctus* (Kreutzweiser et al.1992). Triclopyr also poses well known dangers to salmonid species. Garlon 4 reached lethal concentrations as low as 84 ppb (0.84 mg/Liter) (Johansen and Green 1990).

133 The EPA labels the butoxyethyl ester form (includes Garlon 4) as slightly toxic to birds. The EPA acknowledges that triclopyr's primary breakdown product, TCP, is as toxic to birds, fish, and invertabrates as triclopyr itself, and exhibits similar persistence, mobility, and potential for groundwater contamination (US EPA 1998). Therefore the additional action of the degradate could greatly extend the toxicity of the parent compound. This must be included in the analysis for the proposed actions.

134 Additional evidence points to the broader scale of effects triclopyr has on the ecological communities in which it is applied. Several studies have shown triclopyr to have detrimental repercussions on animal species integral to ecosystem balance. Beneficial arthropods that work to control invasive weeds may be killed (Searle et al 1990). Gastrointestinal parasites that control rodent populations can be wiped out (Boggs et al 1991). Triclopyr

21

has been shown to be detrimental to gastropods involved in nutrient recycling as well (Prezio et al 1999). Triclopyr is also highly toxic to ectomycorrhizal fungi, organisms that are essential to ecosystems and enhance plant survival (Chakravarty and Sidhu, Canadian Forestry Service Publication). The degradate is even more toxic to fungi (Baarschers et al 1988).

Potential herbicide impacts not avoided or mitigated

135 The CBF has failed to include in the EIR avoidance or mitigation measures to eliminate significant impacts that may result in the JDSF due to the proposed herbicide applications in alternatives C1 or C2.

water quality

36 All of the above listed herbicides have been found in water that they were not intended to be in. The use the above listed herbicides has the potential to degrade water quality in the project area be direct contamination or adsorption to soils particles and contamination threw sedimentation. The CBF has failed to give a hard look in the EIR at the impacts to water quality from the proposed herbicide applications. Nor has it evaluated avoidance or mitigation measures to prevent significant water quality impacts.

salmonid and amphibians

37 The project area contains habitat for listed salmonid species including endangered coho salmon and threatened steelhead. The JDSF is also home for native amphibian populations. As discussed above both glyphosate and triclopyr product formulations are considered very toxic to fish and amphibians. Therefore the proposed herbicide usage could significantly impact listed TE&S species in the JDSF. The EIR must include analysis of these impacts and measures within the alternatives to avoid them.

plants of special interest

138 The JDSF contains state listed native plants as well including: Humboldt milk-vetch (*Astragalus agnicidus*), and Roderick's fritillary (*Fritillaria roderickii*) are both state listed endangered; and North Coast semaphore grass (*Pleuropogon hooverianus*) is a state listed threatened species. Obviously these plant are at risk of being killed by the proposed herbicides (see above comments regarding toxicity and environmental fate of each herbicide). Drift does happen. Some of the above chemicals are known for their persistence and mobility that would also greatly increase the risks to non-targeted list plant species. The JDSF management plan as analyzed in the EIR is subject to the provisions in CEQA regarding the avoidance of significant adverse effects on the environment, including native plant communities and rare, threatened, and endangered plants (CCR § 15250). Public Resources Code § 21080.5(d)(2)(a) states that the rules and regulations adopted by the administering agency of a certified regulatory program shall "require that an activity will not be approved or adopted as proposed if there are feasible mitigation measures available which would substantially lessen any significant adverse effect which the activity may have on the environment." The
FPRs are a State Certified Regulatory Program (CCR § 15251(a)) and are subject to these rules. An easy way to prevent significant impacts to listed plant species is to avoid herbicide use within JDSF.

workers

39 The EIR contains no analysis regarding the risk of the workers whom would be applying the herbicides in the JDSF. Herbicide applications are proposed to be accomplished by manual laborers using backpack application equipment. The use of backpack sprayers is a source of concern due to common reports of pesticide exposure episodes involving leaks, drips, and splashes onto the applicators, especially in forestry applications. The

potential for leaks of herbicides onto the clothing and skin of applicators is a concern because of previously under appreciated dermal absorption that must be addressed if the use of significant amounts of herbicides will be applied by backpack application (CA DPR 1998).

140 For example the previously mentioned 1995 CDPR study found that exposure measured by urinary triclopyr levels was higher than predicted by Risk Assessment models, while mean exposure estimated from dermal and inhalation monitoring was lower than predicted. Therefore the workers were at greater risk than previously believed.

141 Though the herbicide labels requires the use of protective clothing by workers, protective clothing is variable in its ability to prevent dermal exposures due to manufacture, types of barrier materials used, length of use and type of pesticide used. The EIR fails to analyze the effectiveness of any chemical barrier personal protective clothing or the likely exposure with and without such clothing.

142 Gloves designed specifically to provide barriers against hand exposure to pesticide contamination available to workers, for example, are particularly important to prevent exposures of pesticide applicators. The label for Garlon 4 requires that "chemical-resistant gloves such as Barrier Laminate, Nitrile Rubber, Neoprene Rubber, or Viton" be worn by forestry and other agricultural workers.

143 These barriers can vary in their ability to prevent worker exposures to chemicals. Pesticide protective gloves manufactured with polyvinyl chloride and nitrite butadiene chemical barriers have been defective to the degree that the gloves were contaminated with pesticides, outside and inside, during the use of organophosphate insecticides (Canning et al. 1998). Nitrile and butyl and other chemical barrier gloves provide protection from penetration by residues of 2,4-D, but only for 6-8 hours of use (Lin and Que Hee, 1998). Nitrile gloves generally offer better protection against dermal penetration of pesticides than does latex, but the degree of protection decreased over time and depended on the pesticides used. The use of surfactants such as nonylphenolethoxylate increased penetration of two fungicides and a growth retardant (Nielsen et al. 2001).

144 The current EIR fails to adequately address worker health risks associated with the proposed herbicide applications for the applicators.

Human health- chemically sensitive, pregnant women, fetuses, and infants

Chemically sensitive people

145 Concern is especially magnified for sensitive populations including those with compromised immune systems, children and the elderly. Dr. Robert Kreutzer of the California Department of Health Services reported in the results of the Department's annual survey of California health indicators that 16.9%, or five million Californians, are sensitive to chemicals and that 6.4%, or close to two million Californians, have been medically diagnosed as having chemical sensitivity that affects their health status. (Kreutzer, Neutra, Lashuay. 1999. Prevalence of People Reporting Sensitivities to Chemicals in a Population-based Survey. American Journal of Epidemiology). In a personal communication, Dr. Kreutzer assured us that the findings of his 1999 report corresponded with other studies of chemical sensitivity in the general population and field experiences of his office in chemical release accidents.

Impacts to pregnant women, fetuses and infants

146 (Much of the following is from Having Faith: An Ecologist's Journey To Motherhood by Sandra Steingraber).

147
Pesticides with low molecular weights cross the placenta without restriction. Even heavier pesticide molecules pass through, but sometimes they are partly metabolized by the placenta's enzymes before they pass through, which can make them *more* toxic than they were to begin with. Pesticides do not have to pass through the placenta to cause harm. Some chemicals will lodge in the placenta and do damage there. (U.S. Department of Health and Human Services. Agency for Toxics Substances and Disease Registry. 2002).

148
The brain of a fetus and of a child under six months is more vulnerable to toxins because it lacks a blood-brain barrier, which in older children and adults prevents many blood-borne toxins from entering the brain's gray matter. Fetal brains are even more vulnerable because of the lack of fat in the fetal body. Thus, the fetal brain attracts most of the fat-soluble toxic chemicals resulting in a disproportionately greater effect on the brain. (ibid)

149
There has only been one study of environmental contaminants in amniotic fluid ever conducted, and it found detectable levels of organochlorine pesticides in one third of the thirty samples of amniotic fluid tested.

150
Research conducted using information from the California Birth Defects Monitoring Program has found elevated risks of particular kinds of birth defects among women using pesticides for gardening and for those living within a quarter mile of agricultural crops. Of 2000 mothers of children with birth defects, who were interviewed, 75 percent of them had at least one source of exposure to pesticides while pregnant.

151
Pesticide applicators have a higher risk of having children with birth defects or fetuses with anencephaly. In a study from the Netherlands found an increased risk of spina bifida when fathers are exposed to certain chemicals, including pesticides. Some chemicals are known to injure the DNA strands carried in the heads of sperm cells, while others affect the testicles ability to produce sperm.

152
In Finland, a birth defect registry shows that children born to women employed during their first trimester of pregnancy in agricultural occupations involving pesticides had twice the risk of cleft lips and palates. In Spain, the rate of oral clefts in similar children was three times that of other children. Spain also shows that undescended testicles were more common in areas of high pesticide use. These findings were mirrored in Denmark. Norwegian researchers found strong associations between spina bifida and hydrocephaly and pregnant workers in orchards or greenhouses. In the U.S., a study of 700 women in California showed an increased risk of fetal death from birth defects among babies whose mothers lived near agricultural crops where certain pesticides were sprayed. Women in their first trimester who live in a square mile of pesticide use are most vulnerable to impacts.

153
One of the most thorough studies linking pesticides to birth defects was conducted in Minnesota by Dr. Vincent Garry at the University of Minnesota medical school. He found elevated levels of birth defects among children of registered pesticide applicators (like farmers) in western Minnesota. He also found a clear geographical pattern of birth defects among the general population. Non-farming families living in the western half of the state were 85 percent more likely to have a baby with birth defects than nonfarming families living in the eastern half because of the increased use of pesticides in the agricultural portion of the state. Further, in western Minnesota, children conceived in the spring when pesticide use is at its highest were significantly more likely to have birth defects than those conceived at other times of the year. No seasonal pattern for birth defects was present in the eastern part of the state.

154
In 1997, the U.S. Toxics Release Inventory included 47 different chemicals classified as known or suspected fetal toxicants, which amounted to 989,700,000 pounds of these chemicals released in that one year.

155
There appears to be a direct relationship between birth-defect rates and the application volumes of chlorophenoxy herbicides, according to an EPA researcher. Dina Schreinemachers, a statistician with the agency's National Health and Environmental Effects Research Laboratory based her conclusions on birth records from nearly 150 wheat-producing counties in four Northern Tier states. In the published report, Schreinemachers says her findings should be viewed with caution because, among other reasons, wheat production acreage was used as a surrogate for actual exposures to 2,4-dichlorophenoxyacetic acid (2,4-D) and 4-chloro-2-methylphenoxyacetic acid (MCPA). However, she also notes that her findings are similar to those from a number of previous studies. Consequently, she says, her results "are especially of concern because of [the] widespread use of chlorophenoxy herbicides."

156
Richard et al found (2005. Differential effects of glyphosate and Roundup on human plancental cells and aromatase. Environmental Health Perspectives. Vol 113, Number 6) that some agricultural workers using glyphosate have pregnancy problems, but its mechanism of action in mammals is questioned. They show that glyphosate is toxic on human placental JEG3 cells within 18 hr with concentrations lower than the agricultural use, and this effect increases with concentration and time, or in the presence of Roundup adjuvants. Surprisingly, Roundup is always more toxic than its active ingredient. The herbicide acts as an endocrine disruptor on aromatase activity and mRNA levels, and glyphosate interacts within the active site of the purified enzyme, but its effect is facilitated by Roundup formulation in microsomes or in cell culture. They concluded that endocrine and toxic effects of Roundup and not only glyphosate can be observed in mammals, suggesting that the presence of Roundup adjuvants enhances glyphosate bioavailability and / or bioaccumulation.

157
Further, Farr et al found (2004. Pesticide Use and Menstrual Cycle Characteristics among Premenopausal Women in the Agricultural Health Study. Am J Epidemiol. 160:1194–1204) that women who used pesticides experienced longer menstrual cycles and increased odds of missed periods compared with women who never used pesticides. Women who used probable hormonally active pesticides had a 60–100% increased odds of experiencing long cycles, missed periods, and intermenstrual bleeding compared with women who had never used pesticides. These abnormalities are linked to increased risk to reproductive success.

158
The precautionary principle should be invoked by the CBF and if in ignorance, it should abstain from using herbicides in JDSF. To the extent the CBF chooses to proceed, it has a duty to engage in as thorough a study as possible on the impacts to pregnant women, fetuses and infants in order to disclose the true cumulative effects of the proposed pesticide use to the public.

Herbicides as a disturbance factor for invasive species

159
The DEIR fails in its analysis of the effects of the treatments that may be used to combat invasive plants and conduct vegetation management. Evidence exists, for example, that herbicides use may create conditions more hospitable to invasive species than were present before the chemicals were applied. CATs is concerned that by spraying herbicides in JDSF the CBF will be actually increasing potential invasive species infestations, rather than reducing them (the 'justification' given for herbicides in the DEIR). This is contrary to and exactly the opposite of the CBF's stated project objectives for the DEIR. The evidence below and the potential indirect impacts exposed of the proposed actions must be analyzed by the CBF in the DEIR.

160
Several studies have confirmed that increased nutrient availability, in the form of excessive dead organic matter, can favor non-indigenous annual species where natural nutrient levels may be insufficient. For example, increases in nitrogen (i.e. the widening of the C:N ratio) have shown to provide a competitive advantage to annuals such as cheatgrass that germinate much earlier in the season than native grasses (personal communication USGS, Corvalis, Oregon). If the CBF uses herbicides on invasive species and competitive vegetation, lots of plants will die, leaving an unnatural amount of dead organic matter on the ground, changing natural nutrient levels, and thus creating an unnatural advantage for unwanted exotic species.

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161
Use of herbicides where non-native weed plants already occur frequently results in a reproductive advantage for non-native species, which then expand rapidly due to the lack of competition. In a short period of time, this can result in an exponential increase in non-native plants (Wooten and Renwyck 2001).

162
McDonald and Everest (1996) of the USFS Pacific Southwest Research Station, found that cheatgrass populations, not observed in the study plots at the beginning of a study, exploded in herbicide-treated plots in a vegetation management study comparing herbicides and non-chemical means of reducing unwanted shrubs. Herbicide plots ended the four year study with 743,667 cheatgrass plants per acre with 22% foliar cover, where cheatgrass was 6 times greater in number of plants and more than 7 times greater in foliar cover than in the non-herbicide control plots (130,300 plants per acre, 3% foliar cover).

163
McDonald and Everest (1996) found that the cheatgrass was colonizing ground cleared by herbicides. Harper and Whitehead, of the Canadian Forest Service, found similar dynamics in comparable ecological conditions in British Columbia. As he notes in his Brush River Brushing Trial site project report (1994) "Total number of species are higher in glyphosate than in other treatments due to the ability of invading plant species to colonize on exposed sites. The initial reduction of shrub and herb cover of naturally occurring species following herbicide application probably allows for the establishment of such 'invaders." That herbicides appear to be a disturbance factor that actually encourages invasive species to colonize and spread in herbicide-treated areas clearly must be analyzed in the EIR.

164
A study done by the British Columbia Ministry of Forests Research Program in the Upper McKay Creek near Lillooet, B.C. found that the choice of herbicides can have a profound effect on the plant species content and diversity many years after treatment (Simar, Heineman and Youwe 1998). "The abundance of several low shrub species (black twinberry, black gooseberry, thimbleberry, trailing raspberry, red raspberry, birch-leaved spirea, and black huckleberry) was reduced for nine years following application of glyphosate. Hexazinone tended to have a longer-lasting effect than glyphosate on the abundance of grasses and forbs." As this report observes, "Plant communities naturally change over time, but sudden shifts in structure and composition may negatively affect the availability of food for wildlife." Lacking an analysis of the impacts over the long-term that may be expected from the use of various herbicides on non-target plant species composition and abundance, and lacking adequate guidance for which herbicides and other treatment options are suited or not suited for various ecological conditions common in the project area, the EIR cannot serve as an appropriate document for future decisions regarding invasive species management as it is currently written.

165
CATs has above provided examples of problems that the JDSF may incur due to the proposed spraying. The CBF is proposing to spray invasives, but the spraying may actually create conditions more favorable to exotics rather than native species. This has the potential to become a continuous spraying loop, something CATs is obviously strongly opposed to. The CBF is required by CEQA to mitigate or avoid these potentially significant impacts.

Cumulative impacts

166
The CBF has failed to analyze the cumulative impacts of past, present and future pesticide use in the JDSF and surrounding area. JDSF has long had intensive forestry practiced, much like on timberlands, that involves heavy herbicide applications. The watersheds of the Noyo and Big Rivers are part of the JDSF and have been and continue to be impacted by pesticide applications. The area framed by Fort Bragg to the West and Willits to the East, and by the Noyo and Big River watersheds has had heavy pesticide usage in the past, with an average of 6,750 pounds of pesticide products applied over the last five years. The CBF has a responsibility to analyze how the proposed herbicide applications within the JDSF will contribute to the cumulative impacts of

past, present and future pesticide applications in this part of Mendocino County. Impacts of special interest should be to human health, water quality, aquatic species, wildlife, and native botanical species.

167

Table 1. Total pounds of pesticide products applied in Mendocino County in the area between Willits and Fort Brag and within the Noyo and Big River watersheds. Data from California Department of Pesticide Use Databases. Information compiled by Californians for Alternatives to Toxics, Feb. 2006.

Year	2004	2003	2002	2001	2000
Total pounds of pesticide products	3,497	4,375	8,685	7,537	9,637

Conclusion

CATs would like to thank the CBF in advance for regarding our comments. Please consider the issues discussed above prudently. Don't hesitate to contact us for further feedback. We look forward to your responses to the public comment period.

Sincerely,

/s/ Pete Harrison
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Letter E-28

Response to Comment 1
The responses below will specifically address the stated concerns about use of herbicides and adequacy of analysis and avoidance of impacts. Support for Alternative D is noted. The Administrative Draft Final Forest Management Plan (or Plan) being considered by the Board of Forestry and Fire Protection (Board) is more restrictive regarding the use of herbicides than Alternative C1. See pages III-38 to 45 and 105 in the Recirculated Draft Environmental Impact Report for JDSF Management Plan Alternative G (RDEIR). Alternative G incorporates elements of Alternatives D-F to provide for a greater amount of the Forest to be managed for all-aged, older forest structure than Alternative C1.

Response to Comment 2
Support for Alternatives E and F is noted. Alternative G (which is incorporated into the Administrative Draft Final Forest Management Plan) provides the greatest management emphasis on research and demonstration. The first three goals of the Plan are: Goal #1 – Research and Demonstration, Goal #2 – Forest Restoration, Goal #3 – Watershed and Ecological Processes. Alternative G provides for less intensive forest management than Alternative C1, with expected annual harvests estimated to decline from 31 million board feet (MMBF) per year to 20-25 MMBF per year, similar to the 19.3 MMBF average annual harvest in Alternative F (Table II-4, page II-29 in the RDEIR). The proposed Administrative Draft Final Forest Management Plan would permit an allowable cut of up to 35 MMBF/year, however it is unlikely that this level could be achieved, given the various other goals and constraints contained in the Plan. Further, it places significant restrictions on the utilization of evenaged management.

Response to Comment 3
Opposition to Alternatives C1 and C2 is noted. Alternative G (which is incorporated into the Administrative Draft Final Forest Management Plan) calls for less intensive management practices than Alternatives C1 and C2, as noted in the response to Comment 2. Alternative G places further restrictions on the use of herbicides. The environmental analysis in the DEIR, RDEIR, and FEIR did not find that a significant adverse effect would occur from the use of herbicides. The specific concerns listed will be addressed in detail below.

Response to Comment 4
The Board assumes that the term “chemical free” Integrated Pest Management (IPM) from the comment refers to no herbicide use. Many non-herbicide approaches to vegetation management require substantial use of petrochemicals.

The reference cited for the Canadian Wildlife Service (White and Haber 1993) appears to have been modified in the comment letter quote. The section quoted appears to be from the section 1.3, outlining five control methods. The first control method listed was herbicide, followed by physical removal, the use of biological agents, prescribed burning, and ecological or integrated pest management. For the IPM section, the correct quote is as follows:

> Ecological or Integrated Pest Management involves combining elements of the above four methods with preventative measures, increased knowledge of the target species biology and ecology, and restoration of the biotic and abiotic components of a habitat before or concomitant with the removal of the invasive exotic (Achuff et al., 1990; Thomas, 1986; Thomas, 1991).

The section of the quote that was paraphrased (altered) in the comment is underlined. From the context, it is clear White and Haber considered herbicides a component of IPM.

The majority of the ideas attributed to Thomas in the quote from White and Haber (1993) document found in the concern letter come from the proceedings of a conference conducted

approximately 20 years ago (1986). As time has passed, the recognition that disturbance is not always necessary for invasive weeds to threaten wildlands had been validated.

Alternative G includes Integrated Weed Management and Integrated Pest Management Strategy that incorporates elements of the correctly quoted description from White and Haber (1993) and that includes consideration of the factors cited from Thomas (1986).

Response to Comment 5
The DEIR defines Integrated Weed Management (IWM) as the control method that shall be used at JDSF (IIV.6.6-20). This has been included in the Administrative Draft Final Forest Management Plan. The term IPM refers to Integrated Pest Management. IPM is a broad set of principles. The more specific implementation of these principles for invasive weed control on JDSF is referred to as IWM in the DEIR. The responses refer to IWM as a JDSF approach and IPM as the broader approach.

Response to Comment 6
The definition quoted in the comment is from Assembly Bill 2260, establishing the Healthy Schools Act of 2000. As indicated in the concern letter it may be viewed on the Department of Pesticide Regulation (DPR) web site (http://www.cdpr.ca.gov/cfdocs/apps/schoolipm/school_ipm_law/17_ab2260.pdf). The Healthy Schools Act supplemented the Education Code and Food and Agriculture Code Section 13181. The last sentence in Section 13181 was not included in the concern letter quote. The final sentence states (emphasis added) "This definition shall apply only to integrated pest management at school facilities." Though IPM shares general principles, specific pest management situations will necessitate some differences in emphasis. Pest management within schools is inherently different from pest management on a forest.

Response to Comment 7
The level of detail that the comment requests is beyond the scope of an EIR. The DEIR provides programmatic direction with respect to vegetation management. This does not relieve CAL FIRE from conducting the appropriate site-specific analysis before undertaking any weed management activities. The DEIR page VII.8.13 to 16 provides an explanation of CEQA analysis and herbicide use. JDSF is building its IWM strategy by using adaptive management. As the invasive weed program develops, standards for treatment are developed based upon knowledge gleaned from management of the Forest, from partners in the Mendocino Coast Weed Management area, and elsewhere. DEIR page VII.6.2-20 includes among the eight "planned actions" included in the Administrative Draft Final Forest Management Plan; "The status of infestations and management effectiveness will be periodically evaluated."

Treatment thresholds depend on the risk posed by the invasive weed and the resources at risk. For example, a single individual of a species that is not established on the forest but is known locally for aggressive spread (example *Deliria odorata*, cape ivy,) would be treated with a goal of elimination. Unfortunately, other invasive species are well established in some areas, so management will be more complex and lengthy. For these species (example *Cortaderia jubata,* jubata grass), treatment could occur when individual invasive weeds threaten a sensitive resource, such as a rare plant occurrence. Numerical triggers may be appropriate for agricultural implementation of IPM, where the decision to treat a pest is based on an economic factor.

The DEIR lists thirteen species with reference to their relative abundance (VII.6.2-12 and 13 and Appendix 7B-1). The document provides adequate detail for consideration of vegetation management at the management planning level. Further detail will depend upon analysis performed with knowledge of individual projects and their environment. In the absence of control measures, invasives have some potential to spread. The invasive nature of these species is well documented (e.g. California Invasive Plant Inventory).

High priority invasive weed occurrences are mapped. These occurrences are monitored, and treatments are evaluated and documented. "The status of infestations and management effectiveness will be periodically evaluated." (DEIR page VII.6.2-20) The inclusion of site-specific monitoring results is beyond the scope of a programmatic EIR.

Response to Comment 8
One-time treatments of any type may not be effective. Neither one-time hand pulling nor herbicide application will eradicate an invasive weed, if there is a well-established seed bank at that location. CAL FIRE will not undertake any invasive weed control measures unless there is a plan to manage the weed occurrence for the long term to cope with resprouting or seeding. Any new techniques will be used on small scale and monitored to determine their effectiveness. The references cited note that herbicides can be an appropriate component of control measures in their discussion of these individual species (Zouahr 2003, CDFA (Dyers–Woad), Huckins and Stoll 2004, Raj 2002, Hoshovsky 1996).

The comment states; "Herbicide use for noxious weed management has been shown to be neither the lowest impact nor the most environmentally or economically effective control treatment method." The statement is represented in the letter as a conclusion drawn from the references cited. The references cited were examined to determine whether they made a similar conclusion, and if so, whether the context was relevant. The second citation for the CDFA Encycloweedia is for Italian Thistle. This web reference lists a variety of treatments as being effective, including goats, seven herbicides, and IPM. The reference does not support the comment's conclusion.

Regarding the citation of Kedzie-Webb et al. (1996), this reference states:

> None of the herbicides mentioned have been found to be cost effective for controlling large infestations on rangeland. Cost effective control of large infestations with herbicides depends on the value of the rangeland. Therefore, early detection and treatment of new invasions is most critical.

Note that this specific rangeland analysis is not pertinent to JDSF.

The remaining references cited Huckins and Stoll (2004) and Hoshovsky (1986), descibe control meaures for broom, and include the use of herbicides in the recommendations. These references do not support the comment's statement.

Response to Comments 9-10
Approaches to weed management will be ecologically based as indicated on page II-11 of the RDEIR, "Integrated Weed Management would consider herbicides as a possible treatment for invasive plant species only under limited conditions. No application would be undertaken unless sit is part of a long-term ecologically- based management approach..." The DEIR includes, in Appendix 7B-1, six pages of discussion of the biology and ecology of the major invasive species at JDSF. The threat posed by a given plant will vary by habitat and associated resources at risk. Inclusion of additional detail on weed biology is beyond the scope of the DEIR. The DEIR includes a sufficient level of detail to enable a thorough analysis of the potential for significant effects to occur.

The DEIR includes direction intended to keep knowledge of invasive weeds current. Page VII.6.2-21 states that one of the eight planned actins for invasive exotic plant species control is "JDSF proposed a cooperative with local, state, and federal agencies, forest landowners, and private and public organizations to develop weed management strategies.

Response to Comment 11
The Board recognizes that IWM at JDSF could involve a variety of techniques (DEIRVII.6.2-20.) The Archer (2001) reference is species-specific information (medusahead grass, a species that is not a concern on the forest). In many cases a single treatment method (including herbicides) is

effective, when it has a sound ecological basis. However, the management of JDSF is not restricted to single treatment methods.

Response to Comment 12
The Board is aware of the importance of timing. DEIR page VII.8-12 indicates this in a discussion of IWM program "which relies on a thorough understanding of the pest's biology, the affected environment, timing,…" Dates referenced in literature may not match annual weather patterns or the phenology of invasives in the redwood region. Phenology is likely to vary by distance from the coast and elevation as well. These site-specific, project-specific issues are better addressed at the project level environmental evaluation than in a programmatic EIR.

Literature would be considered in the development of any site specific weed management project, as would the results of effectiveness monitoring for prior projects (DEIR page VII6.2-20).

Response to Comment 13
The Board recognizes the role of vectors in weed spread. The principle vectors (vehicles, contaminated hay, wind, animals, humans, insects, etc) for the manor invasive exotic species on JDSF are included in DEIR Appendix 7B-1. This appendix also noted whether the species is spread by seed, plant parts, or both.

The IWM strategy at JDSF recognizes understanding of the spread of invasives is important. As provided in the Administrative Draft Final Forest Management Plan Chapter 3, the evaluation of weed infestation will include an investigation of the probable cause of the infestation.

The DEIR includes as one of the eight planned actions to reduce invasive weed populations that "The impacts of invasive exotics and the potential for spread will be considered during the development of individual projects" (page VII.6.2-20). This would include preventative measures. Other preventive measures, such as cooperative activities and modification of potential habitat are included in the Administrative Draft Final Forest Management Plan. As an example, page DEIR VII.6.2-21 states; "JDSF proposes a cooperative with local, state, and federal agencies, forest landowners, and private and public organizations to develop weed management strategies … JDSF will continue to support the International Broom Initiative, and will continue to be involved in local weed management initiatives." Additional Management Measure 1 (DEIR VII.6.2.7) commits to monitoring rare plant occurrences for invasive weed problems.

The Board recognizes that an understanding of the causes of invasive weed infestations is key to effective management. This is a basic component of IWM at JDSF.

Response to Comment 14
Invasive weed management will continue to focus upon roads and other areas that represent potential sources of infestation. Roads link most campgrounds and recreation areas. Some species are readily controlled by a vector approach, while others are not.

Response to Comment 15
The cited document is the Regional Noxious Weed Strategy (US Forest Service, 2002). The document includes general discussions appropriate at a very broad scale. JDSF forest management would make use of some similar approaches, as well as others, on a project-specific basis. For example, the DEIR (p. VII.8-11) identifies the IPM measure of: "Manage incidental introductions including those from rock, straw and other materials."

JDSF has taken immediate action, including manual control methods, as well as pre- and post-project monitoring for invasive weed management. Identification and avoidance can also be effective, and has been utilized. Project-, site- and species-specific measures are more effective than general guidelines.

Response to Comment 16
The IWM approach includes prevention and an understanding of the disturbance effects that lead to infestations. Infestations have been facilitated by both management related disturbances and the proximity of infested rural residential and other lands. The DEIR, page VII6.2-20, provides for consideration of invasives during project development; “The impacts of invasive exotics and the potential for spread will be considered during the development of individual projects.” Some management actions have potential to create conditions that are more favorable to the establishment of invasive species, such as timber harvesting, road construction, road maintenance, and recreational development. These activities can be modified, based upon local conditions, to reduce the threat of infestation. Project modification may include variations in shade retention, buffering of roadsides, and reductions in the level of soil disturbance.

Response to Comment 17
A Monitoring and Adaptive Management Program is included in the Administrative Draft Final Forest Management Plan (Chapter 5) that will provide a framework to develop effective control techniques. Page III-23 of the DEIR summarizes the program. See response 16 above.

Response to Comment 18
Using cleaning or washing as a method to control invasive species is not likely to be effective, given the species of invasive weeds currently known to the Forest. Most of the infestations on JDSF occur due to spread by animals, wind, and vegetative means. Cleaning equipment can be effective in specific instances, depending upon the species and sites involved. Buffering infestations to prevent off-site movement of propagules may be a feasible approach for some projects. Speculation concerning the site-specific utility of cleaning measures is beyond the scope of this document.

Response to Comment 19
Grazing and off-road vehicle use are not permitted within the Forest. However, some illegal off-road vehicle use does occur. Most of this activity occurs along roadways at the periphery of the Forest. Local evidence does not suggest that these activities are a significant cause of infestation by invasive species.

Response to Comment 20
Grazing is counter to Board policy (Policy 0351.6) and is not permitted on the Forest. Grazing occurred historically in some areas in the forest, prior to the establishment of the State Forest. This use was primarily associated with the logging camps and early settlement.

Response to Comment 21
Utilizing grazing as a tool for invasive weed control is likely to be ineffective, due to the terrain, available access, the form of the forest vegetation, and the presence of predators. Brooms are toxic to some grazing animals and other major invasive species are less palatable than native plants. Any future use of grazing as a control method would entail careful analysis of the risks and benefits, as well as requiring a change in Board policy, see response above.

Response to Comment 22
Timber harvests are a key part of JDSF’s legislated mandate. They are critical to the demonstration of sustainable forest management. See DEIR Section II. 2 for Board policy related to management of the state forest. Fuels reduction is not the primary purpose for logging activities. Please see DEIR section VII-8 for an evaluation of forest protection, including IWM.

There is potential for invasive species to become established in the forest environment regardless of the form of stand management that is utilized. In general, the most common species present tend to invade newly disturbed areas, such as roads and skid trails. As the forest canopy redevelops and affected areas regenerate, the degree of infestation tends to diminish. Depending upon specifics such as the relationship of disturbance to invasive species and to existing shade levels, plans can be modified to prevent or reduce the risk or degree of invasive establishment.

The specifics of the project site must be considered, and appropriate projects modifications made to reduce or prevent this occurrence. This is the component of IWM at JDSF.

Timber harvests and fuel reduction will vary in their potential to increase invasive weeds. The measures developed must be project specific. The Administrative Draft Final Forest Management Plan (Chapter 3), Planned Actions for invasive weeds, specifies the following; "Staff will consider the impacts of exotic weeds to native vegetation during the normal course of project development. If there is a high likelihood of weed spread due to a nearby infestation, mitigation should be considered where appropriate and consistent with IWM to minimize weed spread."

Response to Comment 23
At JDSF, revegetation is rapid following harvest. The DEIR includes discussion of fire and fuels issues (page VII.8-5&6). Most of the forest is rated as high with regard to fuel levels, due to the high level of forest vegetation inherent to this region. The fire potential is largely mitigated by a relatively wet climate and lower-than-average frequency of severe fire weather. Other factors also affect the potential for wildfire ignition and spread, including the access and the proximity to fire control resources.

The management of the forest focuses upon promoting ecological processes to regenerate the forest, not mechanical or chemical treatment. Carefully planned timber harvest operations are capable of adjusting site occupancy, which is generally maintained by stand development. Herbicides are not widely utilized, nor depended upon, to maintain the forest vegetation in a specific condition. Herbicides are utilized judiciously and in a localized manner under specific circumstances. The analysis in the DEIR and RDEIR did not find that herbicide use would result in a significant adverse environmental impact.

Response to Comment 24
Forest thinning is an activity that is considered in the DEIR and RDEIR. Under Alternative G and the Administrative Draft Final Forest Management Plan thinning objectives include the adjustment of stand structure and tree species to achieve sustainable production goals and to create specific structural conditions (or habitats), as detailed in Administrative Draft Final Forest Management Plan Table 3.2. Thinning may be an important aspect of stand management on an even or uneven-aged basis, and can contribute to conditions that are more resistant to the spread of wildfire. However, landscape-level fuels manipulation is not a primary objective of thinning.

Shaded fuel breaks are among the fire defense improvements referenced in the DEIR and RDEIR. These shaded fuel breaks may be considered in defensible areas along main ridges, adjacent to high use roads, and adjacent to rural residential neighborhoods (page VII.8-7 of the DEIR). The mesic climate lowers fire risk but also increases the rate at which native and invasive plants can become established within a shaded fuel break. Among the considerations for any fuel break project would be long-term management and maintenance, including addressing invasive species risks. Some species of native vegetation, including ferns, forbs, and low shrubs could be managed to discourage the growth of ladder fuels. Significant impacts related to fire safety are not expected to occur. Historically, the incidence of significant fires is very low in the local area.

Response to Comment 25
The Hazards and Hazardous Materials section (VII-8) of the DEIR includes discussion of wildfire risk and measures to protect the Forest. The proximity of the Pacific Ocean and its resulting summer fog pattern dominate any minor microclimate changes associated with the forest structure within JDSF. The vast majority of the Forest is well vegetated with a high level of forest canopy

Response to Comment 26
The DEIR and RDEIR do not include provisions for broad-scale restoration of the pre-Euro-American fire frequency to the redwood forests at JDSF. Such a practice could pose a threat to adjacent property and may not be consistent with the concept of sustainable timber production,

due to the anticipated level of stand damage that would occur. However, some level of underburning may be considered at a local level in areas designated for late-seral forest development.

The concern quoted a study from the Sierra Nevada regarding the need for underburning. The Stephens article is titled "Evaluation of the effect of silvicultural and fuels treatments on potential fire behavior in Sierra Nevada mixed-conifer forests." Jackson Demonstration State Forest is not located in the Sierra Nevada mixed-conifer forest; it is located in the fog-influenced redwood forest. The results of this modeling are not directly applicable to the redwood forest type found at JDSF, nor is the assumption that natural fire regime is a goal for JDSF.

Response to Comment 27
The reference cited is from the 1996 Sierra Nevada Ecosystem Project, a chapter titled "Use of a Deterministic Fire Growth Model to Test Fuels Treatments." The abstract includes this description of the analysis and results:

> Wildfire spread was simulated under idealized conditions to see how specific fuel and stand treatments affect fire behavior. It was obvious from the simulations that fuel breaks alone do not halt the spread of wildfire. Prescribed burning appears to be the most effective treatment for reducing a fire's rate of spread, fireline intensity, flame length, and heat per unit of area. A management scheme that includes a combination of fuel treatments in conjunction with other land-management scenarios should be successful in reducing the size and intensity of wildfires.

While controlled periodic underburning may have potential to reduce the long-term risks associated with wildfire, significant impacts are not expected in consideration of the current level of risk in combination with planned forest management. The context of the actual quote recognizes that this reference was a simulation and that other techniques have a role in modifying fire behavior. The Sierra Nevada is a different ecosystem than the costal redwoods, and fire issues are different as well.

Response to Comment 28
The DEIR discusses fire history on JDSF and recognizes the ecosystem role of fire (see DEIR pages VII.8-1 through -6). It also identifies the Forest's potential for conducting research on prescribed fire as a management tool, including ecosystem management and as a vegetation management tool to protect, maintain, or improve wildlife or plant habitat. This type of research activity is supported in the DFMP (page 83) and the Administrative Draft Final Forest Management Plan (see Chapter 3). However, systematic application of prescribed fire throughout the Forest is not anticipated.

With respect to "prehistorically natural conditions," Alternative G and the Administrative Draft Final Forest Management Plan provide for substantial areas of the Forest, over one-third, to be managed for older forest conditions, including the remaining old growth groves, which would be the portion of the forest closest to prehistorically natural conditions. Prescribed fire may be utilized within these older forest areas, but only after careful study and consideration of ecological processes and environmental effects, including the application of IWM principles and potentials for either controlling or encouraging invasive species.

The DEIR hazards section describes changes in reforestation techniques that have resulted in a reduction in broadcast burning and the need for subsequent herbicide use (pages VII.8-12 to -13).

Response to Comment 29
Public use of off-highway vehicles is not legal on JDSF, nor do any of the alternatives propose a change in that status. Visitor travel on the forest is restricted to highway legal vehicles on roads

designated as open. Some illegal OHV use occurs despite CAL FIRE enforcement of the laws to prohibit such use. Please see responses above concerning the weed vector issue.

Response to Comment 30
The Administrative Draft Final Forest Management Plan Chapter 3 Invasive Weed Planned Actions include: "Conservation of and reestablishment of native vegetation will be considered in disturbed open areas adjacent to forest roads in order to minimize weed spread." Regarding the comment about native forbs and grasses, understory response is discussed extensively in the DEIR at pages VII.6.2-40 to 41.

Response to Comment 31
The paper by Belsky and Bluementhal (1997) concerning ponderosa pine and mixed-conifer forests of the interior west does not appear to support the comment. Regarding competition, this paper states:

> Prior to extensive Euro-American settlement, circa 1820 - 1890, two natural phenomena maintained the trees at low densities (1) competitive exclusion of tree seedlings by dense understory grasses and (2) frequent thinning of understory trees by low-intensity surface fires. The vigorous graminoid understory was particularly important in maintaining low tree densities because established grasses with their extensive root systems are able to out-compete tree seedlings for soil moisture and nutrients (Rummell 1951; Larson & Schubert 1969; Miller 1988; Karl & Doescher 1993).

Regarding exotic weeds:

> Exotic weeds have been able to displace native species, in part, because native grasses of the Intermountain West and Great Basin are not adapted to frequent and close grazing (Stebbins 1981; Mack & Thompson 1982)

The redwood forest is different ecosystem than the interior ponderosa pine and mixed conifer forests of the west. Grasses play a more limited role in the redwood forest understory and succession that in other parts of the west, primarily due to influence of other plant species that overtop and shade out grasses.

A PEIS is a preliminary environmental impact statement, which is normally associated with a federal project. The lead agency for the JDSF management plan is the Board of Forestry and Fire Protection, which is a state agency subject to CEQA, rather than the National Environmental Policy Act (NEPA). Revegetation has been considered in the Administrative Draft Final Forest Management Plan, DEIR, RDEIR, and FEIR. The Administrative Draft Final Forest Management Plan does not propose widespread fuels reduction in the redwood forest of JDSF.

Response to Comment 32
The DEIR addresses eradication and control (VII.8-12). IWM recognizes that eradication is an inappropriate goal for well-established invasive weeds. It recognizes that control is the appropriate strategy in this situation. It notes that treatments would not be recommended without a careful assessment of the pest's impacts. The management decisions will be site and species-specific. The DEIR, RDEIR, and FEIR provide analysis and guidance of vegetation management that will be considered at the project level. See also the response to Comment 7.

Response to Comment 33
The DEIR and RDEIR considered a range of alternatives to treat invasive plants. The alternatives vary from no use of herbicides (Alternative E) to herbicide usage only very generally constrained by label and other legal restrictions (Alternative B), with several variations in between (see "Herbicide Application" and "Invasive Species Control" in RDEIR Table II.4). The various alternatives consider IWM, a moratorium on herbicide use, research and demonstration of alternatives to herbicides, and

other elements. This range of feasible alternative approaches to herbicide use is adequate to meet CEQA requirements.

The DEIR and RDEIR do not represent a decision document for specific herbicide applications; the approach to vegetation management is programmatic. The DEIR document recognizes that individual projects may use mechanical and manual methods to control invasive weeds (page VII.8-12). CAL FIRE is clearly aware of, and interested in using non-herbicide methods to manage vegetation.

JDSF has been a research site for non-herbicide vegetation control methods. This research has included investigation and consideration of several techniques with potential to control species of broom and the resultant seed bank. CALTRANS utilized JDSF as a test site for several control methods, including alternatives to the use of herbicides (Young 2003). JDSF remains interested and available for research of this kind. As noted in response to earlier comments, the supposition that IPM excludes herbicide use is not supported by the literature.

Several of the alternatives, as well the Administrative Draft Final Forest Management Plan, include consideration of research on alternative methods to controlling invasive species (Alternatives C1, C2, E, F, and G). Alternative G, page II-10 of the RDEIR, include the following statement:

> In an operational context, herbicides will be used only when no other effective and feasible control methods are found after consideration of the scope of the problem, opportunities to effectively manage the situation, and available alternatives and their potential effectiveness, costs, and risks.…

The Administrative Draft Final Forest Management Plan (Chapter 3) details these elements more specifically:

> CALFIRE and the BOF recognize there is public controversy regarding herbicide use. A total ban on herbicide use would compromise research opportunities and the broad demonstration value of the Forest and could result in adverse environmental and economic consequences. JDSF staff will adopt the following limitations to potential herbicide use:
>
> - No herbicide will be used unless it is integral to long-term, ecological based management. Projects will be proactive rather than reactive. These considerations will limit and focus any herbicide use. Long-term management will often integrate a variety of treatment techniques.
> - Public and environmental safety is a priority. When herbicide use is indicated, JDSF staff will reduce risk by selecting appropriate herbicide formulations and application techniques.
> - Recognize that some forest visitors may experience negative aesthetic reaction to dead treated plants, even if they are invasive weeds. Herbicide use will be evaluated for aesthetics where treatments could have this potential effect.

Response to Comment 34

The DEIR and RDEIR include a number of alternatives that incorporate the IWM approach that is based on ecological and preventative principles that are incorporated into the Administrative Draft Final Forest Management Plan. IWM is specifically included in Alternatives C1, C2, E and G, & the Administrative Draft Final Forest Management Plan.

Specific and detailed techniques for control of invasive species are not included in the DEIR. This level of management specificity is beyond the scope of the document. The DEIR and RDEIR provide

the appropriate level of analysis to enable a thorough assessment of the potential for significant adverse effects.

The DEIR does not contain an extensive description of symptoms. It discloses the environmental conditions that exist on the forest.

With reference to restoration of natural ecosystems and the range of alternatives the DFMP includes "Goal #3 - WATERSHED AND ECOLOGICAL PROCESSES**:** Promote and maintain the health, sustainability, ecological processes, and biological diversity of the forest and watersheds during the conduct of all land management activities". This goal helped formulate Alternatives C1 and C2. Alternatives E and F added an emphasis on management for late seral or older forests. Alternative B had little recognition of natural ecosystems. Alternative G places a greater emphasis on older forests than Alternative C1. The second goal for Alternative G and the Administrative Draft Final Forest Management Plan is "Forest Restoration: Work toward active restoration by managing the Forest to promote and enhance forest health and productivity," The objectives under Goal #2 provide additional detail as to how the goal will be attained. The analysis has encompassed an adequate range of management objectives regarding natural ecosystems.

Response to Comment 35
The DEIR and RDEIR consider and retain a broad range of potential treatment methods. The Board has not proposed to make a blanket decision to rely only on non-organic herbicides. As noted above (see response to Comment 33), the EIR alternatives include research and demonstration of alternatives to herbicides. Alternative G included more specific language to limit herbicide use and encourage alternative methods (see response to Comment 33 regarding the RDEIR and "In an operational context…").

Project planning will incorporate consideration of the potential effects associated with proposed treatment methods.

JDSF is open to demonstration and experimentation involving the techniques listed in the comment letter. Alternative G's emphasis on Research and Demonstration add focus. Some, such as torching, have already been used on the Forest. Priority projects would be those that are both feasible and relevant to forest conditions.

Response to Comment 36
The comment letter author may be unaware of the extensive use of volunteers utilized for invasive weed work near the state forest. Several state park groups, a land trust, botanical garden, and neighborhood groups regularly undertake invasive weed control efforts. Recent outreach by the Mendocino Coast Cooperative Weed Management Area failed to recruit a significant number of new volunteers. JDSF is interested in developing volunteer projects. Alternative G supports these activities.

Response to Comments 37- 64
These comments describe specific control methods for a number of invasive species. They do not raise specific environmental impact concerns about the alternatives considered by the Board.

The Board agrees that each invasive weed and proposed project should be evaluated carefully. The DEIR and RDEIR provide a description of the range of control methods to be used and identify the weed species that are anticipated to potentially require treatment. Within this programmatic context, the assessment in these documents did not find that the proposed actions, as mitigated, would result in a significant potential environmental impact.

The specific possible options for control measures are appropriately considered at the project level. The DEIR includes a discussion of the objectives of the DEIR and its relationship to specific projects (page II –9 to 14). Alternative G provides some specificity in terms of general location of future projects, but the specific operational detail is not known at this time. This management

planning process will establish constraints and mitigation that future projects must adhere to, and recognizes the potential need for future analysis and CEQA compliance.

Sources of information regarding the control of invasive plants, and alternative techniques include: “The Weed Workers’ Handbook, A Guide to Techniques for Removing Bay Area Invasive Plants (Holloran et al. 2004), and the Nature Conservancy's “Weed Control Methods Handbook: Tools and Techniques for Use in Natural Areas” (Tu et al. 2001), as well as various university and government web sites. The availability of information on potential techniques does not demonstrate that they are feasible for use on JDSF, or that the potential environmental effects compare with the use of herbicides. Some of the techniques listed are utilized at JDSF, while others have been tried and have shown little or no promise. Some treatments appropriate for agricultural areas are likely to produce significant impacts if utilized in the forest environment.

Response to Comment 65
Please see response 37 for the description of the role of the DEIR in relation to individual projects. The herbicide information provided is adequate for the consideration of potential effects at the management planning level. The information provided does not support a specific decision to use a given herbicide, but discloses the range of possible herbicides that could be used. Please see DEIR Section VII-8.2.3. This section includes discussion of new information. Please also see the RDEIR at pages III-105 through 110.

The DEIR, RDEIR, and FEIR appropriately provide information to inform decision makers and the public.

Response to Comment 66
Once approved, the Administrative Draft Final Forest Management Plan will provided guidance until such time as the document is significantly amended, revised, or replaced. As new and relevant information becomes available, it will be considered, and the management plan may be revised if proposed changes are significant. All herbicide use will be according to label restrictions and all applicable regulations. The level of effectiveness and safety will be considered. If herbicide products that are not addressed in the DEIR or RDEIR are considered for use on a future project under the Administrative Draft Final Forest Management Plan, any necessary CEQA evaluation will be conducted at that time.

Response to Comment 67
The DEIR does not simply assume, as the comment states, that “if an herbicide is registered and label directions are followed that the herbicide product will be ‘safe.’” Appendix 13 of the DEIR provides general descriptions of herbicides considered for use on Jackson Demonstration State Forest that includes information on potential risks (potential for groundwater contamination, effects of contact with skin, eyes or when ingested, etc). The Appendix also includes a brief introduction to the analysis tool, (Table 1) Categories of Herbicide Toxicity. This presents the factual basis for the risks reviewed and captured on the product labels. These ratings are part of both the Federal and State registration process. The registration process along with the site specific use recommendations make it highly unlikely some one would encounter the dose listed in the tables.

The DEIR also discusses the use of targeted treatments and the potential impacts to non-target species (p. VII.8-10 to -13 and Appendix 13). Project-level evaluations of potential herbicide use will consider potential impacts to non-target species.

Pages VII.8-15, 16 and 12 of the DEIR also indicate that a wide variety of information was taken into consideration when evaluating potential herbicide use impacts in general, and—more critical relative to the comment’s concern about project-specific analysis—will be considered prior to any specific application proposal:

> Where herbicide use is proposed for use under the DFMP CDF will review the herbicide's intended use and its possible environmental effects.… CDF will also check for significant new information showing changes in circumstances or available information that would require new environmental analysis.… CDF will look for simple and practical ways to avoid or mitigate potential new significant effects on the environment. Cumulative impacts are unlikely because herbicide uses related to different control projects are separated in time and distance so that their individual effects do not reinforce or interact with each other. Herbicide use under the DFMP is neither widespread nor frequent. Herbicide may be used to reduce weed competition with small seedlings, to release the young trees from competition with brush, or to eliminate exotic weeds. Forestry herbicide uses are substantially less, in both frequency and amount, than in agricultural or urban settings.
>
> Furthermore, based on evaluations CDF has conducted on this issue in relation to herbicide use by other landowner, potentially significant impacts related to the actual application of herbicides on JDSF are not expected. A CDF report titled *Environmental Effects of Herbicide Related to Timber Harvesting* (Norm Hill and Wendy Wickizer March 4, 2002) states that "The effects are generally not cumulative impacts because uses related to different Timber Harvest Plans (THPs) are separated in time and distance so that their individual effects rarely reinforce or interact with each other...."

CAL FIRE will continue to monitor the scientific literature for significant new information about the potential effects of herbicides, both in general and when considering herbicide use for a specific project to be carried out under the ADFFMP.

The alternatives restrict the use of herbicides to varying degrees. Alternative G restricted the herbicide use in the management plan and requires project-specific analysis (RDEIR pages II-10 and 11):

> Alternative G would eliminate one of the management uses of herbicides permitted under Alternative C1 (treatment of native species for road maintenance purposes, unless needed for a specific fire prevention project) and impose further restrictions in the use of herbicides control of hardwoods to adjust conifer/hardwood stocking [ratios] and control of invasive weed species as part of an Integrated Weed Management program.
>
> In an operational context, herbicides will be used only when no other effective and feasible control methods are found after consideration of the scope of the problem, opportunities to effectively manage the situation, and available alternatives and their potential effectiveness, costs, and risks. JDSF staff will seek opportunities to reduce risk by selecting appropriate herbicide formulations and application techniques, as well as taking additional precautions.
>
> Alternative G incorporated Alternative C1's provisions for an effective integrated pest management program. Adjusting imbalance in conifer/hardwood stocking levels by utilizing herbicides will be limited to specific reforestation situation on the east side of the Forest. In specific areas toward the east end of the forest, high tanoak stocking levels are capable of preventing native conifer establishment and growth. Herbicides may be used to decrease native hardwood stocking levels only when other options: are prohibitively expensive, dramatically increase fuel loading, are overly damaging to conifer regeneration, or are not likely to be successful.

> Integrated Weed Management would consider herbicides as a possible treatment for invasive plant species only under limited conditions. No application would be undertaken unless it is part of a long-term ecologically-based management approach. This program will utilize a combination of control methods evaluated for environmental safety and effectiveness. Environmental and public safety as well as aesthetic will be part of the decision-making process for selecting specific treatments....

The DEIR (pages VII.8-15 to -16) discusses the manner in which CAL FIRE will consider and make use of new information that may be identified with respect to specific herbicides and specific applications. The role of DPR in this process also is identified.

Response to Comment 68
Indicative of current herbicide use levels, page VII.8-10 identifies that only 20 pounds (active ingredient basis) of herbicides were applied on JDSF over a four-year period beginning in 2000. Pages VII.8-10 and 11 of the 2005 DEIR address the amount of herbicides that could potentially be used on JDSF based on the DFMP (Alternative C1):

> The low level of herbicide use on the Forest in recent years is indicative of the low level of management activity in general, in addition to the request for reduced herbicide use from the public. When management activity levels on the Forest increase following the implementation of the DFMP, herbicide use levels may increase above those of the past several years. However, it is not anticipated that herbicide use will increase to the levels of the early to mid 1990s.

Alternative G adds restrictions that will result in reduced herbicide use (RDEIR pages II-10 and 11 and Administrative Draft Final Forest Management Plan, Chapter 3), as compared to the DFMP. The Administrative Draft Final Forest Management Plan includes a sequence of evaluation factors that will limit use and potential for adverse effects (see response to comments 33 and 67 for details). These will be analyzed for each specific project and mitigations measures developed to avoid impacts from herbicide use.

Definitive estimates of future herbicide use are not possible at this time, as specific projects using herbicides have not been proposed. The analysis conducted for the DEIR considers the potential for significant and cumulative effects. The anticipated level of impact associated with each area of management, and associated with each of the alternatives considered, is included at the end of each resource subject analysis. A formal risk assessment was not conducted in association with each herbicide. Please see the discussion of herbicide regulation in Section VIII 8.2.3 of the DEIR. The Administrative Draft Final Forest Management Plan, though programmatic with respect to vegetation management, includes specific guidance that is related to forest conditions. This includes the direction with respect to the quantity of even-aged management, road management measures, and use of IWM. By implementing IWM principles, the Board is confident that management will be more efficient and effective, and that significant impacts related to invasive plants and control methods can be avoided, as demonstrated by the analysis in the DEIR and RDEIR.

Response to Comments 69-71
The Hazards section does disclose the use of potentially toxic substances such as fuels and lubricants as well as pesticides (DEIR VII.8.9-10). With the management measures proposed, the analysis of the potential for these compounds to cause hazards was found to be less than significant (DEIR pages VII.8.9-20 through -21and RDEIR pages III-105 through -110).

In providing information on the five herbicides, the DEIR discloses information on compounds other than the active ingredients, where they are relevant. California registers surfactants in consideration of their ingredients and potential toxicity. Because the use of herbicides is selective, there will be minimal use of tank mixes. Dyes will seldom be needed. All herbicide use will conform to existing restrictions and regulation.

For an herbicide to be legal for use in California, it must undergo federal and state toxicology evaluations of the active ingredient and any degradates or contaminants. In developing treatment prescriptions for projects, JDSF will select from registered materials to best balance effectiveness and risk to the environment and humans. This will include reviewing toxicological information on both active ingredients and adjuvants.

The premise in the comment that inerts or breakdown products have not been subject to study is not valid. Many of the toxicology studies test the entire formulation, not just the active ingredient. Study of biological effects of the herbicides will necessarily include consideration of breakdown products as biotic systems interact with the compounds. The responses to the more detailed comments below reveal that these compounds are studied and understood, and do not represent a major source of uncertainty. The DEIR recognizes that information on herbicides is dynamic. DEIR VII 8.-15 describes how CAL FIRE would check for significant new information when herbicide projects are proposed.

The products (including inerts, adjuvants, active ingredients, degradates and contaminants) being used for forestry applications do not appear to be leaving the treatment area and therefore do not pose an exposure risk to the general public or to the beneficial uses of water downstream of areas that have been treated; see response 136 regarding water monitoring. It is not necessary to know every possible active and inactive ingredient that could be used and all the known toxicological effects and endpoints associated with these substances to make a decision regarding the potential future use as described in the EIR. The products have been in common use for forestry applications for years and in some cases decades. The method of application has also been common practice for more than a decade. Effects of the past applications have been evaluated through watercourse monitoring as well as through casual observation by CAL FIRE inspectors when they have done stocking inspections on treated stands, preharvest inspections on adjacent stands, and other inspections in or near treated stands in the course of their regular duties.

For the adjuvant that is most problematic, the DEIR acknowledged that the surfactant commonly associated with the glyphosate formulation Roundup “is substantially more toxic than glyphosate and that POEA is the primary toxic agent of concern for fish.” (DEIR Appendix 13)

The comment is requesting information that is beyond the scope of the proposed management plan’s programmatic approach to vegetation management and its associated environmental analysis (DEIR, RDEIR, and FEIR). Specific inerts and degradates are addressed in the responses that follow.

Response to Comment 72

The comment letter provides an extensive list of toxicity related comments and states that the Board needs to include this information and include mitigations in the EIR. As described in the DEIR at page VII.8-15, CAL FIRE reviews information to determine if it is significant new information. If there is significant new information CAL FIRE will alert California Department of Pesticide Regulation (DPR) and obtain an evaluation of the information. The Board has reviewed the information provided by CATS. The following responses reflect a review of the information to determine if any was significant new information. Mitigation would be required if any of the information led to a determination that a significant environmental effect was likely to occur. No such information was identified. Measures that will reduce risk to human and environmental health are contained in DEIR, RDEIR and FEIR; these are summarized below in response to comment 135. The analysis in the DEIR and RDEIR did not find that the usage of herbicides,

under the alternatives that included it on JDSF, would result in significant adverse impacts. This analysis includes Alternative G, which is the basis for the Administrative Draft Final Forest Management Plan.

The bulk of the information below is known information that was available for the registration process or has been reviewed in other documents. Information on herbicide use and cautions are available on the herbicide's specific label and Material Safety Data Sheet. The California Environmental Protection Agency, Department of Pesticide Regulation, maintains a web site with information (www.cdpr.ca.gov/docs/label/m4.htm) as does the National Pesticide Information Center (http://npic.orst.edu/) and the Extension Toxicology Network (http://extoxnet.orst.edu/). The UDSA Forest Service has compiled information on herbicides used in wildlands in technical risk assessments at http://www.fs.fed.us/foresthealth/pesticide/risk.shtml. Reviews of toxicology and herbicide effects routinely use the EPA Human Health Hazards categories and Ecotoxicological Categories (http://www.epa.gov/oppfead1/labeling/lrm/chap-07.htm) and are compiled in the DEIR appendix.

The potential for adverse effects from the use of herbicides is a result of the inherent characteristic of the compound and the quantity used and/or exposure. For responses 73 though 158, the responses focus on the characteristics of the compounds. For brevity sake, the exposure component of the potential for effect is not included for each comment. The quantity of pesticide used and exposures will be limited, and has been previously addressed. RDEIR, Alternative G includes this (p. II-10):

> In an operational context, herbicides will be used only when no other effective and feasible control methods are found after consideration of the scope of the problem, opportunities to effectively manage the situation, and available alternatives and their potential effectiveness, costs, and risks. JDSF staff will seek opportunities to reduce risk by selecting appropriate herbicide formulations and application techniques, as well as taking additional precautions.

The Administrative Draft Final Forest Management Plan direction is more specific and is listed in response 33, above. The Administrative Draft Final Forest Management Plan will also limit the types of vegetation management that would be considered for herbicide use. Herbicides will not be used for roadside vegetation treatment purposes unless there are significant over-riding management concerns to specific areas, such as fire prevention.

DEIR page VII.8-17 lists as part of the applicable standards and procedures for herbicide application in Mendocino County measures that would prevent harm to the applicators during the application process:

> Protective gear must be worn, including, but not limited to, the following for every pesticide application:
> - Protective eyewear (Applicators must have side and brow protection eyewear and carry a pint of eyewash on their person, if a chemical label specifies eyewear is required)
> - Chemical resistant gloves
> - Long sleeved shirt
> - Shoes and socks

The net result of these limitations is that herbicide use will be low, carefully analyzed and constrained. The findings of no significant impact regarding herbicides (DEIR pages VII.8-20 to -21 or RDEIR page III-105) are valid.

Response to Comment 73
For clopyralid, SERA (2004a) provides the following information: There is uncertainty about the toxicological status of one ingredient in Transline formulation. The inerts (59%) listed in the Transline MSDS are Isopropyl alcohol and Polyglycol 26-2, but the relative amount of inerts in the formulation is not disclosed (C&P Press 2003 in SERA):

> On the U.S. EPA list of inerts used in pesticides (U.S. EPA/OPP 2003), the polyglycol with this CAS number is listed as polyoxypropylene mono(di-sec-butylphenyl) ether and classified as a List 3 inert. List 3 inerts designate those inerts for which the available toxicology data are insufficient to classify the compound as of toxicologic concern....

The third inert is believed to be water. Regarding the total toxicity of both inerts and active ingredients SERA (2004a) further notes:

> Dow AgroSciences (2003) provided clarification of this issue and identified the studies submitted to U.S. EPA that were accepted as relevant to Transline. These studies do not indicate any substantial differences between Transline and clopyralid. This is consistent with the publicly available information on the three inerts contained in Transline.

Response to Comment 74
The human health precautionary statements on the Transline label carry the lowest level of warning; “Caution”. Information on clopyralid is contained in DEIR Appendix 13.

Appropriate protective clothing is to be worn by applicators (page VII.8-17).

Response to Comment 75
Regarding the tests of reproductive and teratogenic effects SERA (2004a) notes:

> ...two oral teratogenicity studies have been conducted in rabbits, one gavage teratogenicity study has been conducted in rats, and four dietary reproduction studies have been conducted in rats. Other than a decrease in maternal body weight, which is consistent with results of subchronic and chronic toxicity assays of clopyralid, these studies report few signs of toxicity in dams or offspring. At doses that cause no signs of maternal toxicity (i.e., doses below about 100 mg/kg/day) no reproductive or teratogenic effects are apparent. The available data suggest that clopyralid does not produce developmental effects at doses that do not produce maternal toxicity.

Doses high enough to cause maternal death would obviously have adverse effects on unborn offspring.

Response to Comment 76
The persistence trait of clopyralid in the soil is disclosed in Appendix 13. The information cited does not represent significant new information. Also see response 78, other research found clopyralid degradation to be relatively rapid in soil (SERA 2004a):

Response to Comment 77
The information about the potential for clopyralid residue in compost to damage non-target plants is disclosed in Appendix 13. The Appendix listed the more relevant regulatory change in California, cancellation of registrations for specialty lawn products. This demonstrates how the pesticide regulatory system is responsive to new information. The Transline label contains a precaution statement about composting or mulching.

The DEIR does not propose composting or making mulch from treated plants.

Response to Comment 78
This information was disclosed in Appendix 13. Recent detailed analysis conducted for the Forest Service includes this (SERA 2004a):

> ...Clopyralid does not bind tightly to soil and thus would seem to have a high potential for leaching. While there is little doubt that clopyralid will leach under conditions that favor leaching—sandy soil, a sparse microbial population, and high rainfall—the potential for leaching or runoff is functionally reduced by the relatively rapid degradation of clopyralid in soil. A number of field lysimeter studies and the long-term field study by Rice et al. (1997) indicate that leaching and subsequent contamination of ground water are likely to be minimal...

Response to Comment 79
The comment about volatility of clopyralid is from a 1990 EPA document. Information Ventures (1995) includes the following; "III. Environmental Effects/Fate Air: Volatilization: Clopyralid does not evaporate easily." Tu et al. (2001) states that Clopyralid is not highly volatile.

The 1999 Transline label approved by EPA does not list volatility among the Environmental Hazards. Under the General Use Precautions it includes:

> Avoiding Injury to Non-target Plants; This product can affect susceptible broadleaf plants directly though foliar contact and indirectly by root uptake from soil in treated areas. Do not allow spray drift to come in contact with vegetables, flowers....or other desirable broadleaf crops or ornamental plants.

Given the other information available, and that the 16-year-old EPA quote is cited out of context, this comment provides no basis to be considered as significant new information.

Response to Comment 80
The full caution from Information Ventures (1995) states: "Do not allow careless application or spray drift. Do not permit spray or spray drift to contact desirable plants as very small quantities may injure susceptible plants". Regarding Non-Target Toxicity for Plants it states: "Contact with non-target plants may injure or kill the plants." Drift control is important practice as it benefits many resources. The Transline label was quoted in response to comment 79.

Response to Comment 81
This comment references an apparent broadcast application. As expected with this herbicide's selectivity, the broadleaf plants declined and grasses increased. SERA (2004a) summary of this work shows the largest decline in mean canopy cover for alien broadleaves. Broadcast (as opposed to directed) application can be expected to affect the species that are susceptible to the herbicide whether they are alien or native. Directed applications would be the predominant method used at JDSF.

Response to Comment 82
Transline's major use in wildlands is to control of yellow star thistle, an invasive weed. In Appendix 7B the DEIR discloses that this species is limited to roadside locations in the eastern portions of the forest. Any potential application would be specifically to roadside infestations within the forest. JDSF's only native grassland (Bob Woods meadow) is not located in the eastern part of the forest.

Response to Comment 83
The International Organization for Biological Control – West Palaearctic Regional Section (Includes Europe) has a more recent analysis of the relative risk to beneficial insects from pesticides in a toolbox database http://www.iobc.ch/toolbox.html#5 . It rates clopyralid as being "harmless or slightly

harmful" for eight of nine arthropods and as "moderately harmful" to one. The dose tested is over 50% higher than the maximum rate that is legal for use in California.

Response to Comment 84
This herbicide would be used for control of yellow star thistle. Applications are timed to prevent seed formation. No applications will be conducted in the late summer or fall.

Response to Comment 85
Drift has been addressed in response 79 & 80. Please see those responses.

Response to Comment 86
At JDSF applications of Transline would be directed at actively growing target species, specifically yellow star thistle. Little Transline will be deposited on soil. Little of that soil is expected to become windborne. The exact Information Ventures (1995) quote is; "Special Precautions: ... Soil: Do not move treated soil. Avoid situations where treated soil particles may blow into areas where susceptible plants grow." Given the applications considered, and the forested condition, there is little risk of wind born soil or vegetation harming non–target plants. Recently treated soil will not be moved.

In summary, regarding clopyralid, no new information has been presented in the comment letter that would require the Board to reevaluate the inclusion of this product as a potential herbicide for use in the EIR.

Response to Comment 8
The classification of glyphosate as a skin or eye irritant is included in Appendix 13. This was taken from the Roundup Pro MSDS. This formulation is a slight eye irritant and is essentiality non-irritating to skin. This is consistent with results from poison control centers. Only 2% had temporary injury to eyes with none reporting permanent damage (SERA 2003a).

SERA (2003a & 2002) reviewed Temple and Smith's New Zealand paper in context. Its value was to describe "health outcomes of accidental and intentional (e.g., suicide attempts) gross overexposures to glyphosate or its commercial formulations" (SERA 2003a).

Regarding glyphosate's potential as an endocrine disrupter, SERA (2003a) notes:

> Only three specific tests on the potential effects of glyphosate on the endocrine system have been conducted and all of these tests reported no effects. All of these assays are *in vitro* – i.e., not conducted in whole animals. Thus, such studies are used qualitatively in the hazard identification to assess whether there is a plausible biologic mechanism for asserting that endocrine disruption is plausible. Because they are *in vitro* assays, measures of *dose* and quantitative use of the information in dose/response assessment is not appropriate. For glyphosate, these studies do not indicate a basis for suggesting that glyphosate is an endocrine disruptor. Nonetheless, glyphosate has not undergone an extensive evaluation for its potential to interact or interfere with the estrogen, androgen, or thyroid hormone systems. Thus, the assessment of the potential endocrine effects of glyphosate cannot be overly interpreted.

Richard et al. (2005) recently conducted another *in vitro* study. It exposed cancerous placental cells and cellular material, microsomes, to glyphosate and Roundup at up to 2% concentrations for up to 48 hours. For placental cells, the lowest LD50 occurred at about a 0.6 % Roundup concentration for 48 hours. Though there is no way to directly compare cellular level to studies of exposure to living animals the concentration at 0.6% is equivalent to 3,367 ppm of active

ingredient (assuming formulation studied was equivalent to Roundup Pro). Contrast this value with the following from SERA (2003a):

> "A 2-year dietary study, in which rats were exposed to 0, 2,000, 8,000 or 20,000 ppm glyphosate in diet, examined morphology of the reproductive organs, mammary glands, and all major endocrine glands, including the testis, ovary, pituitary, and thyroid (Stout and Ruecker, 1990). No treatment-related effects on reproductive organs or endocrine glands were observed at or below the maximally tolerated dose (20,000 ppm in diet) which resulted in decreased weight gain and histopathologic changes in liver, stomach, and eye lens."

Another study from SERA (2003a):

> Subchronic studies, in which mice and rats were exposed to 3,125, 6,250, 12,500, 25,000, or 50,000 ppm glyphosate in the diet, examined morphology of all reproductive organs; mammary glands; and major endocrine glands, including adrenal, ovary, pancreas, parathyroid, pituitary, thymus and thyroid; the study also evaluated sperm counts and morphology and estrous cycle length (NTP, 1992). No treatment-related effects were observed on the morphology of reproductive organs or endocrine glands at or below the maximally tolerated dose (50,000 ppm in diet) which resulted in decreased weight gain in both rats and mice. A statistically significant decrease (20%) in sperm count was observed in male rats exposed to 25,000 or 50,000 ppm. NTP (1992) concluded that there was no evidence of adverse effects on the reproductive system of rats or mice, and summarized the findings as follows:
>
> *"Measures of sperm density, or the number of sperm/g caudal epididymal tissue, were reduced somewhat in male rats in the 2 highest dose groups (25,000, 50,000 ppm); other spermatozoal measurements were not different from controls in rats or mice. There was a slight lengthening of the estrous cycle in high dose female rats (50,000 ppm), but the biologic significance of these findings, if any, is not known."*

These studies demonstrate that living organisms tolerated doses higher than cultured cells. *(in vivo vs. in vitro*) At extremely high doses some effects could be suggested. The Richard et al. (2005) placental cell viability results cited in the comment do not seem to provide new evidence of toxicity or negative effects for cells in culture.

Richard et al. conducted several tests to examine the enzyme that catalyzes conversion of androgens to estrogens, aromatase. Several tests for longer duration (18 hour) using a serum–free medium which was "to optimize the visible effects of the compounds in the shortest period of time." They also note: "The physiological significance of the effects can be questioned, in regard to the concentrations used." The results of the serum-free medium tests showed a 50% decrease in armatase activity over 18 hours at a dose that would be approximately 224 ppm.

The Richard et al. study did find depression of aromatase activity at the sub-cellular microsome level. For glyphosate there was about a 12% decline in aromatase activity at about approximately 2,800 ppm with Roundup reducing activity 50% at the same dose (Figure 5). This is a dose that would kill 40 % of tested placental cells in culture (Figure1A- 48 hour). Roundup partially disrupted a chemical synthesis process in microsomes unprotected by cell structure. This is not surprising considering the dose. The role of Roundup as a "potential endocrine disrupter" should be considered cautiously given this context.

The relevance of Richard's laboratory study can be questioned when considering actual exposure scenarios. Per SERA (2003a):

> The available experimental studies indicate that glyphosate is not completely absorbed after oral administration and is poorly absorbed after dermal applications. Two dermal absorption studies have been published on glyphosate and both of these studies indicate that glyphosate is very poorly absorbed across the skin.

SERA (2003a) notes that 97% of glyphosate ingested is excreted unchanged. The Richard's study is constant with other studies showing Roundup can be more toxic in some situations than glyphosate alone. Hietanen et al. (1983, in SERA ibid) describes liver damage that could be attributed to several factors including the effects on cytochrome P-450 (responsible for the metabolism of a wide variety of endogenous compounds as well as xenobiotics). The possibility of effects on this process is known, thus Richard et al. dose not provide significant new information.

Response to Comment 88
The carcinogenic potential of glyphosate has been examined. SERA (2003a) noted problems with the Hardell and Erikson, (1999) study. In response to a USDA Forest Service concern the U.S. EPA (Tompkins 2000in SERA) responded that:

> The Office of Pesticides Programs Health Effects Division has reviewed the journal article entitled "A Case-Control Study of Non-Hodgkin Lymphoma and Exposure to Pesticides" and concluded that the study does not change EPA's risk assessment for the currently registered uses of glyphosate.

SERA (2003a) includes this information on this research from the most recent U.S. EPA/OPP (2002) assessment:

> This type of epidemiologic evaluation does not establish a definitive link to cancer. Furthermore, this information has limitations because it is based solely on unverified recollection of exposure to glyphosate-based herbicides.

The issue of N-nitrosoglyphosate is cited in comments from references that are 20 to 30 year old. The issue was reviewed in the 1993 RED. SERA (2003a) quotes the RED *(in quotes)* and provides additional information:

> "Technical grade glyphosate contains N-nitrosoglyphosate (NNG) as a contaminant. Carcinogenicity testing of nitroso contaminants is normally required only in those cases in which the level of nitroso compounds exceeds 1.0 ppm. Analyses showed that greater than 92% of the individual technical glyphosate samples contained less than 1.0 ppm NNG. The Agency concluded that the NNG content of glyphosate was not toxicologically significant."
>
> As part of the conduct of this risk assessment, data available to U.S. EPA for RED as well as the more recent data on the levels of *N-nitrosoglyphosate* and related compounds has been reviewed (Bernard 2002; Hirsch and Augustin 1987). This information is classified as trade secret under FIFRA and cannot be detailed in this risk assessment. Nonetheless, no information has been encountered in the CBI files or in the open literature that contradicts the above assessment in the RED. In addition, none of the recent reviews on the toxicity of glyphosate cite contamination with *N-nitrosoglyphosate (NNG)* as a concern (Cox 2002; WHO 1994; Williams 2000)."

Note from the review above, SERA (2003a), that no information from other sources had been found that contradicted the assessment.

Response to Comment 89
SERA (2003a) reviewed Yousef (1985). It noted that Yousef did not specify the actual dose but described it as proportions of 0.01 and 0.1 of the LD50 that would correspond to 38 and 380 mg/kg. SERA cited Schroeder and Hogan's (1981) 3-generation study in rats found no treatment-related effects of glyphosate on mating, fertility, or reproductive parameters at doses of 3, 10, or 30 mg/kg bodyweight. The NIC study (1992, in SERA 2003a) lists declines in sperm counts at higher rates than Yousef, 1,678 & 3,393 mg/kg/day. No effect was noted for the lower doses 205, 410, 81 mg/kg/day.

Among other limitations of Yousef et al.'s work cited by SERA are: not reporting the glyphosate formulation used, administering the dose by gelatin capsule which would result in a spike as chemical is ingested. Given these inconsistencies and documentation this study does not provide significant new information.

Regarding Daruich et al.'s (2001) 21 day exposure SERA (2003a) notes:

> Daruich et al. (2001) assayed effects of glyphosate on enzymatic activity in pregnant rats with a commercial formulation of glyphosate (specified as Herbicygon) that is used in Argentina. Changes in several biochemical parameters were noted but these were accompanied by significant decreases in food and water consumption. Since this study did not use a food and water restricted control, the observed effects cannot be attributed directly to glyphosate.

The studies authors were more guarded in describing results than the comment letter, the abstract noted the exposure "induces a variety of functional abnormalities in the specific activity of the enzymes in the studied organs of the pregnant rats and their fetuses."

Response to Comment 90
In considering the comments it is important not confuse the effects of the surfactant in the herbicide formulation "Roundup" with the effects of the active ingredient, glyphosate alone. Other formulations of glyphosate herbicides are now available from other manufactures so this is an important distinction. The Roundup surfactant is polyethoxylated tallow amine (POEA) or phosphate ester neutralized POEA (SERA 2003a).

It is well understood that these formulations' surfactants can have more toxic effects on aquatic organisms than glyphosate alone. This information is noted in DEIR Appendix 13 page 3. As surfactants are used to help move the active ingredients across plant membranes it should be no surprise that the Roundup formulations will have different and sometimes greater effects than glyphosate alone on other organism's membranes. Where appropriate, a glyphosate product without POEA, for example "Accord" or "Rodeo", can be used. It is important to review any information on glyphosate formulations within the context of the presence of added surfactants including POEA.

The Sawada et al. (1988) work reported on human poisoning. This paper includes a statement that the LD50 of POEA "less than one-third that of Roundup and its active ingredient." Per SERA (2003a) the animal toxicity test results show an oral LD50 for glyphosate alone of >5000 mg/kg, the formulations with inerts (i.e., Roundup) have a similar value, and POEA alone is 1200 mg/kg. The exact amount of surfactants in proprietarily formulations is confidential but SERA lists the maximum at 20%. Per SERA "the acute mammalian toxicity of different glyphosate formulations do not appear to differ substantially" and that "POEA and other surfactants used in glyphosate formulations may be severely irritating to the eyes, skin, and other mucosal surfaces such as the gastrointestinal tract and lungs."

The Walsh et al. (2000) study noted that Roundup decreased steroidogenesis; the active ingredient, glyphosate alone did not. They did not identify the compound in the Roundup formula that was responsible for this difference. Per SERA (2003a):

> In the Walsh et al. (2000) study, however, Roundup did inhibit steroid synthesis, probably due to the effects of the surfactant on membrane function. All of these assays are *in vitro* – i.e., not conducted in whole animals. Thus, such studies are used qualitatively in the hazard identification to assess whether there is a plausible biologic mechanism for asserting that endocrine disruption is plausible. Because they are *in vitro* assays, measures of *dose* and quantitative use of the information in dose/response assessment is not appropriate. For glyphosate, these studies do not indicate a basis for suggesting that glyphosate is an endocrine disruptor."

Diethanolamide is not listed in SERA (2003a), or in the 1993 EPA RED, as an inert in glyphosate formulations. Current EPA (2004a) inert listing for Diethanolamide is List 2: Potentially Toxic Other Ingredients/High Priority for Testing Inerts**.** EPA notes that many List 2 inert ingredients are structurally similar to chemicals known to be toxic; some have data suggesting a concern. The comment refers to an older EPA document on inerts that used an older classification system. The comment lacks relevant information including; concentration, product name or current reference. Given these problems, there is no basis for assuming that the comment provides significant new information.

Response to Comment 91
Drift from ground applications will vary depending on weather conditions, methods, and the amount of herbicide used. The physics of drift are well understood. Proposed JDSF glyphosate applications would be either cut stem applications or directed spray to individual target plants. Limiting foliar applications when wind speed exceeds five miles per hour as well as using equipment that minimize overspray and fine droplets are operational actions that will limit drift.

The EPA RED of 1993 noted additional research would be needed to fully evaluate the effects of glyphosate on non-target plants. It noted "risk reduction measures would be developed if needed, once data from these studies are submitted and evaluated (EPA 1993). Given that glyphosate herbicide labels have been updated since that date, there is no basis for assuming this comment provides significant new information.

Response to Comment 92
Appendix 13 notes the range of half-life in soil range from 2 to 172 days. Soil bacteria readily metabolize glyphosate with AMPA (Aminomethylphosphonate) as a major metabolite (SERA 2003a). EPA (2002) review of tolerances includes the following:

> Further degradation of AMPA to CO2 occurs at a slower rate than the initial degradation of glyphosate. Because of the strong binding of both glyphosate and AMPA to soil particles, there is very little uptake into plants of either glyphosate or AMPA from soil, even right after application of glyphosate.

Given the moderate temperate conditions and moist soils at JDSF, long soil degradation times are not expected.

Response to Comment 93
The comment letter provided no reference for the citation of "Frans, 2004". Scribner et al. (2002) detections were in the parts per billion (range 2.3 to <0.1) This data collections seemed to be focused on agricultural use as there were repeated references to pre emergent, post emergent and harvest season samples. For short-term exposures, the value of 2 mg/kg/day (parts per billion) is recommended by U.S. EPA's Office of Drinking Water (per SERA 2003a). Forestry uses buffers and other measures to reduce the risk to water relative to some agricultural uses.

Recent stream monitoring of forestry use found little concern for movement into water, see response 136 for details.

Response to Comment 94
Appendix 13 of the DEIR contains specific toxicity information for fish and aquatic organisms. The DEIR notes aquatic toxicity varies with the formulation. The RED (EPA 1993) recognized surfactants role in toxicity to aquatic organisms.

Given that glyphosate is a plant killing pesticide, some effects on algae would not be unexpected. SERA (2003a) reports ranges from EC50 values for technical grade glyphosate in algae reported by U.S. EPA/OPP (1993) are as low as 0.85 mg/L for *Skeletonema costatum* (a marine species) and as high as *Chlorella fusca*, with an EC50 of 377 mg/L for growth inhibition (Faust et al. 1994 in SERA 2003a). Pam et al. (2003) observed reduced cell numbers, but not amount of chlorophyll. The authors suggest this is due to a shift in species. The test was conducted for 14 days versus 4 in the other studies. The effects occurred at concentrations one or two orders of magnitude less than the other studies. Relyea et al. (2005c) found no loss of algae abundance at doses that had adverse effects on tadpoles.

See also response to comment 111.

Response to Comment 95
The effect of POEA has been discussed in the response to comment 87.

Response to Comment 96
Glyphosate interaction with soil organisms is complex. SERA (2003a) includes:

> As noted in Section 3.1.15.1, glyphosate is readily metabolized by soil bacteria with AMPA as a major metabolite. In addition, many species of soil microorganisms can use glyphosate as sole carbon source (Dick and Quinn 1995a; Dick and Quinn 1995b; Dotson et al. 1996; Wardle and Parkinson 1992a). Microorganisms, like higher plants, do have the shikimate pathway for the production of aromatic amino acids. Since glyphosate inhibits this pathway, toxicity to microorganisms may be expected (Cox 2002; Issa 1999).... Nonetheless, there is very little information suggesting that glyphosate will be harmful to soil microorganisms under field conditions and a substantial body of information indicating that glyphosate is likely to enhance or have no effect on soil microorganisms (Busse et al. 2001; Wardle and Parkinson 1990a, b; Wardle and Parkinson 1991).

The effects from intensive agricultural applications, or results of use with a genetically engendered crop specifically designed to be resistant to high levels of glyphosate application, are not relevant to the limited applications that would be conducted at JDSF.

Response to Comment 97
This quote from the RED (EPA 1993) should be considered in context, e.g. the registered use patterns. A broad-spectrum herbicide like glyphosate could have adverse effects on plants when broadcast sprayed. Endangered or special status plants can readily be protected by determining if they are present (survey) and avoidance. Targeting only specific species for treatment (directed application, which will be the predominant usage at JDSF) will also limit the potential for accidental harm to non-target plants. Because applications will be targeted and widely separated in both time and space on the forest there should be no long term exposures to mammals, birds or bees from glyphosate or other Roundup products.

Response to Comment 98
Glyphosate has a long and extensive record of studies and use. Some of these studies have been conducted by researchers that are clearly skeptical about glyphosate (Relyea, 2005). The

data have been reviewed by both state and federal regulatory agencies. The historic conduct of laboratories or marketing departments is not relevant to the actual safety of glyphosate or its formulations.

Response to Comment 99
This is information that is readily available. No new information has been provided.

Response to Comments 100-101
This section duplicates comments made previously. Regarding genotoxic (DNA damaging) effects would be also discussed as carcinogenicity. Response 88 addresses carcinogenicity. Regarding hormonal effects, Yousef et al. 1995 work was discussed in response 89. Regarding enzymatic effects, Dauich et al. (2001) was discussed in response 89a. Regarding the citation of Heitanen (1983) and El-Damerdash (2001) no references were provided for these citations. The Walsh study (2000) was discussed in response 90.

Response to Comment 102
The comment regarding pesticides causing birth defects is sweeping and does not specifically pertain to the project. Pesticides are a broad class of products and include fungicides, insecticides as well as herbicides. Only a limited number of herbicides are proposed for use at JDSF. They have been subject to testing on their potential for birth defects and genetic damage. The limitations on use of herbicides that will reduce any potential risk are summarized in response to comment 135.

The comment letter cites Garry et al. (2002) but provides reference for a 1996 article. In general the exposure that Garry studied, agriculture applicators have a higher potential exposure than the public or applicators at JDSF. The historic nature of the study may not reflect the current personal protective measures that applicators are required to use: gloves, complete coverage of arms and legs and protective eyewear.

SERA (2003a) reviewed Garry et al (2002):

> Garry et al. (2002) has conducted a self-reporting survey of individuals exposed to herbicides and other pesticides, including glyphosate. This study reports that 6 or 14 children of parents who had used phosphonamino herbicides had parent-reported attention deficit disorder. While Garry et al. (2002) indicated that the odds ratio for this is statistically significant (OR=3.6; CI 1.35 to 9.65), it should be appreciated that the use of lay diagnosed disease and self-reported exposure histories diminishes the utility of this study for hazard identification.

Garry et al. (2002) notes in that that:

> Regarding the herbicide glyphosate, our present study shows a tentative association between ADD/ADHD and use of this herbicide. *In vitro* studies by our group show that this product was not genotoxic in the micronucleus assay (*67*) and did not have significant pseudoestrogenic effects in MCF-7 cells (*37*). In a recent review of the toxicology of glyphosphate (*68*), little if any evidence of neurotoxicity was noted other than by intentional ingestion (*69*).

At the end of the “Birth Defects” section, with reference to glyphosate and phosphine this paper stated:

> Whether these observations were chance associations remains a concern. Further detailed neurodevelopmental studies are required to resolve these issues.

Given the limited utility of self-reported studies, the use of lay diagnosed disease, and that the authors found a "tentative" association that developmental studies do not reflect, this paper does not provide a basis to assume it provides significant new information.

Response to Comment 103
The more recent citations do include some additional detail not available in earlier assessments. They do not provide new information on the relative hazard of glyphosate use or relative environmental effects. Note that Garry et al. (2002) quoted above did not make any generalizations based on the information now available.

Response to Comment 104
The relative toxicity of the different glyphosate formulations containing POEA has been addressed previously; see response to comment 87. No references are provided in the comment letter the citations of Folmar et al. (1987), Martinez et al. (1990) and Mitchell et al. (1987). These three studies are cited in SERA (2003a) with regard to surfactants. The information on the relative toxicity of Round up verses glyphosate has been discussed previously. Mitchell et al.'s 1987 work is on the effects of Rodeo. The formulation contains glyphosate with a surfactant that appears to be X-77®, a non-ionic alkylphenol ethoxylate-based surfactant. The study showed that this surfactant modestly increases the toxicity of Rodeo - e.g., decreases the LC50 value by about 30% (Mitchell and Chapman 1985a in SERA 2003a). No significant new information is provided in the comment.

Response to Comment 105
Richard et al. (2005) was discussed in the response to comment 87. Inerts were discussed previously in the response to comment 90.

Response to Comments 106 and 107
SERA (2003a) reviewed Hardell and Eriksson (1999) and contacted EPA for analysis. The U.S. EPA (Tompkins 2000) response is included with SERA and notes following:

> The Office of Pesticides Programs Health Effects Division has reviewed the journal article entitled "A Case-Control Study of Non-Hodgkin Lymphoma and Exposure to Pesticides" and concluded that the study does not change EPA's risk assessment for the currently registered uses of glyphosate.

This issue is also addressed in the most recent U.S. EPA/OPP (2002) assessment:

> This type of epidemiologic evaluation does not establish a definitive link to cancer. Furthermore, this information has limitations because it is based solely on unverified recollection of exposure to glyphosate-based herbicides.
>
> Given the marginal mutagenic activity of glyphosate and the failure of several chronic feeding studies to demonstrate a dose-response relationship for carcinogenicity and the limitations in the available epidemiology study, the Group E classification given by the U.S. EPA/OPP (1993a, 2002) appears to be reasonable. As with any compound that has been studied for a long period of time and tested in a large number of different systems, some equivocal evidence of carcinogenic potential is apparent and may remain a cause of concern, at least in terms of risk perception (e.g., Cox 2002). While these concerns are understandable, there is no compelling basis for challenging the position taken by the U.S. EPA.

The de Roos et al. (2003) study was a pooled analysis of three case control studies of non-Hodgkin's lymphoma. Glyphosate was among the pesticides "associated with a possible increased non-Hodgkin's lymphoma incidence". Mc Duffie et al. (2001) did a non-Hodgkin's

lymphoma case control study of 517 cases. The results for glyphosate were mixed and it was not among the factors in the final model (nor was MCPA). The de Roos et al. (2005) study is based on a large prospective cohort, 57,311 applicators with 2,088 cancers in the study. They found no association with non-Hodgkin's lymphoma. They did identify a "suggested association between multiple myeloma and glyphosate exposure, based on a small number of cases."

The references cited do have some suggestions of effects but they are gleaned from variable sample size. Some authors include cautions about the nature of this data. The EPA and SERA (2003a) conclusions seem reasonable. The comments do not provide a basis for significant new information.

Response to Comment 108
This comment is almost identical to comment 91. Please see the above response to that comment.

Response to Comment 109
This comment is identical to comment 93. Please see the response to that comment.

Response to Comment 110
This comment is identical to comment 94. Please see the response to that comment.

Response to Comment 111
This is a more detailed version of comment regarding frogs in comments 94 and 110. Please also see the response to comment 94 as well.
Lajmanovich's 2003 study was study has been cited in Releya (2005b):

> Lajmanovich et al. (2003) examined the impact of Kleeraway (another formulation of glyphosate that contains the POEA surfactant) on a South American tadpole *(Scinax nasicus)* and found an $LC50_{48h}$ of 1.74 mg AI/L.

This Lajmanovich LC50 for frogs is within one order of magnitude of others developed for different frog species, not an unexpected result.

Howe et al. (2004) detailed acute toxicity LC50 for multiple formulations and frog species. The values ranged from 2 to 9 mg (formulation glyphosate acid equivalents)/L with formulations containing POEA being more toxic. Chronic exposure (42 days) was at 0.6 & 1.8 9 mg (formulation glyphosate acid equivalents)/L. No chronic effects were noted for glyphosate alone but were noted for POEA containing formulations.

Dr. Rick Relyea has published several recent studies on pesticide impacts on amphibian and experimental aquatic communities:

- Relyea,R. A. (2005a) The Impact of Insecticides and Herbicides on the Biodiversity and of Aquatic Communities, *Ecological Applications,* 15(2), Pp. 618–627
- Relyea, R. A., (2005b). The Lethal Impacts of Roundup and Predatory Stress on Six Species of North American Tadpoles. Arch. Environ. Contam. Toxicol. 48, 351–357
- Relyea, R. A., N. M. Schoeppner, And J. T. Hoverman , (2005c), Pesticides and Amphibians: The Importance of Community Context *Ecological Applications,* 15(4), Pp. 1125–1134

The Relyea 2005a paper used a tank community with amphibian and insect predators, frog and snail herbivores and zooplankton. There was high tadpole mortality at a dose of 3.8 mg /L for Roundup. This is well within an order of magnitude of the LC50 from laboratory studies (see above). The Relyea paper notes:

> 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 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.

The Relyea 2005(b) paper, "The Lethal Impact or Roundup on Aquatic and Terrestrial Amphibians," was reviewed as it is specific to a glyphosate-containing product. The concentration that the tadpoles were tested in was 3.8 mg a.e./L with a resulting mortality of 96–100%.

The paper on community context (Relyea 2005c) included predators in the tanks. It used a lower dose and noted better survival than in 2005b. (1.3mg a.i./L with 40% survival). It also found that Roundup had no indirect effects on the amphibian community via predator survival or algal abundance. He noted that Roundup did not affect algae numbers at this dose.

These experiments used mesocosms (outdoor cattle tanks with several species present). The authors note the importance of transition from foundational laboratory studies to more realistic and natural experimental venues. Given this emphasis on realism there are some concerns regarding this study. The Roundup label states "Do not apply directly to water, to areas where surface water is present or to inertial areas below the mean high water mark." In an accidental overspray of a hidden small pool, the vegetation obscuring the pool would tend to intercept herbicide before it reaches the surface. The authors note the concentration is a "worst case scenario".

If there is risk of exposing aquatic organisms, a non-POEA formulation of glyphosate can be selected. JDSF applications are directed applications to terrestrial vegetation and will be in conformance with label requirements. The type of exposure tested above would not be expected at JDSF. The greater toxicity of the Roundup formulation on aquatic species is noted in Appendix 13 of the DEIR.

Although the mesocosms testing is interesting, the results are within known values, therefore any new information was not significant.

Response to Comment 112
This comment is identical to comment 96. Please see the above response to that comment.

Reviewing the information presented by the comment letter for glyphosate; recent research was presented. Upon review of this information, effects described were within the range of those previously known or did not provide a basis to assume new effects, thus the comment letter has presented no significant new information. No significant effect regarding the use of glyphosate products as proposed in Alternative G and the Administrative Draft Final Forest Management Plan was identified.

Response to Comment 113
The Board reviewed the comments for significant new information on imazapyr. None was identified. The 22-year-old EPA document cited in the comments was not readily available. The comments do not include any information about actual dose related to the effects listed. SERA (2004b) summarizes 14 dermal animal tests; bleeding and congested lungs were not listed among the effects, though there were pneumonia deaths in some studies.

The dermal effects of imazapyr were noted in DEIR Appendix 13-4. The comments do not provide new information on that topic. Dermal effects are minimized by protecting applicators' skin from exposure by wearing gloves and long sleeved shirt and long pants. Protection measures are summarized in response to comment 135.

The dermal exposure information places imazapyr in the moderately irritating category (TLD50=>2000 mg/kg or 1.92 mL/kg per SERA, 2004b). SERA (2004b) compiled dermal tests including one by Lowe (1988) who found the product is considered to be "no more than slightly toxic by single skip applications." Other tests at lower doses stated the "test material is considered to be mildly irritating to rabbit skin."

Two formulations are used; Arsenal is an aqueous solution designed to be mixed with water and a surfactant. Chopper is an emulsifiable concentrate that can be mixed with penetrating oils, some other similar non-aqueous liquid, and/or water. The respective MSDS have slightly different dermal data, based on the formulations. Arsenal is >5000mg/kg with a rating of mildly irritating. Chopper is >2000mg/kg with a rating of irritating. Both readily fall within the "Caution" rating.

SERA (2004b) provides details regarding one of ten mice that died in a test at high oral dose (5000 mg/kg or 25 mL/kg.). "Necropsy revealed congestion of liver, kidney, and intestinal tract, and hemorrhagic lungs."

Imazapyr's affect on eyes as reviewed in SERA (2004b) would fall in the caution range: "no corneal opacity; irritation reversible within 7 days." The MSDS for Arsenal and Chopper differ slightly but fall in the same "Caution" rating. The Tu et al. (2001) statement is based on formulations; "... some formulations (for instance, the inert ingredients in Chopper® and Stalker®) can cause severe, irreversible eye damage."
Animal studies do result in negative effects at doses that approach the LD50. None of the information provided in the comment is new or indicates significant information beyond that evaluated for the DEIR.

Response to Comment 114
Quinolinic acid is a photolytic (light) breakdown product of imazapyr. Quinolinic acid is also metabolite of tryptophan, a naturally occurring and essential amino acid in mammals. Given soil contains many naturally occurring compounds that can be irritating to eyes or lungs, humans minimize eye and lung exposure to soil, therefore this route of exposure imazapyr poses little threat.

SERA (2004b) considers the neurotoxicological aspects of this compound:

> Schwarcz et al. (1983) noted that quinolinic acid, a photolytic (though not metabolic) breakdown product of imazapyr, causes neurotoxic effects at very low doses when injected directly into the brains of rats (i.e., intracerebral injection). It is possible that the neurologic effect identified by these studies (Medical Scientific Research Laboratory 1992, as cited by Cyanamid 1997; Salamon et al. 1983c,d) resulted from contamination of the administered dose by a photolytic breakdown product, rather than as a result of imazapyr administration. However, as noted in Section 3.1.15.1, quinolinic acid levels in the brain are regulated by an active transport system and it does not seem likely that sufficient quinolinic acid would be present in imazapyr to cause frank signs of toxicity. This supposition is supported by the fact that signs of neurotoxicity have not been noted in other studies on reproductive or developmental effects and neurotoxicity has not been noted in standard acute and chronic toxicity studies. In addition, none of the studies in the imazapyr database reported histopathological changes in nervous tissue. Thus, the weight of evidence does not support the assertion that imazapyr is likely to have neurotoxic potential.

As a breakdown product in soils it would be unlikely to come in contact with eyes, skin or the respiratory system of the casual forest visitor. It would not be present during application.

Response to Comment 115
The information on soil half-life and persistence are constant with that provided in the DEIR.

Imazapyr mobility in soils is noted in SERA (2004b). The degradation halftime in soil is highly dependent on microbial population (SERA 2004b). Descriptions of soil mobility vary. Mobility of imazapyr is decreased in soils with; higher microbial activity, low ph, moderate temperatures, high organic and or clay content (CMDAR 2003, Cornell undated, SERA 1999). Thus the "usual behavior" will vary with climate and soil. This information places Tu et al. (2001) quote in context. At JDSF the soil and climatic factors favor less soil mobility than other locations. The major forest soil types are fine loams with pH values that shift from approximately 5.5 to 5.2 with depth.

Tu et al.'s description of movement of soils particles appears to be based on McDowell et al.'s (1997) work and is the result of soil erosion. The abstract for this paper describes half-life and the movement of herbicide in the soil profile. SERA (1999) also include some information from this work, but no reference to soil movement citing this author. There is little potential for soil disturbance that would result in mobilizing soil particles at JDSF, given the type of applications anticipated, (cut surface or directed foliar).

The fate of imazapyr in water is complex. The Kd, the ratio of the concentration of a chemical adhered to soil particles, depends on the physicochemical properties of both the soil as well as the chemical being bound to the soil (Winegardner, 1996 in SERA, 1999). Kd values in the range of 1.24 to 3.02 mL/g have been reported for silt loam soil by McDowell et al. (1997). Values for other soils range from 0.06-0.09 mL/g for sandy soil to 4.55 mL/g for pond sediment. SERA (1999) notes that the complexity of the soil processes makes reliance on Kd values an over simplification. The Ko/w can be related to soil by the equation Ko/c = Kd/oc, where oc is the organic carbon content of the soil (mg organic carbon/mg soil). The "certos" imazapyr information cites a Ko/c (organic carbon water partition coefficient) of 8.81 (units not listed). SREA (2004b) lists four Ko/c; 100, 46, 30.6(sand), & 99.8 (silt loam) ml/g. The "certos" absorption coefficient provides no new information on movement in soil or water.

Response to Comment 116
As noted the movement from soil to water is complex. Michael and Neary (1993) sampled both buffered and unbuffered applications to Alabama costal plains. Berisford et al.'s paper was not readily available but the relevance of results from a perched water table in the southern costal plane is limited given the geology at JDSF. Rashin and Garber's 1993 Washington work was compiled in Neary and Michael (1996). The application rate was smaller by one order of magnitude (2.2 vs. .01 kg/ha) and the detection was lower by two orders of magnitude (130 vs 1. mg/m3) than Michael and Neary's work. Both these were for aerial application, a method that is not proposed for use on JDSF.

Response to Comment 117
The DEIR Appendix 13 noted that the risk to non-target plants would be higher with imazapyr than other herbicides. The supposition from the comment that this risk to non-target plants is "extremely hazardous" is not supported in Tu et al. (2001). The labels for Chopper and Arsenal both contain cautions about damage to non-target plants from roots that are grafted or in close proximity to treated area. For the types of application proposed at JDSF (cut surface or directed foliar), special status plants can be buffered to prevent any potential effect.

For imazapyr, no significant new information was provided that would alter the consideration of this herbicide in the DEIR.

Response to Comment 118
The effects noted on kidney and liver weight and function are studies designed to determine chronic toxicity of triclopyr (EPA RED, 1998). The RED makes no statements regarding "fetotoxicity" but did discuss reproductive effects. The DEIR notes that triclopyr is slightly fetotoxic, based on a discussion in SERA (2003b) and the MSDS.

Response to Comment 119
TCP is a breakdown product of both triclopyr and an insecticide, Chlorpyrifos. Based primarily on Chlorpyrifos, the EPA reviewed research and has lowered the chronic reference doses (RfDs) for TCP. The EPA has incorporated the new information where appropriate. Many papers by the principle authors cited in the comment letter were reviewed and included as references by the EPA (2000).

Response to Comment 120
SERA (2003b) reviewed Spencer et al.'s (2000) work and noted a problem in the methodology for calculating the urine excretion values that could have under or overestimated the amount excreted. SERA notes that Spencer's higher values make very little difference to the assessment of risk.

Response to Comment 121
The EPA RED is the evaluation of the data available for triclopyr in 1998. It documents the potential human health and environmental risks of the current product uses, and establishes decisions and conditions under which these uses and products will be eligible for re-registration. The RED called for additional cautions about use in areas with shallow ground water, addressing concerns about the relative mobility.
There is no reference for the comment letter's citation of "Stark, 1983".

Response to Comment 122
The comment cites Anudo et al. (2002) study and describes it as study in Native American Gathering areas. The actual document states the study's purpose was to "determine dissipation and off-site movement of four forestry herbicide products containing glyphosate, triclopyr, or hexazinone on native plant materials". The amounts detected at 50-100 feet from the treatment areas were small (0.3 to 0.06 ppm) and infrequent (3 of 20 samples) occurring on ceanothus (shrubs). This value is 30 times lower than the mean residue level for ceanothus in application sites. The type of treatment sampled, broadcast application for reforestation of large reforestation sites, is not anticipated at JDSF, reducing the potential for off site movement of triclopyr. The details of the Tahoe National Forest monitoring were not provided. The comment letter may be referring to an incident that has been cited in litigation. This detection occurred as the result of research that created a worst-case scenario: a major rainfall event, and a research plot with compacted soil, and with no erosion slowing surface organic material. In an affidavit, Dr. Robert Powers noted the movement of triclopyr was a result of the movement of the soil itself from the atypical impacted research site (D. Bakke personal communication). Use of triclopyr under the conditions that resulted in the soil movement at the research area is not proposed at JDSF.

Response to Comment 123
SERA (2003b) noted that minimum quantity of an inert is 1% and that Dow Elanco had indicated that no individual inert is present at greater than 6% in Garlon 3A or Garlon 4. The amount of kerosene in Garlon 4 is small and its toxicity is known. This presents no new concerns.

Response to Comment 124
The RED (EPA 1998) includes further analysis that notes:

> ... total of 379 (Ground Water Database) wells were sampled and 5 wells were found to contain triclopyr residues. The major degradate of triclopyr, TCP, is both mobile and persistent. EPA is requiring a label advisory warning

> users that under certain conditions, use of this chemical may result in groundwater contamination.

The EPA RED (ibid) prescribes this information for end product labels:

> This chemical has properties and characteristics associated with chemicals detected in groundwater. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

This demonstrates EPA addressed concerns by requiring label language.

Response to Comment 125
Pryridinol is a component of TCP 3,5,6-trichloro-2-pyridinol which is a metabolite of triclopyr and other pesticides (see response to comment 119, above). The word "pryridinol" alone may be either a function of authors referring to the chemical by a more general name or reference to another compound. There are other pyridinol compounds such as 3,5-Dichloro-2,6-dimethyl-4-pyridinol; an effective anticoccidial agent used in poultry (Medical Dictionary Online 5/06). For the purpose of this response, the Board assumes that references to pryridinol refer to TCP. See above responses to comments 119 on human health and 124 for discussion of the EPA approach to the water issue.

Response to Comment 126
The comment general statement attributed to the USGS about relative concentrations "degradates" (breakdown products or metabolites) was not found in the cited source, USGS Circular 1144 (1998). Some metabolites and breakdown products were sampled for, but not TCP. The context of the quote attributed to the US FWS is unavailable. The RED for triclopyr considered breakdown products as does the SERA (2003b) Risk Assessment prepared for the USDA Forest Service. It is unclear which risk pesticide risk assessments were referenced by US FWS. Regarding the relevance of La Clair et al. (1998), this study involved an insect growth regulator, *S*-methoprene and its breakdown products.

Response to Comment 127
The USGS (1999) study roughly compared retail purchases to stream content. All triclopyr detections were below the "Freshwater aquatic-life criteria" and most were 5,000 times less that the chronic value (0.1 vs. 506 ppm.)

Response to Comment 128
Berrill et al.'s 1994 paper is cited in Appendix 13 of the DEIR. Berrill noted the relative toxicity of the ester and amine formulations of triclopyr. Information is readily available on the MSDS for Garlon 4 and Garlon 3A. "Perkins et al. 2000" was cited in the comment letter, but no reference was provided.

Response to Comment 129
The quote from the nine-year-old RED (EPA 1998) regarding "awaiting further limitations" is of limited relevance. The section in context:

> **A. Manufacturing-Use Products**
> **1. Additional Generic Data Requirements**
> The generic data base supporting the re-registration of triclopyr for the above eligible uses has been reviewed and determined to be substantially complete. The Agency is requiring additional confirmatory data to better characterize the fate and chronic toxicity to fish of triclopyr, specifically its 3,5,6-trichloro-2-pyridinol (TCP) degradate, in the aquatic environment. A fish early life stage study (guideline 72-4) using rainbow trout, coho or chum salmon is required for TCP because aquatic concentrations of TCP may be

> greater than 1% of the LC50 (1.5 ppm) for rainbow trout (the most sensitive species). A one-year duration aerobic metabolism study (guideline 162-4) is also required. Previous aerobic aquatic metabolism studies have not fully characterized the degradation of TCP. The Agency encourages registrants to conduct the new aerobic metabolism study using natural waters and sediment from native habitat for the fish species selected for the early life stage test.

SERA noted that "The TCP study was required by the U.S. EPA/OPP (1998a) but completed after the RED was published." EPA (2004b) more recently revisited the concern regarding listed salmonids. This document did not make reference to the need for additional information.

Response to Comment 130
This comment contents has been discussed in the response to comment numbers 126, 128, and 129, above. It provides no new information.

Response to Comment 131
Regarding Kreutzweister et al. (1995), the results did indicate there was growth reduction at concentations of 0.45mg/L and 0.25mg/L, which are close to the LD50 (0.79-1.76 mg/L) from Kreutzweister (1994). It is not surprising that doses high enough to cause mortality would also affect growth. The 1995 paper also noted that at lower concentrations there were indications that the growth of the youngest trout was reduced. The authors note; "These results were in general agreement with the predictions of laboratory time-toxicity tests."

JDSF is not considering aerial applications. Johansen and Green (1990 in SERA 2003b) result's had LC50's close to those of Kreutzweister and others.

Response to Comment 132
With regards to aquatic invertebrates SERA (2003b) notes:

> The available LC50 values, while not as extensive as those for fish, suggest that most invertebrates are about equally or somewhat less sensitive than fish to the various forms of triclopyr. Some families of invertebrates (Ephemeroptera, Plecoptera, Trichoptera, Odonata) are much more resistant than fish to Garlon 4 (Kreutzweiser et al. 1992).

The information on toxicity to fish is well established and has been the subject of five previous comments.

Response to Comment 133
The toxicity to birds was noted in Appendix 13 of the DEIR as being "slightly toxic to birds". This is based on feeding studies where birds would experience the effect of any TCP that was metabolized from triclopyr. EPA RED (1998) notes "These data indicate that TCP is slightly toxic or practically non-toxic acutely to the bird species tested." The RED included mitigations that reduced the level of concern for birds to acceptable. Given that the JDSF use of triclopyr will be limited and directed to target vegetation, the risks to birds will be lower than those evaluated for broadcast and agricultural applications in other risk assessments (for example, EPA 1998, SERA 2003b).

Response to Comment 134
Triclopyr could affect gorse spider mites, the subject of the Searle and others paper from 1990, in two ways. It could directly affect the insect or, if the herbicide was successful in killing the target gorse, the spider mites might die from lack of food. Fortunately gorse has not become a major problem at JDSF as the result of the ongoing IWM program.

The fact that any changes in vegetation, including herbicide application can have varying effects on other organisms is not unexpected. Boggs et al. (1991) states; “Our results indicate that man-induced habitat modifications can alter host parasite relationships in the community.”

The Prezio et al.(1999) study looked at gastropods in habitat that had been changed by brush cutting and herbicide use. Details available from the research project website http://www.pfc.forestry.ca/ecology/ferns/fsnow/index_e.html provide more context than available from the abstract. The brush cut areas had declines in only deciduous trees with all other vegetation increased in the years following treatment. In contrast the herbicide treatments reduced deciduous trees, shrubs and in one case, ferns. The treatments changed the microsites as well. The authors suggest the decline in gastropods in herbicide treated areas was due to changed microclimate and decreased litter decomposition. Litter decomposition changes would be presumably is a result of changes in inputs (vegetation) and microclimate. This factor suggests the possibility the results were a consequence of habitat manipulation not the herbicide use itself.

SERA (2003b) includes this in the discussion of terrestrial microorganisms based on Chakravarty & Sidhu and others work:

> ***4.4.2.3. Microorganisms–*** The potential for substantial effects on soil microorganisms appears to be low. As summarized in Section 4.3.2.4, experimental studies conducted in artificial growth media suggest a very high degree of variability in the response of soil bacteria and fungi totriclopyr with NOAELs of up to 1000 ppm in some species and growth inhibition at concentrations as low as 0.1 ppm in other species. As summarized in Table 4-4, an application rate of 1 lb/acre is estimated to result in longer term soil concentrations that are well below 0.1 ppm – i.e., in the range of about 0.02 to 0.05 ppm – and peak concentrations in the range of about 0.2 ppm. Thus, if the laboratory studies are used to characterize risk, transient inhibition in the growth of some bacteria or fungi might be expected. This could result in a shift in the population structure of microbial soil communities but substantial impacts on soil – i.e., gross changes in capacity of soil to support vegetation – do not seem plausible. This is consistent with the field experience in the use of triclopyr to manage vegetation.

This conclusion seems valid for JDSF as well. The assumption that herbicide effects on fungi in a laboratory would be equal to that in the field is conservative. JDSF directed applications focused at specific vegetation, would result in less uniform effects than under broadcast application.

The comment provides no significant new information regarding triclopyr.

Response to Comment 135

The comment letter states that the Board has failed to include measures that eliminate significant impacts from proposed herbicide use. No significant impacts were identified regarding the use of herbicides for Alternatives C1-C2 (DEIR VII.8-10 though 22) and for Alternative G (RDEIR III-105 to110) for the limited herbicide use proposed. Alternative G virtually eliminates one management use (treatment of native species for road maintenance) and imposes grater restrictions on two other uses (RDEIR III-105). The environmental analysis has identified measures that reduce the risk to human and environmental health.

The specific and limited list of herbicides available for use narrows the potential for negative effects. The list of herbicides and basic characteristics are included in DEIR Appendix 13. The reliance on Integrated Weed Management and limiting situations where herbicides are considered for use reduces the potential for any negative effects. The RDEIR, Alternative G eliminates one category of herbicide use (RDEIR p. II-10). This alternative also imposes further restrictions on the use of herbicides for both hardwood control and invasive weeds (RDEIR p. II-10 &11).

The Administrative Draft Final Forest Management Plan, Chapter 3, includes the following direction for herbicide use:

> CAL FIRE and the BOF recognize there is public controversy regarding herbicide use. A total ban on herbicide use would compromise research opportunities and the broad demonstration value of the Forest and could result in adverse environmental and economic consequences. JDSF staff will adopt the following limitations to potential herbicide use:
>
> - No herbicide will be used unless it is integral to long-term, ecological based management. Projects will be proactive rather than reactive. These considerations will limit and focus any herbicide use. Long-term management will often integrate a variety of treatment techniques.
> - Public and environmental safety is a priority. When herbicide use is indicated, JDSF staff will reduce risk by selecting appropriate herbicide formulations and application techniques.
> - Recognize that some forest visitors may experience negative aesthetic reaction to dead treated plants, even if they are invasive weeds. Herbicide use will be evaluated for aesthetics where treatments could have this potential effect.
>
> This plan limits the types of vegetation management that would be considered for herbicide use. Herbicides will not be used for roadside vegetation clearance to treat native vegetation, unless there are significant over-riding management concerns specific to the area, such as fire prevention. Additional guidance for potential consideration of herbicides use for restoration of historic conifer/hardwood ratios or for reforestation has been discussed in this chapter under Timber Sales.

The FEIR and RDEIR have clearly identified measures, which are incorporated into the Administrative Draft Final Forest Management Plan, that will programmatically reduce the potential for adverse effects of herbicide use. Avoidance and mitigation measures are developed on a site-specific basis. The regulatory process for individual use of herbicides is described in DEIR p. VII.8-13 to 18. Individual herbicide applications are based on label restrictions and Pest Control Recommendations that are CEQA equivalents. Generic buffer distances were not included in programmatic analysis as an adequate buffer for one situation may be unsatisfactory for others.

Response to Comment 136

The project-specific planning process, including compliance with labels, pesticide regulations, and pest control recommendations, will provide adequate water quality protection. The Board has not conducted extensive evaluations because the anticipated use is low, as are the risks. The discussion in the DEIR and in the responses to several comments, above, support the finding of low risk.

The comment speculates concerning indirect movement via soil particles that have adsorbed herbicides. This scenario is unlikely to deliver significant amounts of herbicide to water because the bulk of the herbicide will be deposited on the plant. Minimizing sediment delivery to watercourses is an important goal for water quality and protection of salmonids and is emphasized throughout the DEIR and the Administrative Draft Final Forest Management Plan. Project-specific mitigation will be developed when a risk of herbicide movement to watercourses is anticipated.

The concern stated that the herbicides referenced in the DEIR have been found in water that they were not intended to be in. While records of movement into water can be found for various historic uses, relevant ground based monitoring of forestry applications has not found significant migration of herbicide residues to surface waters. Limited monitoring of watercourses by the North Coast

Regional Water Quality Control Board following forestry herbicide applications did not find detectible levels of residues when application was ground based (http://www.cdpr.ca.gov/docs/empm/pubs/tribal/min06-98.htm). No aerial application is anticipated (DEIR appendix 13). Green Diamond (owner of approximately 400,000 acres in Del Norte, Humboldt and Mendocino Counties) has reported in recent Timber Harvesting Plans (quote from Timber Harvesting Plan 1-06-230 HUM, page 143) "… 28 years of monitoring data from aerial applications with BMP implementation clearly demonstrate that forestry applications of herbicides have little, if any immediate or incremental impact on water quality or aquatic habitat. Additionally, six years of voluntary monitoring of ground based herbicide application with BMP implementation have shown similar results."

There is no basis to expect that the limited use of herbicides will result in any degradation of the water quality in the project area. Each potential treatment will consider environmental and public safety, and be required to mitigate potential impacts.

Response to Comment 137
The relative risk to fish and amphibians from some herbicide formulations is well understood and has been addressed in the DEIR and within this response to comments. Significant impacts to both listed and non-listed species can be avoided by simple measures, including use of the appropriate herbicide formulation, specification of an appropriate buffer, and use of safe and appropriate application techniques to prevent movement of the herbicide into watercourses. The site specific analysis is required to address any threats to these species. Significant impacts to amphibians or fish are not expected to occur. See response 136, monitoring of watercourses for herbicide residues resulting from forestry ground applications, has shown no reason for concern.

Response to Comment 138
A single state listed rare plant species has been found on JDSF. The Humboldt Milk vetch *(Astragalus agnicidus*) was discovered in abundance within an area that had been recently harvested. Two other species (*Fritillaria Roderickii* and *Pleuropogon hooverianus*) are considered likely to occur on the Forest, but have not been found to date (refer to Tables VII.6.2.1 and VII.6.2.2 in the DEIR; asterisks in the tables designate plants that have been documented on JDSF to date). Known occurrences are mapped and protected. The risk to rare plants that could exist on JDSF but have not yet been located will be minimized by the survey requirements detailed in the RDEIR. On a project-specific basis, both planning and operational measures can be used to protect special status plants.

The Administrative Draft Final Forest Management Plan is not a Timber Harvesting Plan subject to the Forest Practice Rules (FPRs). The Administrative Draft Final Forest Management Plan's potential environmental impacts have been addressed in the DEIR, RDEIR, and FEIR per standard CEQA requirements, not per certified regulatory program requirements. However, timber operations conducted pursuant to the management plan are subject to the FPRs. Please see the DEIR at page II-9 through -16 for a discussion of the role of the Forest Practice Rules relative to the Management Plan for JDSF.

Response to Comment 139
CAL FIRE employees have applied most of the herbicide utilized within the past 3 to 6 years. Exposure has been minimized by proper training, use of appropriate equipment, and proper application technique for targeted vegetation. The citation of "CA DPR 1998" in the comment is not appropriately referenced, and the Board is unable to evaluate the value of this study. Given the limited and appropriate use of herbicides on JDSF, with application by trained persons with appropriate application and personal protection equipment, significant impacts to applicators are not expected to occur.

Response to Comment 140
The comment is a repeated reference to the triclopyr study addressed in response to comment 120.

Response to Comment 141
None of the herbicides that are considered for use at JDSF have label requirements for protective clothing beyond those listed for worker protection standards (example: respirator or water proof clothing). Excessive barrier clothing can increase applicator fatigue as well as reduce mobility and safety. Applicators will be protected from exposure during routine applications by worker protection standards. If a specific project would place applicators at an unanticipated risk for higher exposure, the application techniques can be modified or other mitigations used on a project-specific basis.

Response to Comment 142
CAL FIRE shall comply with label requirements for specific types of gloves if and when Garlon 4 is used.

Response to Comment 143
The Administrative Draft Final Forest Management Plan and EIR do not include a proposal to use organophosphate insecticides, 2-4D, fungicides, or growth retardants. Applicators at JDSF will comply with standards for glove cleaning.

Response to Comment 144
All applications of herbicides would be well within the regulated legal structure for use in California and additional site specific analysis. The California EPA evaluates and regulates worker protection standards as does the Federal EPA. Given the small quantity of herbicide use anticipated, the limited applicator exposure, diligent compliance with worker protection measures, and the ability to implement project specific protection measures, no formal risk assessment is necessary. The comment has not identified any unique worker risk inherent in JDSF applications. Applicator risk will likely be further reduced as a result of the limited use of herbicides specified in the Administrative Draft Final Forest Management Plan (Chapter 3).

Response to Comment 145
Chemical sensitivity can be broken into two groups. Risk assessment methodology recognizes that some individuals may be more sensitive to chemicals than others (for example; infants, toddlers, and the elderly). The methodology also recognizes the variation in reaction to chemicals among individuals, which is formalized in EPA risk assessments as an uncertainty factor (Whitford et al.1999). Herbicides registered with EPA must undergo a risk assessment that evaluates this type of sensitive individual.

The paper by Kretzer et al. (1999) examines multiple chemical sensitivity or MCS. This could be considered a second type of sensitivity. He notes:

> There is great controversy over the notion of a disorder in which the victim develops wide-ranging symptoms to many unrelated chemicals at conventionally subtoxic exposure levels, but through toxicologic mechanisms....

And

> Despite the fact that there is little substantive research supporting a toxicologic explanation for this condition, and that medical researchers disagree vigorously about its nature and etiology, MCS is rapidly becoming an established diagnosis on the basis of public belief and political fiat.

Definitive science on this subject does not exist. The concern is speculative in nature. Chemical exposure can be effectively minimized by using a range of site specific measures, including notification and posting, temporary closure, selecting techniques that will reduce exposure to treated foliage, and minimization of the number of compounds by utilizing adjuvant and dyes only when needed. The choice of specific measures would be dependent on the location of the treatment site relative to forest visitor use and environmental site factors.

Treatments will be of limited areas and short time frames reducing risk of exposure. See response 72 for a summary of measures that will limit use, reducing any risk of exposure.

Response to Comments 146 to 158
The Board has examined the product-specific comments for relevant new information that would affect the analysis of herbicide use. Although there are interesting new research techniques, the relative risk of using the specific products remain unchanged.

The comments include statements about pregnant women, fetuses and infants. As noted above, the standard risk assessment recognizes that these groups may be more sensitive and addresses that fact in regulatory process. A response to concerns relative to generic toxins, unnamed pesticides, or herbicides not considered for use at JDSF is beyond the scope of the analysis necessary. The responsibilities of CAL FIRE and other agencies for evaluation of information on herbicides have been noted previously. Comments 147 to 158 are either: non specific in nature, involve pesticides or herbicides that are not proposed for use at JDSF, or are repeated citations of information already presented in the comment letter (for example, see response 87 for a detailed discussion of the Richard, 2005 document).

Potential use of herbicides on JDSF use is limited and cautious. The DEIR VII.8-16 notes:

> Cumulative impacts are unlikely because herbicide uses related to different control projects are separated in time and distance so that their individual effects do not reinforce or interact with each other. Herbicide use under the FMP is neither widespread nor frequent. Herbicide may be used to reduce weed competition with small seedlings, to release the young trees from competition with brush, or to eliminate exotic weeds. Forestry herbicide uses are substantially less, in both frequency and amount, than in agricultural or urban settings.

Response to Comment 159
IWM will focus decisions regarding invasive plant control upon consideration of the ecological response of the proposed treatment. The ecological nature of the JDSF IWM Program and other management approaches under the Administrative Draft Final Forest Management Plan also were addressed above in the responses to comments 9-11, 23, and 34. Further, please see responses below.

Response to Comment 160
The comment postulated an effect has little relevance to the planned action at JDSF. Early geminating invasive weeds like cheat grass, are not a major invasive weed problem within the State Forest. Many vegetation control techniques beside herbicides would logically generate dead organic matter, for example, mowing, cutting, hand pulling, grubbing. Nutrient cycling is more complex in the redwood forest than the grasslands that cheat grass degrade. Dead invasive weeds would be a minor small part of the annual carbon cycling in the redwood forest. In actuality, areas with organic ground cover seem to be at lower risk for the establishment of the most invasive grass species (jubata grass) at JDSF. The comment provides no basis for a significant indirect effect.

Response to Comment 161
Wooten and Renwyck (2001) reviewed USDA Forest Service invasive weed projects in Northwest Washington in the report titled “Risky Business: Invasive species management on National Forests”. . No specific references to “exponential increases” were found searching this document. The comment’s premise that the use of herbicides in areas where non-native weed plants exist frequently results in expansion of non-native species, is a narrow view. At JDSF, a suite of native and non-native plants will expand depending on the treatments, site conditions and competition

with other plants. The species- and site-specific approach proposed at JDSF would avoid broadcast or extensive treatments such as mowing when treatments would result in undesirable species shift. The DEIR and Administrative Draft Final Forest Management Plan recognize the ecological basis of invasive plant control as an important element of IWM at JDSF.

Response to Comment 162
The reference is utilized out of context in the comment. A review of McDonald and Everest (1996) indicates that the focus was upon improving growth of ponderosa pine seedlings growing with the rhizomatous drought tolerant shrub bear-clover (*Chamaebatia foliolosa*). Cheatgrass is a Siberian exotic that actively grows on the site before native bear-clover and ponderosa pine have initiated new spring growth. The application, timed to control bear-clover, occurred when cheatgrass had competed its life cycle. If controlling cheatgrass was an objective, the timing of applications could be modified to target cheatgrass. Cheatgrass is not a significant invasive plant problem in the Forest. Project objectives and ecological responses of plants are more relevant to the shift in species than herbicide use per se.

Response to Comment 163
Harper and Whitehead (1994) reports results of treatment designed to set back competing vegetation in order to allow conifer seedlings to become established. The results, as quoted in the comment, note that “invaders” became established. The “five main species” are, in fact, native to North America. The use of the term “invader” in this context appears to refer to a species that becomes established following disturbance (i.e., early seral). The comment assumes erroneously that “invading” plant species are invasive exotic weeds. Herbicides and other vegetation management methods such as those reported are utilized to modify species composition. The proposed IWM approach recognizes this fact, and will utilize a target species focus to insure that native species diversity is maintained.

Response to Comment 164
Sirmard et. al. (1998) provides information on grazing effects following clearcutting, as well as conifer response. Widespread changes in vegetation can have the potential to affect wildlife. At JDSF, the treatment activities will be focused on target species, and treatment areas will be limited. Many of the invasive weeds at JDSF have low palatability to wildlife. The fact that Sirmard’s results varied with vegetation type supports the concept that site-specific evaluations are preferable to generalized programmatic direction. The DEIR and Administrative Draft Final Forest Management Plan provide for such site-specific evaluations.

Response to Comment 165
In responding to a number of previous comments, the Board has explained that a sound ecological basis is critical to effective invasive weed management. The proposed IWM approach is ecologically based and minimizes the effects of vegetation control measures. The DEIR and DFMP also emphasize adaptive management. This approach will allow JDSF staff to monitor and learn, thus improving outcomes.

Each of the six comments regarding “Herbicides as a disturbance factor for invasive weeds” was reviewed for relevance. Reviewed in context of JDSF commitment to proactive ecologically based IWM, there is no support for the comment premise of a “potential significant impact”

Response to Comment 166
The DEIR (see sections VII.6.2, VII.8, VIII.5, VIII.7.3, and Appendix 13) and RDEIR (section III.6.3, III.8, IV.4, and IV.6) specifically address the potential for cumulative effects from herbicide use and invasive species, and found that a significant impact would not occur.

The comment includes several statements that postulate a cumulative effect. Though JDSF has a history of forest management, herbicide use has been light in the last decade.

For adverse cumulative herbicide effects to occur, the effects of prior uses would have to have persisted and combined with present and future potential effects. Herbicides commonly used in forest management applications typically degrade fairly quickly as noted in the information provided in DEIR Appendix 13. In living organisms these products, do not tend to bioaccumulate (build up and concentrate over time). They are used in relatively small quantities, though county-wide forestry use can be measured in the thousands of pounds, it's a small fraction of the tons of soil and living organisms present. Forestry-related herbicide use does not typically occur in one place year after year. There is no basis to assume there has been any significant accumulation of herbicides in the effected environment.

The comment letter provides no reference for the statement that both the Noyo and Big River Watersheds are impacted by pesticides (no pesticide related CA Water Board TMDL listing for these watersheds exists). Using the figures from the comment letter, approximately 1,350 lbs of pesticides have been applied in the two watersheds in contrast to approximately 1.2 million pounds for Mendocino County. The Noyo and Big River watersheds comprise 7.6 % of the acreage in Mendocino County and they account for 0.1% of the pesticide usage by this measure. Given the analysis in the DEIR and RDEIR, as well as the Administrative Draft Final Forest Management Plan's limitations on herbicide use described in this and other responses, the Board finds that there will be no cumulative effects to human health, aquatic species, wildlife, and native plants.

Response to Comment 167

The table that follows lists forestry use relative to county-wide pesticide use for the last three years available. It shows that forestry use has declined from the 2002 use (18,706 lbs and 15,561 acres DEIR VII.8-9) and typically accounts for approximately ½ of one percent of total pesticide use in the County by weight, despite the extensive forestlands. County-wide pesticide use has declined in these last three years as well when measured by weight. Forestry related herbicide treatments were implemented on approximately 1/3 of one percent of the county land base.
A more local area, bracketing JDSF lands on the north and south, comprised of approximately 266,600 acres was identified using township and range. The area was not extended to the east as this is a different watershed with different land uses; to the west is the ocean. For these lands surrounding JDSF, past forestry and timberland herbicide usage use varied annually from 74% to 35 % of total pounds used within this smaller area. The annual variation in use ties to the fact that the major forestry use in this area, reforestation, typically occurs only once or twice a rotation (~45-80 years) on a given area. Note that for the most recent data, 2005, with 40% of the use for forestry, these applications took place on less than one percent of the land area queried surrounding JDSF. With treatments dispersed across the landscape, any potential effects are dispersed as well. The pesticide use data indicate that there is little potential for a resultant cumulative impact, given the relatively low level of usage and the lack of mechanisms for accumulation over space and time.

See also the response to comment 137 in DEIR comment letter P-177 from Richard Grassetti.

Pesticide Use Patterns in Mendocino County Relative to Forestry Use						
Analysis Area	**Year**	**Pounds of All Pesticides Applied**	**Pounds of Pesticides Applied for Forestry & Timberland Applications**	**Fraction of Total Pesticide use for Forestry & Timberland Applications**	**Acres of Forest & Timberland Treated***	**Acres of Forest & Timberland Treated as fraction of Total Acres Examined**
Mendocino County	2003	1,475,689	10,032	0.68%	9,277	0.37%
	2004	1,162,903	5,189	0.45%	6,255	0.25%
(2,482,050 acres)	2005	1,213,174	6,287	0.52%	9,382	0.38%
JDSF and Neighboring Areas	2003	5,389	3,976	73.79%	2,673	1.00%
	2004	3,659	1,298	35.48%	1,414	0.53%
(266,600 acres)	2005	4,256	1,724	40.49%	2,244	0.84%
* Reports may count acreage more than once if more than one pesticide has been applied. For the county-wide numbers not enough information was available to remove duplicate acres. For the JDSF and neighboring areas, the acres that were obviously duplicated for a given location were removed.						
Source: DPR website and DPR staff, October 2007.						

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E-36

From: Pete Stanton [unca_pete@juno.com]
Posted At: Saturday, February 11, 2006 8:54 PM
Conversation: Comments on Jackson State Demonstration Forest Management Plan

Subject: Comments on Jackson State Demonstration Forest Management Plan

Feb 11, 2006

California State Forestry Board California State Forestry Board P.O. Box 944246
Sacramento, CA 94244

Dear California State Forestry Board ,

Take the logging industry bribery money you get, and re-invest it in killing children in Iran (with them new fancy baby nukes). Just tell the loggers you lost it.

Sincerely,

Pete Stanton
4 Achange Rd.
grover beach, CA 94115

1

Email Letter E-36

Response to Comment 1
Comment noted.

E-37

From: djconnel@ieee.org
Posted At: Wednesday, February 01, 2006 8:11 PM
Conversation: Jackson State Forest

Subject: Jackson State Forest

Members Board of Forestry
PO Box 944246
Sacramento, CA 94244-2460

Dear Members Board of Forestry,

I strongly oppose the proposed management plan for Jackson State Forest. I support immediate, serious preservation efforts for this valuable natural resource. Please do not allow the logging industry to exert its influence here.

Sincerely,

Daniel Connelly
omitted
San Francisco, California 94107
cc:
Mendocino County Board of Supervisors
Governor Arnold Schwarzenegger

1

Email Letter E-37

Response to Comment 1
Opposition to the DFMP noted. Support for a preservation oriented management plan noted. The logging industry has the same opportunity for public comment that is provided to all. The management plan adopted for JDSF will not be based on logging industry influence. The management direction of JDSF derives directly from legislative statutes, regulations, and policies set by the State Board of Forestry and Fire Protection. A discussion of the legislative mandate for the state forest system can be found in section II of the DEIR. See General Response 2 and 17.

Kraemer, Candace E-38

From: nnordicn@comcast.net
Posted At: Thursday, February 09, 2006 6:00 PM
Conversation: Jackson Forest
Subject: Jackson Forest

1 Please do not go back to the old days. We need to think of future generations and what we are leaving
2 them. Please extend the public comment period in that I have been unable to read all of the 1,500 pages.

Norbert Rypp
P.O. Box 295
Kirkwood, CA 95646

Email Letter E-38

Response to Comment 1
The ADFFMP represents significant advancement in the management practices aimed at protection and restoration of environmental resources. One of the primary goals of the JDSF Management Plan is to achieve net improvements of conditions for all natural resources over time in comparison to existing conditions**.** See also General Response 15.

Response to Comment 2
See General Response 5.

E-39

From: brinecekristy@yahoo.com
Posted At: Tuesday, February 28, 2006 11:08 PM
Conversation: Jackson State Forest

Subject: Jackson State Forest

Members Board of Forestry
PO Box 944246
Sacramento, CA 94244-2460

Dear Members Board of Forestry,

1 I personally disagreed with the proposal management plan for Jackson State Forest because of their plans such as clear cutting, large-scale commercial logging, herbicide uses and cutting off the oldest second-growth stands. In addition, it will affect the Jackson State Forest wildlife, species habitat, and the recreation of hiking, horseback riding, bike riding and camping.

2 Jackson State Redwood Forest is view by the California Department of Forestry as a lumber and source of revenue; on the other hand, Jackson State Redwood Forest is viewed by people like us, ones whom are writing in support to prevent massive logging of the state forest?s recreational and ecological treasures. Therefore, I am writing this letter supporting the restoration of Jackson State Redwood Forest.

Sincerely,

Tiffany Vue
180 Sconce Way
Sacramento, California 95838
cc:
Senator Deborah Ortiz
Mendocino County Board of Supervisors
Governor Arnold Schwarzenegger
Assembly Member Dave Jones

1

Email Letter E-39

Response to Comment 1
Please see Response to Form Letter 2.
See also General Response 7, 9, 10, 11, 12, 14 and 15.

Response to Comment 2
Support for a more restoration oriented management plan noted. The Board supports a balanced, multiple use concept that provides high levels of resource protection and sustained production of high quality timber products. The ADFFMP has placed greater emphasis on protection and restoration, with the goal of improving all resource values over time in comparison to existing conditions. The timber harvest level under the ADFFMP is based on providing a varied landscape with a set of forest structures designed to support a viable research and demonstration program rather than a goal of a particular level of timber production. This analysis has resulted in a planned average annual harvest level of approximately 20 to 25 million board feet which is well below current growth. CAL FIRE has consistently harvested well below the growth of the forest, resulting in an ever increasing inventory of larger, older trees.

E-40

From: WBReid@Compuserve.com
Posted At: Tuesday, February 28, 2006 8:12 PM
Conversation: Jackson State Forest

Subject: Jackson State Forest

Members Board of Forestry
PO Box 944246
Sacramento, CA 94244-2460

Dear Members Board of Forestry,

I have been spending a portion of my summer in and around Jackson State Forest for 25 years. Since moving to Seattle in 1997, my wife and I have made an annual trip to California, with the primary reason being our two-week visit to Jackson State Forest and the surrounding area. Generally we are in California spending our money for a month each year, and we encourage several other people to make similar trips.

1,2,3 I find it distressing and appalling that the proposed management plan for the Forest allows for clear cutting, cutting older trees, and big logging operations. It seems to me that one of our precious few natural forests is being threatened by heavily monied forces, and I oppose strongly the management plan as it stands. Once places like Jackson State
4,5,6 Forest are cut down (not to mention damaged by herbicide use and insufficient protection for the streams) they are gone for all generations to come.

7,8,9,10 I personaly want Jackson State restored to an old growth redwood forest for habitat, recreation, education and research.

Please take action to save this wonderful place for all our children.

Sincerely,

W. Bruce Reid
3030 S. Bradford St.
Seattle, Washington 98108

1

Email Letter E-40

Please see Response to Form Letter 2.

Response to Comment 1
See General Response 2 and 10.

Response to Comment 2
See General Response 9.

Response to Comment 3
While no definition of "big logging operations" is provided in the comment, it can be assumed that the comment relates to the overall quantity of harvesting. While the comment does not go directly to the contents of the EIR, or the analysis therein, the following response is provided.

The legislative mandate for the forest is to demonstrate sustainable and economic forest management. The economic component of this mandate requires the use of commercial logging operations. The timber harvest level under the ADFFMP is based on providing a varied landscape with a set of forest structures designed to support a viable research and demonstration program rather than a goal of a particular level of timber production. This analysis has resulted in a planned average annual harvest level of approximately 20 to 25 million board feet which is well below current growth. In addition, the commitment to monitoring and adaptive management will ensure not only that harvest does not exceed growth, but that other timber related resource conditions are on the correct trajectory to meet the stated management goals. Potential impacts to other resource values have been mitigated to "less than significant". See also General Response 16.

Response to Comment 4
See General Response 2. The main portion of JDSF was purchased by the State over a period of years from 1947 to 1951 from a private seller. At that time, most of the lands were in a cut-over condition, with relatively low stocking. CAL FIRE has consistently harvested well below the growth of the forest, resulting in an ever increasing inventory of larger, older trees. The forest that you see today is the result of 50 years of forest management that included timber harvesting. The ADFFMP has placed greater emphasis on protection and restoration, with the goal of improving all resource values over time in comparison to existing conditions. See also General Response 15.

Response to Comment 5
See General Response 7.

Response to Comment 6
See General Response 11.

Response to Comment 7
See General Response 8 and 9.

Response to Comment 8
See General Response 11 and 12.

Response to Comment 9
See General Response 14.

Response to Comment 10
See General Response 2.